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Editorial.....

It is heartening to note that our journal is able to sustain the enthusiasm and covering various facets of knowledge. It is our hope that IJMER would continue to live up to its fullest expectations savoring the thoughts of the intellectuals associated with its functioning .Our progress is steady and we are in a position now to receive evaluate and publish as many articles as we can. The response from the academicians and scholars is excellent and we are proud to acknowledge this stimulating aspect.

The writers with their rich research experience in the academic fields are contributing excellently and making IJMER march to progress as envisaged. The interdisciplinary topics bring in a spirit of immense participation enabling us to understand the relations in the growing competitive world. Our endeavour will be to keep IJMER as a perfect tool in making all its participants to work to unity with their thoughts and action.

The Editor thanks one and all for their input towards the growth of the **Knowledge Based Society**. All of us together are making continues efforts to make our predictions true in making IJMER, a Journal of Repute

Dr.K.Victor Babu
Editor-in-Chief

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DEPICTION OF NATURE IN BILL BRYSON'S A WALK IN WOODS: REDISCOVERING AMERICA ON THE APPALACHIAN TRAIL

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Travel writing is an old canon of literature, dealing with nature writing, adventure writing, exploration writing, guide books etc. Understanding how people's relationships with nature form, how they influence personal values and attitudes, and what behavioral implications they may have could provide more insight into how connectedness to nature can effectively contribute to travel writings. This paper focuses on the portrayal of nature and environment in "A Walk in the Woods" by Bill Bryson. This slightly, lightly charming comic adventurous book is most obviously appealing for exploration of nature, man and the natural world, visions of the Appalachian Trail, Isolation and Friendship etc. The Appalachian Trail stretches from Georgia to Maine and covers some of the most breath-taking terrain in America-majestic mountains, silent forests, sparking lakes, and Bill Bryson introduces us to the history and ecology of the Trail and to some of the other hardy folks he meets along the way-and-a couple of bears.

Keywords: Nature, Appalachian Trail, Walk, Exploration, Travel.

It snakes through some of the wildest and most spectacular landscapes in North America, as well as through some of its most poverty-stricken and primitive backwoods areas. With his offbeat sensibility, his eye for the absurd, and his laugh-out-loud, sense of humour, Bryson recounts his confrontations with nature at its most uncompromising over his five-month journey. This paper is expected to enhance the vision of the readers across other cultural boundaries and to get a clearer insight into the nature of the travel literature. Relation between nature and travel is very old. Humans have always felt nature closer to their soul by travelling to the paths of nature.

Travel experiences enhances emotional connections to nature and encourages a desire to foster similar nature connections among others. In this paper the focus is on the depiction of nature in the travelogue "A Walk in the Woods: Rediscovering America on the Appalachian Trail" by Bill Bryson. It is a travel memoir that documents Bill Bryson's trek along the Appalachian Trail. The comical, yet heartfelt memoir is made all the more surreal by the fact that Bryson had no actual experience in hiking. Moreover, he did not know anything about the potential difficulty in hiking several of the more difficult trails on the circuit. Though this might have—and has—spelled disaster for others, Bryson's narrative explores the themes of endurance and, almost ironically, the place of commonsense in navigating the journey of one's own life. Bryson begins his journey in his hometown of Hanover, New Hampshire by going to a sporting goods store and buying a plethora of hiking gear. Though he has no real idea what much of the gear is for, Bryson plans to actually hike the entirety of the Appalachian Trail, which is 2,200 miles. He will begin at Springer Mountain, located in Georgia, and then end at



Mt. Katahdin in Maine. Accompanying him for most of the journey is Bryson's friend, Stephen Katz, who is just as unprepared as Bryson is, highlighted by his arrival with a duffel bag full of Snickers and his being out of shape.

The two begin at Amicalola Falls, which is about seven miles from Springer Mountain. Though they are in good spirits, the two friends soon realize that they are perhaps in over their heads. For starters, they begin the trek on a cold day in March. Also, they are undeniably out of shape yet carrying forty-pound packs on their backs. Though things seem disparaging at first, they eventually find a groove in the previously perilous hike and continue on. Bryson comments on how they are able to meet various types of hikers along the trail, including Boy Scouts, seniors and students. One fellow hiker, Mary Ellen, who is described as less-than-bright, actually stays with the duo along the course of a few days.

A snow front almost strands them early on, leaving them in the boring comfort of motel rooms and bunkhouses. After a few days, however, they are able to reach the Smokey Mountains, which actually turns out to be more difficult than their earlier hike through Georgia. After a strenuous hike, they eventually make it to Clingman's Dome, a noted landmark which is the highest point on the Appalachian Trail. While on vacation in Tennessee to celebrate their accomplishment, the pair decide to skip the rest of the Smokey Mountains. Instead, they drive to Roanoke, Virginia, which is a flatter trail.

The pair begin their hike again on the easier trail, and are relatively without incident until Katz begins a relationship with a married woman and is subsequently forced to hide from her angry husband. After a few trials and errors, including dodgy rest quarters, the pair end the first leg of their journey in Front Royal, Virginia. The men part at this point in the narrative, but make plans to meet up for the summer, where they will then hike the Hundred Mile Wilderness in Maine.

Bryson continues hiking alone, though finds the hiking in Pennsylvania too rocky and uncomfortable. When he finally makes it to New England, he finds himself enjoying the hike more and heads first to Massachusetts' Berkshire Mountains, and then to Vermont's Stratton Mountain, the so-called spiritual birthplace of the Appalachian Trail as it is where the trail's creation was conceived. In addition to these two landmark mountains, Bryson also hikes Mt. Lafayette with a fellow hiker, as well as Mt. Washington, which is one of the Appalachian Trail's largest tourist attractions (in New England).

As agreed, Bryson and Katz meet up again and begin their Maine hike in August. Like the beginning of their journey, however, they find the hike particularly strenuous, especially after months of easier hikes around New England. Katz has not been hiking at all, so finds the hike especially daunting. Several mishaps, including Katz wandering off the trail and getting lost for almost two days, as well as tough road and dangerous streams, force the pair to come to terms with the fact that they are not ready for this part of the trail. The two hitchhikes out of the woods and find themselves in a Maine guesthouse on their last night in the state. While there, the owner informs them that, when they are indeed ready, the trail will still be there to welcome them back.

Bryson's narrative is both comical and didactic in its approach. Bryson is able to use humour to show just how ill-prepared he and Katz are for their journey. Despite this ill-preparedness, they are still able to enjoy themselves eventually, and they endure



based on hard work and perseverance. There is a theme of learning at play in Bryson's narrative, especially learning as one goes, or on-the-go, which is vital to the overall narrative as a critique on life in general, and to the pair's specific hiking experience found within the story.

At the same time, Bryson highlights the dangers of hiking, especially when ill-prepared. This didactic approach is highlighted in many examples, including Katz getting lost for almost two days near the end of their journey, as well as daunting rivers, lagoons, campsites, people, and animals. Though Bryson's tale has a happy ending, the narrative still addresses the important fact that, ultimately, hikers are dealing with the vagaries of nature, and as such, it is a smart move to know when the road is too dangerous. Actually, this can be a matter of life and death for hikers, especially inexperienced hikers like Bryson and Katz. Indeed, as the guesthouse owner at the end of narrative suggests, one can always return to the trail at a later date. This suggests that one can always return to a journey with more experience, which is far better than being injured or worse due to hubris or sheer ignorance.

In the movie "A Walk in the Woods," Robert Redford plays Bill Bryson, the author of the book by the same name. He and his buddy, Stephen Katz, played magnificently by Nick Nolte, walk the Appalachian Trail. Bryson is an accomplished author and lived 10 years in Great Britain. Katz has a shady background. Both men grew up together from a town near Des Moines, Iowa. When Redford's character is asked where he's from, he goes into a lengthy explanation, saying he lives in New Hampshire but spent a decade in England. Katz, a scruffy, out-of-shape, bear of man, whose blunt talk scrapes up against Bryson's politically correct equivocating, blurts out his answers and then some.

After walking in heat, snow and teetering on the edge of cliffs, Bryson is asked again by the taxi driver taking them home and this time he doesn't hesitate. "I'm from Iowa," he answers. Commonality wins out when you're succumbing to nature. Sure, Iowa is fine. Even though one of them lived in New England and roots for the Boston Red Sox. The other "stays loyal" to the Chicago Cubs. But in the end, we are all people from Earth. That's one takeaway from a movie that I'd recommend. Better is the book, a wonderful read that makes you laugh and cry almost simultaneously as only Bryson can. Either way, the message is the same: Earth, in this case the forest, can bring us together despite our differences. Dare I say, unite us in the common goal of protecting our natural resources. The intellectual, successful, put-together Bryson and his work-in-progress friend Katz end up citizens united. They shared an experience: Being awakened by nature.

In the movie, Redford, an environmentalist, speaks about the loss of trees and the fragility of nature through his character, Bryson. He mentions the demise of the American chestnut. "It was here and then 50 years later. Poof! Gone," he tells Katz. So many of our trees in the West are being infected by boring insects and disease that they are dying. The U.S. Forest Service gave me a count of 12 million dead trees in the national forests of Southern California this year — and counting. The drought, in its fourth year, magnifies the devastating effect. Dry trees, stressed by lack of water, are prone to infection or pests. I wrote a few months ago about the dying redwoods. They are not used to Southern California summers, especially the warmer variety we've had



lately due in part to human-produced global warming. Oaks, too, are looking pale. When we water, we can't forget to properly water the trees. That means, give them water around the drip line of the tree. That can be many feet from the trunk. But the trees in the forest need protection, too. If that isn't on your mind, that will change when you see this movie. Locked in a bubble world of computer games, cell phones and television, we can keep the natural world at arm's length. Our children and our grandchildren, God forbid, are slowly losing touch with what's green, growing and alive. In the movie, Katz asked Bryson why. Why did he decide to hike 2,100 miles (give or take) of the Appalachian Trail when he's past 60 years old? "You know, John Muir once said: 'A man needs to throw a loaf of bread and a pound of tea in an old sack and jump over the back fence,'" Bryson answers. Once you do that, we can say we are all from the same place.

The strange and palpable menace of the woods is enlivened by lurking and stalking peril: surly rattlesnakes, water moccasins, and copperheads; bobcats, coyotes, a tightening circle of hunger-emboldened wolves, wild boar, and onslaughts of merciless pincered fire ants. Oh, and the prospect of sharing a tent for a few confused and lively moments with a sofa-sized bear.

Even if hikers manage to avoid such encounters while picking their way through brambles, while negotiating hardscrabble trails that are no more than 18 inches wide, and while, acrophobically, edging along ledges that drop off to an abyss, there is poison ivy, poison sumac, and poison oak. Even if a hiker manages to avoid cracking his head after slipping on a stream's moss-slickened rocks; even as he avoids being carried away by a river current; even as he escapes bubbling under foaming water, the weight of his pack and his water-logged boots and pants submerging him so he can't surface right-side up into forest air - there are lightning bolts. Spending the night in the wilderness holds the chance that the ultra-wearied hiker's tent might be crushed beneath falling trees, or by rock-falls, or eased off a precipice on ball-bearings of beaded rain and sent paragliding on to distant valley floors, or swept away by the watery wall of a flash flood. No wonder Bill Bryson admits that "even asleep, you are a coiled spring.

It is so good that Bryson hiked great portions of the Appalachian Trail - and described his ordeals unvarnished - so that no one would never (as in never ever) have to experience the discomforts and deprivations.

Through Bryson's writing, the reader can appreciate the history, lore, geology, glaciation, botany, dendrology, biology, zoology, ornithology of the Appalachian Trail, no ordinary footpath - and, take it all in, while strolling along paragraphs of entertaining observations and conversations. Most certainly, there is an allure to the reveries involving places that conjure up - well, allure: the Shenandoah region has been celebrated in no fewer than forty recordings. There are mountain monikers: Blood, Standing Indian, Old Rag, Blue Ridge, Big Butt, the Smokies. There are forests whose names alone beckon: the Chattahoochee, stands out. There are the names of "notches" - Bearpen Gap, Rockfish Gap, Elkwallow Gap, the Delaware Water Gap.

If we were bolder, and a bit more fit, we might be tempted to

- Stroll up Greylock and Moosilauke;
- Check out Kittatinny's wall of quartzite "arrayed in long, wavy bands that lie at such an improbably canted angle - about 45 degrees - as to suggest to even the dullest imagination that something very big, geologically speaking, happened here."



- Thrash our way through Maine's ominous and brooding Hundred Mile Wilderness and its heavy, dark, shadowy woods (inclining more to black than green) to take in its denim-blue lakes, and lonely undulant mountains, as far as the eye can see.
- And then we would take on the intimidating Mount Katahdin, beckoned by its startling muscularity- having negotiated the forbidding terrain of Baxter State Park, which takes a certain hearty pride in its devotion to ruggedness and deprivation.

Happily, Bryson's *A Walk in the Woods* spares us trying to find our way to those scenic wonders, which are not easy gets, by any means. The Appalachian Trail is not a quick turnoff from a well-lit guard-railed four-lane highway, chaperoned by restaurants and lodges.

Traveling south to north, Bryson found much to laud in Shenandoah National Park, where he was taken with a broad, ancient-seeming, deeply fetching glade cradled by steep hills. There he relished everything you could ask for in a woodland setting... tall, stately trees broken at intervals by escalators of dusty sunshine, a winding brook, a floor of plump ferns, cool air languidly adrift in a lovely green stillness. He felt vaguely enchanted.

Bryson provided cautions - a mental foothold - regarding the Pennsylvania portion of the Appalachian Trail, whose terra unfirma is "where boots go to die." Boots must contend with mile upon mile of jagged, oddly angled slabs of stone strewn about in wobbly piles.... requiring constant attentiveness if you are not to twist an ankle or sprawl on your face - not a pleasant experience with fifty pounds of momentum on your back... hikers leave limping and bruised. In another stint, a bit further north, Bryson and his sidekick had to contend with dense and lacerating undergrowth that was punctuated by boulders resembling large animals momentarily at rest. All of which lent the still recesses a certain eeriness. In steamy, oven-like August, they trudged through air that was oppressive and close, as if the trees and foliage were breathing on us with a hot, vegetative breath - which imposed an unsettling sense of isolation.

Bryson and his sidekick found little comfort indoors. There was an awesomely unlovely bunkhouse whose floor was bare concrete and whose walls were made of uninsulated plywood. The place had the aura of a garage. Even indoors, the great out-of-doors had a way of insinuating itself. After a taxing trail, they traipsed wearily into a dark and leaky woodland shelter, whose mud floor had the look and consistency of chocolate pudding. The sleeping platforms were cramped and filthy; there were scraps of wet litter everywhere. This "refuge" also sheltered the scurryings and scamperings of absolutely fearless rodents. The stages of squalor and hunger are made vivid. From a gentle descent into squalor there's a self-conscious grubbiness, followed by disgust, followed by a resignation and disregard that seemed inconceivable only a few days before. Hunger, too, follows a defined pattern and the hiker longs for a route to something, anything, resembling a lunch counter. He'll push himself on the chance that, over the next hill, there's a vending machine. One of his greatest fears: getting lost



enroute to an eatery, on a restaurant day. Aches and blisters are a central feature of any self-respecting Appalachian Trail hiker's existence. Bryson goes on to describe the buckling strain on the shoulders, back, lower lumbar, knees, ankles, muscles and joints. His descriptions had me reaching for a tub of analgesic rub and a carton of Ace bandages. The weight, the cumbersomeness of carrying one's kitchen, wardrobe, and bedroom on one's back has the hiker walk at a tilt, hunched and pressed forward, your eyes on the ground. The vividness of that description had me dialling my chiropractor, to obtain the relieving adjustment that would realign all the skeletal and soft tissue that would be tortured into spasm by simply imagining such loads and tilts. Clearly, ever so clearly, trudging the Appalachian Trail with fifty pounds of momentum on one's back - never quite balanced and absorbing more than its share of gravity - is not a saunter, not an amble.

Along with the exhaustion, there's additional exertion in fending off endless assaults of swarming mosquitoes and a haze of repellent-resistant ravaging blackflies. One may also have to flee from no-see-ums that can drive almost any hiker to distraction, and had Bryson diving into his tent. Shelter is key. On a long stretch, hikers must somehow be prepared for plummeting temperatures as well as soaring temperatures. Bryson writes of being clammy sodden in some stretches and chilled to the bone in others. The forest air is not always bracing - sometimes it's uncomfortably refrigerated. Wind whisks away body heat.

Bryson hiked through the summer of 1996, and yet this eerily unpredictable drop in body core temperature was a factor he noted in physiologic detail. He explained that a hiker is apt to become desperate and irrational in response to this gradual and insidious sort of trauma as his natural responses grow sluggish and disordered. Research informed Bryson that there is scarcely an instance of hypothermic death that isn't, in some measure, mysterious and improbable.

Bryson explained that hypothermia and other disorienting aspects of the dense woods can rob a casual hiker of his senses. The reader is allowed to imagine wandering to a stumbling, confounded death. Most casual hikers, Bryson cautioned, are emotionally and physically underequipped to cope rationally with such circumstances and chance encounters with denizens of the wild. Given those chances, our senses and sense tell us to experience the woods via Bryson's paper product. The reader imagines how good it feels to liberate one's toes from the lace-snugged fortresses that have absorbed miles of shadeless heat, along with the twists of ankles and jolts to the metatarsals. After miles and miles of nature, the reader comprehends the hiker's euphoria coming on a shelter appointed with a nearby privy, a good water source, and a picnic table. At a hostel, even at a flea-infested motel, there's a shower that removes coatings from the grubby, sweat-streaked, comprehensively-bushed hiker, who is rank enough to assault even the nostrils of those with acute sinus congestion. There's the joy of stepping from the dog's breath air of a really hot summer's day into the crisp, clean, surgical chill of an air-conditioned establishment... seated in a window booth, clutching a bucket-sized Coke. There are



flawless days that deliver a crisp, tangy perfection - and the hiker gulps the invigorating minty-clean air of northern mountains. There's the euphoria of descent - though even the heartiest might opt for a helicopter or a parachute rather than having to brakedown his knees. The Katz passages always brought a smile that makes us chuckle (even throw an occasional head-back laugh) at his wry quips, rejoinders, dismissals, and his solutions.

Bryson writes of the relief in discovering that one has not lost his bearings and way; the relief from no longer having to wonder if a helicopter could spot him through the canopy of trees. There's also the sigh of relief that the hiker has not been mugged, mauled, and gnawed pulpy by a bear. Lying in the inky dark, in a little tent, night after night, with nothing but a few microns of trembling nylon between him and the chill night air, he had listened apprehensively to what he thought were grunts and mysterious snufflings, the clatter of upended cookware.... the alarming wobble of the frail tent shell as something oversized brushed against his sanctuary. The mind had raced to recollect what might have been left out to pique the olfactory properties of a hungry bear.

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BEHAVIOR OF MAXWELL SPEED DISTRIBUTION AT DIFFERENT TEMPERATURE

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ABSTRACT

This research work aims at on developing mathematical model for Maxwell-Boltzmann velocity distribution. The dependency of average velocity of an ideal gas on temperature has been studied. Software employed to conduct the simulation. Tabulated values of probability distribution as a function of temperature are obtained and plotted. The simulated result agreed with the theoretical results via literature reviews. Thus, the result shows that the probability peaks at average velocity and decrease on either side making distribution look like Gaussian. Such approach also be applied to other similar concepts like Fermi-Dirac Distribution and Bose Einstein distribution.

Key Words: Probability distribution, Maxwell-Boltzmann Distribution, temperature, Model

1. Introduction

In the context of kinetic molecular theory of gases ; a gas contain large number of a particles in rapid motion. Each particles has different Speed and each collision between particles changes the speed of the particles[1]. Plotting the numbers of molecules whose velocities falls with in a series of narrow ranges provides a slightly asymmetric curve known as Velocity distribution[1,2]. The peaks of this curve would corresponds to the most probable velocity. This velocity distribution known as Maxwell Boltzmann Distribution. It is used to determine how many molecules are moving between V and $V + dV$. Assuming that one dimensional s are independent of one other ,the velocity y and Z direction does not affect the x velocity .

In this work, I will present some of the theoretical models for behavior of Maxwell Speed distribution structure at different temperature models and I will review the simple Maxwell Boltzmann velocity distribution model picture, then discuss more complex descriptions of Molecules of gas.

Hence the Maxwell Boltzmann distribution[3] is shown as equation below:

$$\frac{dN}{N} = \left(\frac{m}{2\pi K_b} \right)^{\frac{1}{2}} \exp \left[\frac{-mv^2}{2K_b T} \right] dv(1)$$

Where $\frac{dN}{N}$ is fractional of molecules moving at velocity V and $V + dV$, m is mass of the molecules, K_b is Boltzmann Constant, T is absolute temperature. Additionally, the function can be written in terms of scalar speed described as



$$f_v = 4\pi v^2 \left(\frac{m}{2\pi k_b T} \right)^{\frac{3}{2}} \exp \left[\frac{-mv^2}{2k_b T} \right] \quad (2)$$

In three dimension where the particles have collective motion with velocity [2,3,10], the microscopic distribution depends on orientation of ω with respect to V ;

$$f(\omega) = \left(\frac{m_e}{2\pi k_b T} \right)^{\frac{3}{2}} \exp \left(\frac{-m_e}{2k_b T} (\omega - v)^2 \right) \quad (3)$$

Where $(\omega - v)^2 \equiv \omega^2 + v^2 - 2\omega \cdot v$ unless normalization condition used here below

$$\int_{-\infty}^{\infty} f(\omega) d^3\omega = 1 \quad (4)$$

As a consequence we often need a models, empirical studies and simulation among the others.

2. Maxwell - Boltzmann Model

Maxwell Boltzmann statics employed to derive Maxwell-Boltzmann distribution of particles Speed in ideal gas [5,6]. It describes the average distribution of non-interacting material particles over various energy states in thermal equilibrium and is applicable when temperature is high enough and or particle density is low enough to the render quantum effect negligible, thus the expected number of particle with energy ϵ_i , so for the statics; the average number of particles in set of states with energy ϵ_i described by equation (5,) by [5,6]

$$\frac{\langle N_i \rangle}{N} = \frac{g_i}{e^{(\epsilon_i - \mu)/KT}} \quad (5)$$

$$= \frac{1}{Z} g_i \exp(-\epsilon_i/KT) \quad (6)$$

Where, ϵ_i is the i -th energy level, $\frac{\langle N_i \rangle}{N}$ is the average number of particles in set of states with energy ϵ_i , g_i is degeneracy of energy level i that is the number of states with energy ϵ_i , which may nevertheless be distinguished from each other by some other means, μ is chemical potential is Boltzmann Constant, T absolute temperature, N total number of particles and $N = \sum_i N_i$, Z is partition function and given by $Z = \sum_i g_i \exp(-\epsilon_i/KT)$, Where the index i now specifies a particular state rather than the sets of all states with energy ϵ_i and $Z = \sum_i \exp(\epsilon_i)/KT$

3. Partition function of gas Model

In order to find out the partition function, I need an expression for the density of states $g(\epsilon)$, as an intermediate step, I will find the density of the states in K -Space, $g(K)$ and then convert into density of states as function of states. The number of points in the region bounded by k and $k + dk$ is:

$$g(k)dk \cong \frac{4\pi K^2 dk}{8} \frac{1}{(\pi/L)^3} \quad (7)$$

The first factor is the volume between spherical shells of radius k and $k + dk$ and the second factor shows as the number of grids points per unit volume of K -Space [8,9]. Figure 1 shows density molecules in k -space, states lies on 3-dimensional rectangular grid points per unit volume of K -Space [7,8,9].

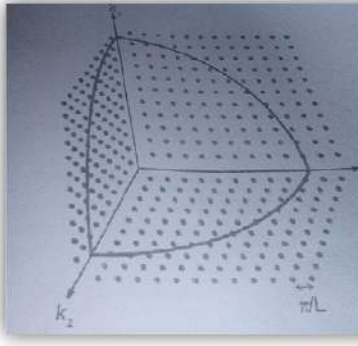


Figure 1: Density Molecules.

Hence $\epsilon = \frac{\hbar^2 k^2}{2m}$ using this term into equation (7) we obtain the following equation ;

$$g(k)dk = \frac{4\pi}{8(\mu/L)^3} \frac{2m\epsilon}{\hbar^2} d\epsilon \quad (8)$$

But from the expression $\epsilon = \frac{\hbar^2 k^2}{2m}$ we derive the equation $k = \sqrt{\frac{2m\epsilon}{\hbar^2}}$. It gives the expression of ;

$$\frac{dk}{d\epsilon} = \frac{1}{2} \sqrt{\frac{2m}{\hbar^2 \epsilon}} \quad (9)$$

Combining equation (9) in to (8), then the density of states re-described by the equation;

$$g(\epsilon)d\epsilon = \frac{V}{4\pi^2} \left(\frac{2m}{\hbar^2}\right)^{3/2} \sqrt{\epsilon} d\epsilon \quad (10)$$

But from (10) the parameter in θ with unit of temperature is defined as

$$\theta = \frac{\hbar^2 \mu^2}{2mkL^2} \quad (11)$$

So, from equation (10) and (11) the density of the states provided by the expression ;

$$g(\epsilon)d\epsilon = \frac{\pi}{4} \sqrt{\frac{\epsilon}{(k\theta)^3}} d\epsilon \quad (12)$$

Hence partition function could be expressed by an expression as ;

$$Z = \int_0^\infty g(\epsilon) \exp\left(-\frac{\epsilon}{KT}\right) d\epsilon \quad (13)$$

Thus, substituting equation (12) in to (13) I have the expression for partition function as ;

$$Z = \frac{\pi}{4} \frac{1}{(K\theta)^{3/2}} \int_0^\infty \sqrt{\epsilon} \exp\left(-\frac{\epsilon}{KT}\right) d\epsilon \quad (14)$$

From equation (14) the result of integral provides ;

$$\int_0^\infty \sqrt{\epsilon} \exp\left(-\frac{\epsilon}{KT}\right) d\epsilon = \frac{\sqrt{\pi}}{2} (KT)^{3/2} \quad (15)$$

So, from equation (14) the partition function becomes

$$Z = \left(\frac{\pi T}{4\theta}\right)^{3/2} \quad (16)$$

4. Results and Discussion

4.1 Maxwell distribution at different temperature Model

I employed MATLAB code to generate the simulation in the next section

Clear all, Close all, nfig=0;

K = 8.6170e-5;

TC = 0:50:300;

T = TC + 273;

KT = K*T;

c = 2*pi/(pi*KT).^1.5;

Eo = 0; Ef = 0.5; NE = 251; E =

linespace(Eo,Ef,NE)';

```

NT = max(size(T)); F = zeros (NE,NT);
for n = 1:NT
F(:,n) = c(n)*sqrt(E).*exp(-E/KT(n));
end
fout = 1;
fprintf(fout, '\n\');
fprintf(fout, 'Maxwellian      Distribution
Function verses energy and temperature\n');
fprintf(fout, '\n\');
fprintf(fout, 'Temperature (C).....%10.0f
%10.0f %10.0f\n', TC(1:3:NT));
fprintf(fout, 'Energy F(E) for various
temperature \n\');
fprintf(fout, '      (ev)
(Probability per unit energy)\n');
Form = 1:10:NE
Fprint (fout, ' %6.3f
%10.3e %10.3e %10.3e n\ ', E(m,1:3:NT));
End
fprintf(fout, '\n\');
Nfig = nfig+1; figure(nfig)
plot(E,F(:,1:3:NT)), grid
title('Maxwellian Distribution for different
temperature')
xlabel('Energy(ev)'), ylabel('probability per unit
energy ,f(E)')
v = axis; v(2) = 0.25; axis(v);
for n = 1:3:NT; gtext([num2str(TC(n)), 'C']); end
Emax = 0.15; for I = 1:NE, if E(I) Emax; NEmax = I;
end, end EE = E(1:NEmax); FF = F(1:NEmax, :);
E

```

The out put of the programed code needed to MATLAB Software shown as tabulated in table 1

Table 1: Maxwell Distribution Function versus Energy and Temperature

Temperatur e	0°C	150°C	300°C
Energy(ev)	Probability per unit energy		
0	0.00E+00	0.00E+00	0.00E+00
0.02	1.89E+01	1.33E+01	9.70E+00
0.04	1.14E+01	1.08E+01	9.15E+00
0.06	5.98E+00	7.66E+00	7.47E+00
0.08	2.95E+00	5.11E+00	5.76E+00
0.1	1.41E+00	3.30E+00	4.29E+00
0.12	6.60E-01	2.09E+00	3.14E+00
0.14	3.05E-01	1.30E+00	2.26E+00
0.16	1.39E-01	8.05E-01	1.61E+00
0.18	6.31E-02	4.93E-01	1.14E+00

0.2	2.84E-02	3.00E-01	8.01E-01
0.22	1.27E-02	1.89E-01	5.60E-01
0.24	5.68E-03	1.10E-01	3.90E-01
0.26	2.53E-03	6.60E-02	2.71E-01
0.28	1.12E-03	3.96E-02	1.88E-01
0.3	4.96E-04	2.36E-02	1.29E-01
0.32	2.19E-04	1.41E-02	8.92E-02
0.34	9.64E-05	8.41E-03	6.13E-02
0.36	4.24E-05	5.00E-03	4.21E-02
0.38	1.86E-05	2.97E-03	2.88E-02
0.4	8.16E-06	1.75E-03	1.97E-02
0.42	3.57E-06	1.04E-03	1.35E-02
0.44	1.56E-06	6.15E-04	9.20E-03
0.46	6.83E-07	3.64E-04	6.27E-03
0.48	2.98E-07	2.15E-04	4.27E-03

In equation (12) I found the density of state in a Maxwell - Boltzmann gas as a function of energy and partition function as it has been expressed in equation (16).Hence using Boltzmann distribution the number of particles $n(\epsilon)d\epsilon$ in the energy range ϵ to $\epsilon + d\epsilon$ is

$$n(\epsilon)d\epsilon = \frac{N}{Z} g(\epsilon) \exp(-\epsilon/KT) d\epsilon \quad (17)$$

4.2 Velocity Distributions Depends on Temperature

The peaks in distribution occurs at $\frac{dn(\epsilon)}{d\epsilon} = 0$, Which I find out $\epsilon = \frac{1}{2}KT$ as by [11,12,13].Figure 4.1 indicates the speed distribution at three different temperature. The curve shows the Maxwell – Boltzmann speed probability curve for an ideal gases at three different temperature

Figure 1 Shows the dependence of The Maxwell – Boltzmann distribution molecules on mass .Heaver molecules move more slowly than lighter molecules. Thus, heaver molecules will have smaller speed distribution as shown in figure 2 and 3,while lighter molecules have speed distribution that is more spread out.The result shows that at lower temperatures ,the molecules have lower energy.Thus,the speed of molecules becomes lower and distribution has a smaller range.As temperature of the molecules increases (See figure 3),the distribution flatten outs. Because the molecules have greater energy at high temperature. In fact, if we heat gas to a high temperature the peak of curves(See figure 2 and 3) would shifts to right since the average molecular speed will increases.

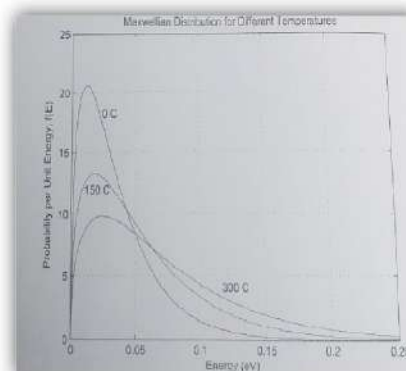


Figure2:Speed distribution at 0°C, 150°C and 300°C.It shows Maxwell – Distribution at three different temperature

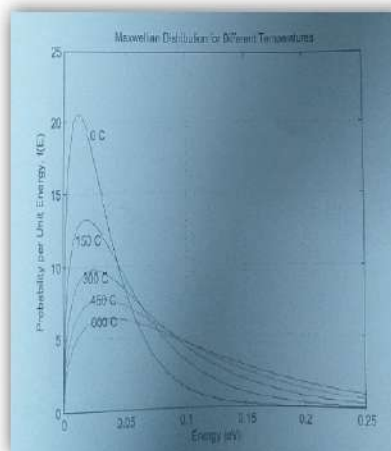


Figure3:Speed distribution at 0°C, 150°C, 300°C, 450°C, and 600°C



Conclusion

The Maxwell –Boltzmann distribution is used to described particle speed in ideal gases,where particles moves freely inside stationary container without interacting with one another,except for collisions in which they exchange energy and momentum with each other. The energy of such particles allows what is Maxwell Boltzmann statics. The Maxwell-Boltzmann velocity distribution is the result of kinetic energies of gases.

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MIGRANT AGRO-WORKERS IN INDIA, THE PANDEMIC, 2020 AND ITS IMPACTS ON AGRICULTURE, FOOD SECURITY, AND LIVELIHOODS IN INDIA

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The COVID-19 pandemic has resulted in an extraordinary health crisis world-over, where we are still dealing with the unknown characteristics of the virus. This is also an economic crisis of such scale that many wonder whether the world economy will ever revive back to its pre pandemic days. This health crisis has laid bare the gaps of the neoliberal economic regime and the widening inequalities of the last three decades of its domination. The health crisis has acted upon these pre-existing inequalities and made it more brutal for those belonging to the marginalized classes, social groups and gender. This article looks particularly at the impact of the pandemic and resulting lockdown on migrant agricultural workers, the most deprived of the rural society in India.

The response of the right wing Indian government to announce a nationwide lockdown has been named amongst the most rigorous across the world. However, in comparison the accompanying economic package and other measures of food security to upgrade the conditions of the most deprived sections of the country in this period of near complete stalling of productive activities has been pathetic. The ensuing humanitarian crisis and desperate conditions of the working class is certainly leading many to take the difficult choice between a health risk and dying out of starvation.

The population of 100 million internal migrant workers have been the worst sufferers in the unplanned lockdown that started on March 25. They have been stuck in the cities and other locations of work, without wages, money and food. The images of migrant workers walking hundreds of kilo meters to reach their villages during the lockdown brought this otherwise invisibilised population under public eye.

The Indian statistical datasets have been ineffective in capturing actual extent of short term circular migration. Therefore, the estimations of worker population migrating for different occupations have largely remained under-reported. However, there have been decisive trends of increasing number of internal migrants moving from rural to urban areas for work between the decadal census findings of 2001 and 2011. Studies using railway data found that between 2011 and 2016, an average of nine million workers assumed interstate travel. This trend has been directly commensurable with the delicate agrarian crisis in the countryside, which has been marked by falling farm incomes and increasing indebtedness whose most disturbing result although not a robust measure has been a sharp rise in incidences of farmer suicides.

Among the various categories of migrant laborers in India, one category is of the seasonal workers employed in agriculture and related activities. Data shows that the agricultural laborers, who take upon rural to rural inter district and interstate seasonal migration, mostly belong to the Scheduled Caste and Scheduled Tribe categories, making them one of the most deprived strata of the rural hierarchy. With their mobility limited this very section faces one of the greatest impact of the pandemic lockdown.



In order to fully measure the harshness of the blow that has been fallen on these agricultural labour classes, the pandemic has to be situated within the context of the pre COVID-19 economic conditions. The COVID-19 pandemic crisis comes at a time when the Indian economy was already revolving under an extended period of stagnation, and fall in demand. The slump in consumption was most evident in rural India in the months leading up to the pandemic, all through last year with the same trend continuing well into this year, showing no signs of recovery. This demand crisis has been attributed prominently to the fall in days of employment available to manual workers along with a slowing down of the wage rates. Research shows that real wage growth for rural laborers rushed from 14.6 per cent in 2014 to a mere 1.1 per cent in 2019. Women laborers fared even worse receiving four fifths of the wages that were paid out to men in the harvest and post-harvest agricultural operations.

Under such conditions, the present agricultural season was even more crucial for the rural workers to fight their daily battles of hunger and destitution. Village studies have come to show that in the Indian countryside there no longer exists a pure class of agricultural laborers as a result of declining days of employment available in agriculture. However, there is a class which can be classified as manual workers, who shift from seasonal agricultural work to non-farm manual work in the lean season. From this same class the migrant agricultural workers belong to.

When the nationwide lockdown was announced in India, while the rain-fed regions of the country did not have standing crops, the regions endowed with irrigation facilities either had standing crops of wheat, vegetables, oilseeds or pulses ready to be harvested. The regional variation in the cropping pattern as a result of the disparity in development of agricultural systems and wage rates contributes towards the movement of migrant agricultural laborers in search of employment. In the northern states of Punjab and Haryana it is a busy season of wheat harvesting, which employs big numbers of migrant laborers from the eastern states of Bihar and Jharkhand who are employed in both the field operations as well as the loading and unloading activities at the government run procurement centers. It is estimated that Punjab involves one million migrant workers and Haryana about 0.6 million workers during this rabbi season, of whom belong to the state of Bihar. In the wake of this pandemic on the one hand there has been a shortage of labour in these northern states to carry out harvest and post-harvest operations, while on the other hand in the states from where the workers could not migrate the agricultural wages have fallen due to oversupply of labour. The migrant workers in their home states have also been adversely affected by the absence of all non-farm work during this period of lockdown.

Some migrant workers although had been able to travel to different states for work. The shameful death of a twelve year old tribal girl, JamlaMakhdam due to exhaustion, as she walked for three days to her home state Chhattisgarh has thrown some light on the multitude of deprivation that the migrant agricultural workers have to suffer. Jamla had migrated to Telangana state as an agricultural worker to harvest chilies along with others from her village. Child labour continues as a result of the abject poverty of the families and communities they belong to, as well as the caste ridden vision of policy makers. The Census of 2011 reported the presence of 10 million child laborers in India, of whom 62 per cent were employed in agriculture.



The despicable work and living conditions that the migrant agricultural laborers are subject to are not unique to India. This pandemic crisis has made the policy makers confront with the essential work of the migrant farmhands who keep agricultural production running. The Food and Agriculture Organization noted in one of its policy briefs, “Migrants play a substantial role in the agro-food systems. Measures affecting the movement of people (internally and internationally) and resulting labour shortages will have an impact on agricultural value chains, affecting food availability and market prices globally.”

The United Kingdom in order to meet the challenge of labour scarcity of migrant Romanian workers on its fruit and vegetable fields, called for applications of farm workers from its own people. However, that experiment seems to have failed as farmers have been forced to admit the skilled nature of agricultural work. A farmer was quoted saying, “They’re quite physical jobs. They’re repetitive. It means working outside in all weathers. For most of the jobs you need a good standard of manual skill meaning you can use both hands at the same speed.”

Many other western countries dependent on an inflow of migrant farm workers from Mexico, Eastern Europe and Africa to run their agricultural production have provided relaxations for their movement. However, there has been a lack of adequate measures to ensure safety of the health of these vulnerable sections of workers. The IUF (International Union of Food, Agricultural, Hotel, Restaurant, Catering, Tobacco and Allied Workers’ Associations), in its charter of demands on agriculture has highlighted the precarious working conditions of these farmhands. On the one hand closure of borders has taken away their major source of livelihoods, while those already working on different farms in the countryside lack essential access to public health. Only ‘5 per cent of workers in agriculture have any access to a labour inspection system or legal protection of their health and safety rights.’ according to The IUF statement.

The All India Agricultural Workers Union (AIAWU), with the largest membership of agricultural workers in India, has also put out a set of demands to enrich the conditions of agricultural workers during the period of the COVID lockdown. The union has stressed on government provisioning of food rations covering all sections of the rural working class population at a time when these people are out of work, and incomes to buy their own food. The AIAWU has demanded that the government should assist in generating employment and issue timely wages under the Mahatma Gandhi National Rural Employment Scheme (MGNREGS), which was legislated under the Rural Employment Guarantee Act in 2005 to provide up-to hundred days of employment to all rural households. However, over the years the scheme has suffered as a result of budgetary cuts. In this period of the pandemic crisis, revival of the scheme would be crucial to generate employment and demand in rural India, where otherwise all other non-farm activities are presently stalled and movements restricted.

Talking over a telephonic interview, Vikram Singh, Joint Secretary of the AIAWU expressed concerns over the directives of the Ministry of Agriculture for the next agricultural season, which emphasizes mechanized farm operations, to keep the norms of physical distancing in place. There are reports to suggest that states like Punjab are already making efforts to bring a shift in the cropping pattern from the usual rice



cultivation to maize for its greater mechanized operations. Reports from villages also inform that due to the restrictions on labour movement under lockdown, farmers were compelled to carry out mechanized harvesting operations to save their crop yields. At a time when rural farm workers are coping with loss of livelihoods, a greater shift towards mechanized operations can act as a further warning to the possibilities of finding work in the near future. Although, only time will tell how well founded these concerns are.

Historian David Arnold, wrote on the sparsely recorded history of the 1919 Spanish Flu, considered as the last biggest pandemic to have struck India taking away millions of lives. He commented on the inability and conspicuous absence of the colonial state to provide relief especially to the poorer sections of society. Since the 1919 Flu, India has attained independence and there have been leaps in scientific advances made. However, in the management of the present crisis by the central government one finds a striking similarity in terms of a general absence of sensitivity towards the health and livelihood concerns of the working class majority.

Therefore, it is time, more than ever, for building harmonies to push for a working class driven agenda for tackling this pandemic crisis and beyond. The agricultural workers of the third world form one of the largest sections who are being dispossessed of their health, and livelihoods. Although at present their voices may sound feeble due to the starved bellies.

According to S. Mahendra Dev, Vice Chancellor of the Indira Gandhi Institute of Development Research in Mumbai, the complete shutdown of all economic activities except essential services will create an economic crisis and misery for the poor, with massive job losses and rising food insecurity.

The economic shock will likely be much more severe for India, for two reasons.

1. Pre-COVID-19, the economy was already slowing down, compounding existing problems of unemployment, low incomes, rural distress, malnutrition, and widespread inequality.
2. India's large informal sector is particularly vulnerable. Out of the national total 465 million workers, around 91% (422 million) were informal workers in 2017-18. Lacking regular salaries or incomes, these agriculture, migrant, and other informal workers would be hardest-hit during the lockdown period.

Here, in this literature review based article, I would like to focus on the impacts on agriculture, supply chains, food and nutrition security and livelihoods.

Agriculture and supply chains

COVID-19 is disrupting some activities in agriculture and supply chains. Preliminary reports show that the non-availability of migrant labor is interrupting some harvesting activities, particularly in northwest India where wheat and pulses are being harvested. There are disruptions in supply chains because of transportation problems and other issues. Prices have declined for wheat, vegetables, and other crops, yet consumers are often paying more. Media reports show that the closure of hotels, restaurants, sweet shops, and tea shops during the lockdown is already depressing milk sales. Meanwhile, poultry farmers have been badly hit due to misinformation, particularly on social media, that chicken are the carriers of COVID-19.

Here are some measures are required to keep the agricultural sector and supply chains working smoothly:



1. The government has correctly issued lockdown guidelines that exempt farm operations and supply chains. But implementation problems leading to labor shortages and falling prices should be rectified.
2. Keeping supply chains functioning well is crucial to food security. It should be noted that 2 to 3 million deaths in the Bengal famine of 1943 were due to food supply disruptions—not a lack of food availability.
3. Farm populations must be protected from the coronavirus to the extent possible by testing and practicing social distancing.
4. Farmers must have continued access to markets. This can be a mix of private markets and government procurement.
5. Small poultry and dairy farmers need more targeted help, as their pandemic-related input supply and market-access problems are urgent.
6. Farmers and agricultural workers should be included in the government's assistance package and any social protection programs addressing the crisis.
7. As lockdown measures have increased, demand has risen for home delivery of groceries and E-commerce. This trend should be encouraged and promoted.
8. The government should promote trade by avoiding export bans and import restrictions.

Using social safety nets as a bridge between health shock and economic shock

The lockdown has choked off almost all economic activity. In urban areas, leading to the widespread loss of jobs and incomes for informal workers and the poor. Estimates by the Centre for Monitoring Indian Economy show that unemployment shot up from 8.4% in mid-March to 23% in the first week of April. In urban areas, unemployment soared to 30.9% as of April 5. The shutdown will cause untold misery for informal workers and the poor, who lead precarious lives facing hunger and malnutrition.

The best way to address this urgent need is to use social safety nets extensively to stabilize their lives with food and cash.

The Indian government has quickly responded to the crisis and announced a \$22 billion relief package, which includes food and cash transfers. Several state governments have announced their own support packages.

The central government's relief package, called Pradhan Mantri Garib Kalyan Yojana (Prime Minister's plan for well-being of the poor), is aimed at providing safety nets for those hit the hardest by the COVID-19 lockdown. However, it is inadequate compared to the enormous scale of the problem. Nobel Prize economists Esther Duflo and Abhijit Banerji say that the government should have been much bolder with the package's social transfer schemes. The \$22 billion in spending is only 0.85% of India's GDP. This is much lower than the packages passed by the United States, European and some Asian countries. India should think bigger, and be spending at least 4% to 5% of GDP. The central and state governments must spend more, even if there is one-time hike in the fiscal deficit.

Below are some additional measures needed in addition to the government package:

- **Food and nutrition security.** Government warehouses are overflowing with 71 million tons of rice and wheat. In order to avoid exclusion errors, it is better to offer universal coverage of distribution in the next few months. Nutrition programs like



Integrated Child Development Services (ICDS), mid-day meals, and Anganwadis (rural child care centers) should continue to work as essential services and provide rations and meals to recipients at home. Eggs can be added to improve nutrition for children and women. Several state governments have started innovative programs to help informal workers and the poor. For example, the Kerala government is providing meals with diversified diets at the doorsteps of households.

- **Cash transfers.** Unemployed informal workers need cash income support. The government has provided Rs. 500 (\$6.60) per month to the bank accounts of 200 million women via the Jan Dhan financial inclusion program. But this too is insufficient. We need to have a minimum of Rs.3000 (\$40) per month in cash transfers for the next three months.
- **Migrant workers.** There are about 40-50 million seasonal migrant workers in India. In recent days, global media have broadcast images of hundreds of thousands of migrant workers from several states trudging for miles and miles on highways; some walked more than 1000 kilometers to return to their home villages. They should be given both cash transfers and nutritious food.

COVID-19 is an extraordinary challenge for India; its large population and the economy's dependence on informal labor make lockdowns and other social distancing measures hugely troublesome. The central and state governments have recognized the challenge and responded aggressively but this response should be just the beginning. India must be prepared to scale it up as events unfold, easing the economic impacts through even greater public program support and policies that keep markets functioning.



A STUDY ON ASSAMESE CHILDREN MAGAZINE

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ABSTRACT

Children's literature is a part of literature. It helps to develop emotional intelligence and creativity of children. Children magazines play an important role in children literature. It contains useful writings for the children. Assamese children magazines and children literature are not different from that. The writings of the children magazines also help us to know the thinking of the children of contemporary time period.

Key-Words: Literature, Children Literature, Children magazine.

INTRODUCTION

Children's literature is important because it provides them with opportunities to respond to literature: it gives appreciation about their own cultural heritage as well as those of others. It also helps to develop emotional intelligence and creativity of children. Children's literature or juvenile literature includes stories, books, magazines or poems made for them. The children magazines play an important role in children's literature. The Assamese children magazines also are not different from that. In this paper we'll try to discuss about the children magazine of Assamese literature.

AIMS AND OBJECTIVES OF THE STUDY

- The main aim of the study is to discuss about the children magazine of Assamese literature.
- Another aim is to discuss the role of children magazine in Assamese literature.

METHODOLOGY

- The primary data are collected from the children magazines of Assamese literature.
- The secondary data are collected from various published work.

DISCUSSION

The literary magazines reflect the contemporary life style in literature. In nineteenth century, Assamese children literature established through the magazine. In the first Assamese newspaper *Arunudoï*, writings for children were also published with the writings of adults. After that, in 1886, the first Assamese children magazine *Larabandhu* was published. It was edited by Karunabhiram Baruah. He was inspired through the writings of children published in *Arunudoï*. The second Assamese children magazine *Akan* (1916-1918) was edited by Hemchandra Goswami. The famous Assamese writers Atul Chandra Hazarika, Saratchandra Baruah, Chirajuddin Ahmed, Krishnakanta Handique etc. wrote in *Akan*.



Some other Assamese children magazines were *Moina* (1923) edited by Raghunath Choudhary, *Arun* (1927) edited by Mohadev Sharma, *Amar Desh* (1932) edited by Tulshi Narayan Sharma, *Pakhila* (1933) edited by Harendra Nath Sharma, *Again Akan* (1933) edited by Birinchi Kumar Baruah, *Parijat* (1942) edited by Dinanath Sharma, *Rang Ghar* (1948) edited by Birinchikumar Baruah and *Kanchijoon* (1951) edited by M Ibrahim Ali. But the time period of these magazines were too short. Then the other children magazine *Deepak* was published in October, 1954. The editor of *Deepak* was Gaurikanta Talukdar. *Deepak* had been published for 17 years continuously. *Joonbai* (1960-1970) was another children magazine edited by Navakanta Baruah. Before *Joonbai*, only the story from *Ramayana-Mahabharata*, *Purana-Uponishada*, story of other countries were published in the children magazines. *Joonbai* changed the trend.

In 1982, the famous children magazine *Safura* was published. It was edited by Dr Bhabendra Nath Saikia. *Safura* is published regularly in present day too. *Safura* is exceptional for its stories which are written on naughtiness of childhood, didactic editorial etc.

Before eighty decade, the environment of childhood was different from present time. The mentality of children of present time is also different. In present time, the children literature is also released from conservative mentality. In this purpose, another children magazine named *Mauchaque* was published in 1984. It is edited by Shantanu Tamuly. It is regularly publish in present time also. Various writings like short stories, poems, travelogues, autobiography, biography, the childhood of some famous people are published in *Mauchaque*. The famous travelogues for children published in *Mauchaque* are *Bideshi Bandhur Deshat* (In the Country of Foreign Friends) by Rathindra Nath Goswami, *Sagarar Sipare Dhuniya Deshat* (In the country of sea) by Bikash Baruah, *Temsar Duipar* (Two banks of the river tems) by Kiran Tamuly, *Takiot Teradin* (Thirteen days in Takio) by Shantanu Tamuly etc. The autobiography of Atul Chandra Hazarika and Rabin Benarji was also published in *Mauchaque*. The childhood days of famous Assamese writers Syed Abdul Malik, Jogesh Das, Shilabhadra, Lkshminandan Bora, Mahim Bora, Jatindranath Goswami, Jaineswar Sarma, Kirtinath Hazarika, Mamoni Raisam Goswami, Chandraprasad Saikia, Hiren Bhattacharya, Homen Borgohain, Nirmalprabha Bordoloi, Dr Nagen Saikia, Nirupoma Borgohain are also published in *Mauchaque*. These are the priceless resources of Assamese literature.

NatunAwiskar is a science magazine for children edited by Shantanu Tamuly. It is published regularly since 1988. It is a famous science magazine for children in Assamese. *NatunAwiskar* introduced the recent inventions and progress of science in simple language. Children are benefited by it. Some science fictions are also published in *NatunAwiskar*.

BaroOthara is a magazine for children and Juveniles in Assamese. It is edited by Kuntal Moni Sharma Bordoloi. It includes short stories, novels, poems, translated novels and stories etc. The famous Assamese novel for Juveniles *Bakul Phoolar Dore* by Mrinal Kalita was published serially in *BaroOthara*. The other famous novels published in *BaroOthara* are *Bonyatar Ring* by Abhijit Sharma Baruah, *Matribhumi* by Santosh Kumar Karmakar, *Ribrib Munmihotor Sesh Nohowa Kahini* by Mrinal Kalita etc.



CONCLUSIONS

The children magazines are valuable resources of children literature. There are page for children in daily and weekly newspapers too. It is a good initiative to make children creative. It also makes rich the children literature.

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PROBLEMS FACED BY OLD AGE PEOPLE IN INDIA

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Abstract

Ageing is an irreparable biological process and is defined as the survival of the increasing number of individuals, who have completed their adult roles. Ageing is stated as the inevitable consequence of decline in productiveness. With the advent of technology and modernization, there has been a decrease in the mortality rate, increase in awareness, nutrition, advancement in health care facilities and an increase in life expectancy. When individuals reach old age, the various problems that they have to experience include, decline in health conditions, retirement, financial problems, loneliness and dependence upon others. The problems that have been taken into account in this research paper include, social, economic, psychological, health, crime, abuse and other miscellaneous problems. Another area that has been included is social work interventions. There are formulation of measures and policies that aim at alleviating the problems of the elderly, provide them security, protection and focus upon their well-being.

Keywords: Aged People, Crime, Economic, Health, Psychological, and Social Work.

Introduction:

With the advent of industrialization, globalization and economic liberalization, the individuals are getting familiar with innovative and modern techniques and methods. The youth is occupied with enhancing their career opportunities, middle aged people are engaged in jobs and earning their livelihoods and the aged individuals are leading retired lives. They either get occupied in some kind of honorary work, or manage the household chores through obtaining assistance from the caregivers or they follow their daily routine. The individuals are gaining more mobility and joint family system is being disintegrated into the emergence of nuclear family system. The aged people are experiencing changes in their social lives. In India, there has been an increase in the number of older persons. The aged people within the country are being provided various facilities and senior citizen benefits. These are beneficial and render a significant contribution in providing them support, especially when they are living by themselves. In the present world, individuals, belonging to marginalized, deprived and socioeconomically backward sections of the society aspire to earn better career opportunities and sustain their living conditions. The individuals migrate from rural areas to urban areas in search for better livelihoods opportunities, leaving their elderly parents. When individuals live separately from their elderly parents, they may communicate with them and make regular visits. On the other hand, there are cases of individuals, who do not look after their parents and mainly focus upon enhancing their own livelihoods opportunities. The levels of savings and investments are the determinants of growth of the modern sector and, hence, the generation of employment as well as the process of urbanization. The development of industrialization has led to



migration of individuals to other places, primarily in search for employment opportunities.

The aged people in India, experience various types of problems. These are social, economic, psychological, health, crime and violence, abuse and other miscellaneous problems. Old age or elderly consists of ages nearly a surpassing the average lifespan of individual increasing number of old people in India, today issues that need to be taken care of if economic and social improvement is to proceed effectively. As per the tradition of India, old age people had occupied the position of power and prestige in the family. But nowadays they are becoming inactive, dependent, sick and weak in terms of economically, physically and psychologically all these phenomena lead to several social economic problems. Because of technological advancement in field of health, education, medical facilities and very same and it due to other national schemes or programs for old age people, they're each decline in the death rate of old age people resulting in continuous incline in population of 60 years and above age people in India.

The major problems which oldest people face are lack of economic provisions, poor health conditions, lack of emotional support and illness in the post retirement period. The problem of inadequate income after retirement, loss of spouse or ample free time, poor health, social isolation, were family relationship and physically and financially dependency et cetera - all these situations are interrelated or interdependence, The traditional Indian joint family system is now declining and more families are becoming nuclear. On the background it is taken to explore the correct situation of care and support for all the oldest people in the families. Therefore an attempt has been made in the study and understands the major problems faced by old age people, their opinions about health care and treatment by their family members.

Social Problems:

The position and status of the aged individuals have been undermined by transformations in the cultures, values and overall living conditions of the individuals. In the present existence, technology has gained grounds and individuals belonging to all age groups, categories and backgrounds are making use of technology in carrying out their tasks and functions. The elderly individuals are not usually aware of usage of technology, they may just speak on the phone, watch television or listen to music and religious beliefs on radio or on their mobile phones. This indicates that they are usually unaware of how to perform various tasks and functions through the usage of technology. When aged people are unaware of usage of technology, they may encounter problems in communicating with people at distant places by sending messages, pictures and videos. Unawareness in terms of technology is one of the factors that impedes socialization of the aged people. When individuals belonging to rural communities, migrate to urban areas in search of better employment opportunities, they usually leave their parents. There are number of reasons for this, the living accommodation in urban areas is expensive, and the rent is unaffordable for them. When individuals get engaged in full time jobs, then taking care of the needs and requirements of the elderly usually becomes a problem for them. The aged people may experience problems in adjusting to social life of the cities. They usually feel apprehensive in going to nearby marketplaces and obtain assistance from their family members. The complexities of modern life and living



conditions undermine the traditional values and beliefs of the aged people. They have their own traditional beliefs and viewpoints, which normally are not believed by the youth and the middle aged people, as they are accustomed to modern values and beliefs. Hence, in this manner, the knowledge and beliefs of the aged people gets devalued.

Research has indicated that when individuals reach the age of 60 years, they are unable to realize that they have now reached old age. This means that individuals are not completely prepared for old age (Singh, 2015). When they have their family members around, relatives and a good social circle of friends, then it is likely that they may feel secure and supportive. On the other hand, there are aged people, who are above 80 years of age and live alone. They do not have family members around and are primarily dependent upon their caregivers. In these cases, aged people experience social problems. They do not take pleasure in going out into the social circle. In case, celebrations or ceremonies are organized among their relatives, friends or neighbours, they do not enjoy going. Hence, when aged people get accustomed to isolation, they experience social problems. In order to alleviate social problems, it is vital for the individuals to form a good circle of friends and interact with relatives, friends, caregivers and neighbours.

Economic Problems:

Economic problems are experienced by the aged people, belonging to deprived, marginalized and socio-economically backward sections of the society. When the individuals are engaged in minority jobs, when their income is meagre and is not enough to meet their needs and requirements, then the individuals experience economic problems. Social security and financial security of the aged people is of utmost significance. In India, majority of the aged people experience financial problems as they are not in a position to earn their livelihoods. When their savings are not enough to meet the medical expenses and other household responsibilities, then they experience financial problems. When they possess finances and wealth, then usually they are exploited by their family members. In India, more than 65 percent of the aged people are dependent upon others for their daily life activities and responsibilities. The aged women, who are independent accounted for less than 20 percent, whereas men were independent to a major extent (Financial Status of Older People in India, 2011).

The financial status of the aged people is directly connected with their financial independence. With the disintegration of the joint family system and the emergence of nuclear family system, the aged people prefer to live by themselves and manage all their finances. The younger individuals are having increasing academic and professional pursuits and due to this, the elderly are connected with them to a lesser extent. The individuals, who have accumulated wealth with their hard work have acquired network, and value in terms of the money matters. The economic problems among the aged people have taken place due to fast changing socio-economic conditions, ongoing open market policies, and liberalization of economy (Financial Status of Older People in India, 2011). When individuals have been engaged in well paid jobs and professions, then they do not experience financial problems. On the other hand, financial problems of the individuals have been severe, when they have been unable to make savings for old age. The major economic problem that aged people have experienced is that of exploitation. There have been cases of family members and relatives, who keep a watch



on the finances that they possess. In a direct as well as in an indirect manner, they make an attempt to take money from them. When individuals are unable to find good employment opportunities or aspire to seek admission in a reputed educational institution for the pursuance of higher studies, they exploit the elderly family members and take money from them for their own benefit. The other problems that aged people experience in terms of finances is robbery and theft. When outside the home, individuals feel, a person is living alone and possesses sufficient wealth, they even get subjected to violent and criminal acts.

Psychological Problems:

An individual lives in a society. Within the society, he has certain roles and functions to perform. The performance of roles and functions are primarily based upon his occupation. For instance, if he is a teacher, he will teach individuals and contribute towards their effective growth and development. If he is a medical doctor, he would get involved in making provision of medical treatment to the individuals and so forth. With aging, the individuals generate awareness in terms of values, norms and principles, which they impart to their family as well as the community members. The aged people have the major task of adequately guiding the individuals towards the right direction. Hence, they have an important role to perform towards the progression of their family and society. The psychological problems among the aged people emerge from loneliness, isolation, powerlessness and meaninglessness. When they live in isolation, when they are not acknowledged by the other individuals, and when their contributions or functions have not proved to be meaningful and beneficial to the individuals, then they experience psychological problems.

Health Problems:

As the individual ages, health problems among them are common. There are various kinds of health problems experienced by the aged people. These include, visual impairments, hearing impairments, speech impairments, decline in word usage and vocabulary, pain in the joints, high or low blood pressure, and other illnesses. Older individuals may live longer but they may get prone to illnesses and diseases. World Health Organization defines health as a state of complete physical, mental and social well-being. It is not merely absence of a disease. Health is considered more important for the aged people, as they are the ones, who primarily experience a decline in the health conditions in old age. The Constitution of India envisages the establishment of a new social order based on equality, freedom, justice and dignity of the individual. It aims at the elimination of poverty, ignorance and ill-health and directs the State to increase education, nutrition levels and standards of living among individuals. Bringing about improvements in the health care is regarded as one of the primary duties. The maintenance of the health and strength of the workers, men, women, children and the aged people is implemented, when they are provided with opportunities and facilities to enhance their living conditions in a well-organized manner.

The health of the aged people gets affected by primarily two factors. These are due to the environmental conditions and biological conditions. When environmental conditions are taken into consideration, both home as well as outside the home influence their health. Within the home, when any kinds of conflicts and disputes take place between individuals, then aged people in some cases feel stressful and they have an



effect upon their health. These conditions usually affects the mind-sets of the individuals. As a result, they may not consume their proper diet and nutrition, may not obtain adequate sleep and as a result, they experience a decline in their health conditions. The biological conditions that have an impact upon the health of the individuals include, visual impairments, hearing impairments, pain in the joints, nervous disorders, weakness, heart complaints, asthma, tuberculosis, skin diseases, and so forth. Women usually report more health problems as compared to men (Balamurugan, & Ramathirtham, 2012).

Not only in India, but in other countries of the world as well, aging of the population is on the rise. Progression in the health care and medical facilities, improvement in the living conditions and the general quality of life and operative measures of birth control could be attributed to the emerging global phenomenon. The population is stated to be aging, in which the proportion of the aged people is said to increase. India is passing through technological, social, cultural and demographic transition. The individuals began to realize that health is important and they need to implement appropriate measures to take care of their health care requirements. With the improvement in health care facilities, the individuals are able to meet their health care requirements appropriately. Eventually, there has been a decline in the mortality rate due to an increase in life expectancy, which ultimately leads to an increase in the population of the aged people (Balamurugan, & Ramathirtham, 2012).

The aged people, who are above the age of 60 years and are living below the poverty line, account for seven to eight percent of the population. The aged people in the unorganized sector like the agricultural labourers, casual workers or landless labourers have to look after their family and household responsibilities and financial problems are the major causes of barriers within the course of achievement of their desired objectives. Aged people need assistance and support from their family members and caregivers in taking care of their health conditions. When they receive support and assistance, they are able to maintain good health and live longer. On the other hand, when they are lonely and lack the support and assistance, then they are unable to meet their health care requirements in an appropriate manner (Balamurugan, & Ramathirtham, 2012).

REVIEW OF LITERATURE:

Review of selected literature is an essential part of every research process. It helps us to examine and evaluate what has been said earlier on the research subject.

Raju, S. S. (2011) has focused on the research on ageing India and provides an analysis in terms of social, financial, psychological and physical and health aspects and elder abuse. Author has also discussed the issues upon which models of care for old age people can be framed and argues that factors like place of accommodation, social class and gender among others tamed to influence such models of care. In the opinion of author, the institution of the family needs to be protected and standard and social work intervention or through professional welfare services, including economical support, counselling to old age people and their family members also. Author has concluded that, not all aspects of ageing have been uniformly steady and majority of them are microlevel localised studies.



Kumar, Y., & Bhargava, A. (2014) have attempted to bring out the abusive behaviour towards old age people by their family members. Through the study author have discussed on the types of abuse prevalent towards the oldest people and studied the impact of abusive behaviour of family members. To the study authors have also examine the day adequacy of social security measures to safeguard the position of the old age people in the families is common rich insights the depletion of human values among the modern and new generations. Authors have opined that timely intervention of social work government policies and imperatives majors should give an utmost importance to overcome the problem of old age people.

Hemavathi U. & Rani. B. S , (2014) have focused on the problems faced by old age people based on age, gender and types of stay, that his institution and non-institution of Tirupati town and Mannurapalli village in Andhra Pradesh State. Through the study authors have found that, there were the majority of old age people who admitted in institution where from nuclear families. Institutionalised old age it will be facing many social problems such as I'd just mental problems compared with non-institutionalised old age people. Authors have also observed that, institutionalised old age people facing many psychological problems compared non-institutionalised were as non-institutionalised old age people were facing high financial problems.

Singh. R. (2015) has given insight into the socio economic condition of the oldest people along with the social and health problems faced by old age people. Through the study author has focused on the factors contributing to problems of old age people in India. Author has focused on the fact that, due to urbanisation family nuclearisation, rapid growth of industrialisation and rise of individual philosophy, diminished the Indian traditional values that earlier had a vested authority with old age people. Author has suggested that, there should be efforts to prevent the problems of elders and this can be carried out through awareness generation in families and social work intervention. Author has concluded that, as far as India is concerned social security schemes should be coupled antipoverty programs.

Objectives of the study:

- To focus on the major socio economic problems faced by old age people.
- To know the perceptions of old age people about the causes of problems and negative attitudes towards life.

METHODS:

The study is descriptive in nature. A sample of 300 old age people (60 years onwards) was taken by using convenience sampling method. This sample was identified in the demarcated geographical area of Vaishali District of Bihar, India. The study is mainly based on primary data which was collected through small questionnaire. The primary data collected from the respondents have been processed and analysed by using percentage method.

Results and Discussions:

The following table shows the age profile of the selected respondents,



Table: 1
Age profile of the respondents

Age group (years)	Number of Respondents	Percentage
60 to 70	150	50%
71 to 80	140	46.67%
Above 80 years	10	3.33%
Total	300	100%

As per the collected primary information, majority of the respondents were belonging to the age group of 60 years to 70 years (50%). 46.67% respondents were belonging to the age group of 71 years to 80 years and only 3.33% respondents were above 80 years of age.

Table : 2
Gender wise distribution of the respondents

Gender	No. of respondents	Percentage
Male	170	56.67%
Female	130	43.33%
Total	300	100%

As per the selected sample 56.67% respondents were made and 43.33% respondents were female. The following table shows the major problems faced by old age people.

Table:3
Major problems faced by old age people

Problems	No. of respondents	Percentage
Economic problems	100	33.33%
Psychological problems	35	11.66%
Accommodation related problems	10	3.33%
Health-related problems	100	33.33%
Elder abuse	15	5%
All the above problems	30	10%
No any problem	10	3.33%
Total	300	100%

The above table reveals that 33.33% respondents face the economic problem. The economic problem arises when old age people are not able to sustain themselves financially. Therefore lose the financial independence because of increasing competition from young generation. It is often that majority of old age people are not having a capacity to be productive or like the opportunity as they were before. After retirement idleness is made to believe that they are not physically productive now. It exists because of infused inactivity, lack of games/tools, and withdrawal from family responsibilities etc and this has been negative emotional effects of the old age persons. As for the collected information the person respondents face the pulsing or accommodation related problems. According to these respondents the present accommodation is not suitable, sufficient as per the current requirements. These food is people face the problem of lack of peaceful place to be in today's changing lives styles and social values and societal is like nuclear family doctor and priorities of new generation have led to increased



religions towards old age people by their family members. With this isolation comes in there for the problem of housing or accommodation exists and it leads to the Fremantle quality of life of old age people of 33.33% respondents faced the health-related problems. During the old age phase, metabolism process slows down, and individuals become physically and mentally weak. They are more prone to sickness, diseases et cetera. Therefore, the clear thinking ability is reduced and diminished eyesight and they are experiencing difficulty in recalling memories; and weakness to bone diseases. 5% respondents face the problem of the abuse or ill-treatment by the family members of majority of old age people face in the abuse in terms of religions, but the real abuse and also physical abuse. Many times old age people are used economically, emotionally and mentally for various reasons in different ways of it is observed that the one person respondents face all the above stated problems and only 3.33% respondents have stated that they have no any problem.

Table: 4
Opinions of old age people regarding care and treatment given by family members and other relatives

Opinions	No. of respondents	Percentage
Respectful treatment	100	33.33%
Normal treatment	120	40%
No cordial treatment	80	26.66%
Total	300	100%

In Indian society, family members are the main source of care and support to the old age people. Therefore, it would be important to know, what are the opinions of selected old age people about the treatment they are getting by the family members. As per the information provided by the respondents in this context, 33.33% respondents have stated on TV. That is they are getting respectful treatment in the families and by the other relatives. 40% respondents reported that they are getting normal treatment by their family members and other relatives and 26.66% respondents reported that the treatment according to them by the family members and other relatives is not cordial. This shows that still in Indian society voltage people are getting respectful treatment by their family members and other relatives.

Table: 5
Perception of old age people about causes of problems and negative attitude towards life

Perception	No. Of Respondents	Percentage
Generation Gap Conflict	280	93.33%
Increasing Crime Rate	170	56.66%
Lack of Mobility	210	70%
Poor Health Condition	230	76.66%
Loneliness	190	63.33%

In the opinion of 93.33% respondents, conflict due to generation gap is the major cause of problems and negative attitude towards life. According to them they are unable to accept the new social values and standard of new generation. They face



problem of generation gap conflict with son / daughter or grandson/ daughter, it may spoiled their interest in the life.

According to 56.66% respondents increasing crime rate in metropolitan cities caused to increase problems and negative attitude towards life. Many old age people in staying alone in flats and advantage of this fact is taken by criminals. 70% respondents have opined that, lack of mobility is the major cause for increasing problems of old age people. Majority of old age people are unable to cope with the fast life of metropolitan cities. Majority of old age people cannot move fast. They feel uncomfortable on the outside of their homes. Therefore their mobility is limited. In the opinion of 76.66% respondents, poor health condition is the major cause for the problems of old age people. In the old age phase many health problems associated with individual, such as heart palpitation, knee pain, poor eye sight, poor hearing capacity etc. Make old age people as a burden on family members. 63.33% respondents have opined that, loneliness is the major cause for the problems of old age people. In Indian society, marriage is considered as a main source of companionship. What individual require living is the companion of spouse. However if one of the spouse dies, it creates a sorrowful space in the life of other partner. Death of spouse has created loneliness in the life of old age person.

Table: 6
chronic disease found among old age people

Diseases	No. Of Respondents	Percentage
Cough and Cold, Whooping	40	13.33%
Joint Pain, Knee pain	150	50%
Hypertension	30	10%
Heart disease	15	5%
Diabetes	65	21.66%

As per the information provided by the respondents, 13.33% of them suffer from cough and cold, whooping. Majority of the respondents suffer from joint pain and knee pain. 10% respondents were associated with Hypertension, 5% were associated with heart disease and 21.66% are suffering from diabetes. It shows that, the prevalence of joint pain, knee pain and diabetes are much higher in metropolitan cities. The diseases among the old age people increased burden on the family members, health care takers.

Conclusion and Suggestions:

Through the study it is found that, now a days the old age people resided in Vaishali District is facing mainly economic problems and health related problems. Apart from these problems many old age people are suffering from psychological problems. It is found that, in many families still old age people are getting respectful or normal treatment. But it should be noted that, the people who are not getting respectful treatment by their family members is not negligible. It is found that, there are several causes of problems and negative attitude of old age people towards life. The major causes are conflict due to generation gap, lack of mobility, poor health conditions and feeling of loneliness. All these factors spoiled the life of old age people and created negative attitude towards life. It is observed through the study that, almost all the



selected old age people are suffering from various diseases like knee pain, joint pain, heart disease, diabetes etc. Due to fast life style Vaishali District. Through the study it is found that there is wide scope for social work intervention through counselling, medical care and health care, rehabilitation centre/old age homes and financial support for old age people.

Efforts should be made by government and NGOs for creating awareness among old age people on various government schemes or programmes. There should be proper utilization of experiences and expertise of old age people for the welfare of the society, so that their negative attitude towards life can change into positive attitude and this will help to reduce their feeling of dependence on the family members. There should be proper and effective implementation of national policy and programmes for old age people.

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ofnd f"kk.k i)fr e ekuorkokn

Mk- euh"kk xknkj

Ig vkpk; ILdrj

jkt dh; cixM LukrdkYkj egkfo|ky;]

MhMokuk

Lkkj

ekuorkokn ,lk fopkj vkj n"ku g tk ekuo eY;k vkj fpurkvk ij viuk /;ku dflnr djrk gA ekuo d loxh.k fodkl d fy, Hkkfrd] ufrd ,o vk/;kfred ixfr vko";d gA gekj "kk=k e Hkh /e] vFk] dke vkj ekfk d :i e ekuo d pkj i: "kkFkk dh ppk dh xb gA ; mld thou dk lFkdrk inku djr g rFkk mld leLr dk; lektkue[k gh gku pkfg,A ekuoh; mPprj eY;k dk ekuorkokn dgk tkrk gA f"kk e ekuorkokn ,d ,lk nfVdk.k g ftle Nk=k dk tkudkj nu d fy, lkfgfr;d vFkk dk mi;ix gkrk g ;k *ekufodh* ij /;ku dflnr fd;k tkrk gA ;g ydrkf=d ;k ufrd thou nfV g tk ;g ifV djr dh fd eu';k d ikl viu thou dk vFk vkj vkdkj nu dk vf/kdkj vkj mUkjnkf;Ro gA

thou dh fo"okRe/kkj dk nfVdk.k ofnd lekt jpu e vurfufgr gku d dkj.k ofnd f"kk.k i)fr e vk/;kfred nfVdk.k dk u doy vurHkko gh Fkk] vfir og mldk vk/kkj Hkh cuk gvk FkA ekuo dk loxh.k&ufnd] Hkkfrd rFkk vk/;kfred fodkl djuk ofnd f"kk.k i)fr dk mf"; FkA vkJe vFkok x:dy d thou e lcd lFk leku :i l 0;ogkj gku d dkj.k rFkk o'k rFkk 0;ogkj e vR;Ur lknxh ,o lekurk fo"kk :i l 0;ogkj e yku d dkj.k fdlh Hkh idkj d o'ke; dk lLdkj ckyd d eu d Ajj ugh gk ikrk FkA vkJe vFkok x:dy e fuokl dju d dkj.k folkFkh thou dk uxj d foyklh okroj.k l i.k :i.k vfyrl j[kk tkrk FkA uxjh thou d l?k'kk dk Hkh folkFk;k d thou ij fdlh idkj dk iHkko ugh iMrk Fk vkj bl dkj.k "k) lLdkj iklr dju ;kx; okroj.k ogk lno cuk jgrk FkA cãp;kJe e Hk;p;k vfuok; gku d dkj.k folkFkh e Hkh U;ukf/KD; dh Hkkouk dk fuek.k ugh gk ikrk FkA f"kk.k fu"kyd Fk bl dkj.k lHkh dk f"kk.k iklr dju d lfo/kk Fkh lFk gh folk d egu'o dk lLdkj lrr :i e eu iVy ij vdr fd;tku d dkj.k f"kk.k dk vFkkittu dk lku ek= le>u d LFkku ij ml J'B thou dk xBu dju okh lthouh d :i e eku tkrk FkA J'B thou 0;rhr dju oky vkpk;k d iR;fk vu"kk lu e lnr jgu d dkj.k folkFkh thou e fcxMu dh vFkok mle mPN[kyrk ;k Lojpkj fuek.k gku dh lHkkouk gh ugh jgrh FkA f"kk.k dk /kfed lLdkj cuku d dkj.k rFkk cãp;or dk mld lFk lyXu dj nu d dkj.k mld jkjk leLr "fä;k dk fodkl ifo=rk dh Hkkouk d lFk gkrk FkA ;g f"kk.k i)fr jkVh;rk dh Hkkouk d lFk&lFk *ol/ko dVEcde* dh vurjkVh; Hkkouk dh Hkh leFkd FkA /ku d fy, folk nku djuk frjLdj.kh; le>u oky rFkk riL;k ;k ,o Kkue; thou 0;rhr dju oky _f'k gh Hkkjrh; folkkihBk d vkpk; gvk djr Fk vkj mudk gh ofnd jkV d f"kk.k d Ajj lor= lokf/kdkj jgk djrk FkA

e[; "kn & x:] x:dy] cãp;kJe] vu"kk lu] loxh.k fodklA

ilRouk & lLk dh leLr ixfr dk dUn fcUn eu'; gA 0;fDr ekuo leg dk gh ,d v"k g blfy; 0;fDr dk doy viu fy, ugh vfir lEi.k lekt d d dY;k.k d fy, dk; djuk pkfg,A /e] vFk] dke ,o ekfk :ih i: "kkFkpr'V; mld thou dk lFkdrk inku djr g vkj mld leLr dk; lektkue[k gh gku pkfg,A ekuorkokn dk ey vk/kkj ekuo gA Hkkj e jktkjk egujk;] jfoUnukFk Vxkj] xkiky'd'k xk[ky] vjfoUn ?kk'k] nhun;ky mik/;k; e ekuorkokn fopkj/kkj dk fpru n[kk tk ldrk gA jfoUnukFk Vxkj vk/;kfred ekuorkokn FkA ie] lg;kx Hkkb pkj d vk/kkj ij rFkk ol/ko dVEcde e fo"okl dj ij fo"o d ekuo dY;k.k dk dh ckr djr gA

ekuookn ekuo dY;k.k ;k lEi.k lekt d dY;k.k d fy, dk; djrk gA ekuoh; mPprj eY;k dk ekuorkokn dgk tkrk gA ekuoh; mPprj eY; dk vFk g LokFk l Ajj mBdj nljk d fgr e dk; djukA lLk d lc ekuo ,d nlj dh LorU=rk dk lEeku dJA lekurk jkjk leku ykdk d fl)kur d vk/kkj ij ijlj ,d nlj dk lg;ix dJA fookn ,o >xMk dk fuiVkj "kfture; rjndk l dJA bl idkj dgk tk ldrk g fd ekuorkokn og g ftle ekuo vU; ykxk dk n[k nn egll dj vkj mud l[kh thou d ekx e ck/kd u cudj mud ixfr ,o fodkl ij cy nA ekuorkokn;k u ekuo dk ekuorkokn dk dUn cuk;kA o fo"o cu/kRo d vkn"i icy nr gA ekuorkokn u Lofgr l vf/kd ijtgr



dk egüo fn;ka ;g ekuo cf) vj food e vkLFk j[krk gA ekuorkokfn;k u bl ckr ij cy fn;k fd ekuo dk viu vñj dh cjb; k dk nj dj ekuoh; x.kk n;k] ie] ekuork] nku"khryk] ijkidkj] vfglk vkfn dk fodkl djuk pkfg,A ekuorkokfn;k u ufrd LorU=rk ij cy nr g, bl ekuo dk ijd rüo cryk;ka

Hkkjrh; nk"kfudk dk ekuorkokn ikphudky l gh ipfyr jgk gA ikphu le; e Hkh gekjk ;g /;; jgk fd lHkh ekuo l[kh jgA blh dk ge ekuorkokn dgr gA lLdr lkfgR; dk n'VkuR

lo HkoUr lf[ku] lo lUr fujke;ka

lo Hknkf.k i";Ur ek d'pñ nh[kHkx HkoAA

bl "ykd l ekuorkokn dh Hkhouk Li'V gkrh gA ble ;g n[ku dk feyrk g fd ijkru dky e Hkh eu';k d l[kh gku dh dkeu dh xb Fkha

ekuorkokn f"kkk & Hkkjrh; f"kkk e ekuorkokn ,d j"keh /kk dh rjg Vxkj] xk/kh] tkfdj glu] j[kkd'.ku] bdcy] ug:] vkfn f"kkk"kkfL=;k dh fopkj/kjk l xtjrk pyk x;ka bu lHkh Hkkjrh; f"kkk"kkfL=;k u f"kkk d }kjk 0;fDr d vk/kfRed fodkl dk cgr egüo fn;k g tk mudh ekuorkokn f"kkk dk dñ dgk trrk gA oreku ;x d nk e[; vkn" g & ,d ekuorkokn vj nly okkfud iofra

ekuorkokn f"kkk dk pje y[; 0;fDr dk l[kh cukuk gkxk ftll fd og ixfr djrk tk, vj bl lllj dk jgu ;kk; LFku cuk lA ekuorkokn f"kkk d fuEu m[; g &

1% ekuorkokn f"kkk dk mnn"; 0;fDr e vkRe fo"okl txr djuk gA

2% f"kkk dk mnn"; ekuo dh lHkh ;kk;rkvk dk fodkl djuk gA

3% f"kkk }kjk ckyd e jpukRed lekykuk ,o lekykukRed jpukRedrk dk fodkl djuk vko";d gA

4% ekuorkokn f"kkk dk ,d mnn"; ;g g fd ckyd dh pruk dk l"kdR ,o tkx:d cuk;k tk,] ftll og thou e tk dN lUnj ,o vuk[kk g mld fo'k; e ltx jg ld ,o tk dN f"kkk&fiV ,o :f<xr g mll efDr ik lA

5% ekuorkokn f"kkk dk mnn"; ckyd dk mldh egkurk dh vuHkr djuk Hkh g vFkr mle ,lk vRe&ck/k txkuk g fd og lekt ,o l'V dk egroi.k vx cu lA mle fodkl dh vlhe lHkhouk, gA

6% folkfk;k e mPp eY;k dk fodkl djuk vFkr mue mPp Lrjh; ,o ekuoh; eku;rkvk dk fodkl djukA

7% ekuorkokn f"kkk vUr e gj ckyd dk ,d vPNk eu';cuku dh dYiuk djrh gA

8% ckyd d ekufld LokLF; dk fodkl djuk ekuorkokn f"kkk dk ,d vU; egroi.k mnn"; gA

9% ekuorkokn f"kkk ey : i l ;g Lohdkj djrh g fd ekuo ,d fopkj"khry ik.kh g vr mldh fopkj"khryk ,o /k; dk fodkl dju dk i.k i;k]l djuk pkfg, ftll og Lo; lR; vj vlr; d chp Hkn dj lA

ofnd f"kkk.k i.kyh e ekuorkokn &

vk t dh bl voLFk e lHkh d fy, vj fo"kr% Hkkjr d fy, exn"kd gku oky ofnd f"kkk.k i)fr d fl)kur dk xEHkjrkd fpuru djuk vko";d tku iMrk gA ofnd f"kkk.k i)fr d ie[k fl)kur fuEu g &

1% thou dh fo"okRe/kk.k dk nfVdk.k ofnd lekt jpuk e vUrfufgr gku d dkj.k ofnd f"kkk.k i)fr e vk/kfRed nfVdk.k dk u doy vUrHko gh Fkk] vfir og mldk vk/kk] Hkh cuk gvk Fkka

2% vk/kfRed nfV l noRo dk ilr dju oky rFk Hkfrd nfV l thou d iR;d {= e vxlj gku oky lkeF; ;Dr ,o oHko lEiUu lekt dk fuek.k gh f"kk.ki.kyh dk mnn"; Fkka

3% vkn" lekt ogh dgyrk g ftle iR;d 0;fDr dk thou vkn" gk vj bl dkj.k 0;fDrRo dk fodkl djuk ,o vkn" 0;fDr thou mRiUu djuk ofnd f"kkk.k i)fr dk y[; Fkka

4% 0;fDrRo fodkl e "khy lo[ku] mÜke x.kk dk i)fr;Dr ifjrk'k ,o Lodro;ijk;.krk dk fuek.k vfHkr Fkka

5% vkfkd ifjLFkr ,o f"kk.k e vkt tk vfoHkT; lEcu/k mRiUu gvk g mldk ofnd i)fr e y"khkx Hkh ugh Fkka cãpk; vkJe e Hk;p;k vfuok; gku d dkj.k folkfh thou Lokoych ,o ifjLFkr fuji{gkvk djrk Fk rFk fd lH e Hkh U;ukf/kD; dh Hkhouk dk fuek.k ugh gk ikrk Fkka



%6% vkJe ,o x:dy e jgu oky folkfkk;k dh l[;k FkkMh gku d dkj.k o;fDr d ILdkj djuk lyHk FkA vkt ftl idkj f"kk.k rU= dk ,d futho dkj[kku dk Lo:i ikr gk x;k gj olk ml dky e lHko gh ugh FkA

%7% f"kk.k fu"kyd Fkkj bl dkj.k lHk dk f"kk.k ikr dju dh lfo/kk FkA lFk gh folk d egro dk ILdkj lrr :i l eu ivy ij vdr fd; tku d dkj.kj f"kk.k dk vFkkikt d lku Hkx le>u d LFku ij ml J'B thou dk xBu dju okyh lthou d :i e ekuk tkrk FkA

%8% J'B thou o;rh dju oky vpk;k d iR;{k vu"kklu e lnk jgu d dkj.k mu ykxk dk vkn"k thou lno vk[kk d lefk foloku jgu d dkj.k folkFk thou d fcxMu dh vFkok mle mPN[kyrk ;k Ljpkpj fuek.k gku dh lHkkouk ugh jgrh FkA

%9% f"kk.k dk /kkfed ILdkj cuu d dkj.k rFkk cāpk;or dk mld lFk lyx dju nu d dkj.k mld jkjk leR "kfDr;k dk fodkl ifo=rk dh Hkkouk d lFk gkrk FkA cāpk;Je e fofkku idkj d fuc/gvk djr FkA iJUr mudk gr LokHkkfod "kfDr ,o eukofr dh dpyu vFkok nck nu d fy, ugh gkrk Fkkj iR;r mudk mnn"; mlg ;kx; fn"kk nuk jgrk Fkkj ftll mue vfkd lkeF; idV gk l dA cāpkjh dk miokl u dj HkjiV Hkktu [kkuk pkfg, fdUr mldk vlj jtkx.kh vFkok relx.kh u gk] ml vRel;e d jkjk viu "kkjifjd ,o ckd d {kerkvk dk li.k ifjrk" ,o fodkl djuk pkfg, vkfn ckr mlg crkb tkrh FkA bu fuc/kk rFkk bl bl riL;ke; thou dk gr ;gh Fk fd vx pydj o l[kiod xglFkJe dk vxhdj d j l d rFkk lekt ,o noRo d fy; viu thou dk mi;kx dju d fufer vko";d x.kk dk lp; dj l dA

%10% /ku d fy, folknku djuk frjldj.kh; le>u oky rFkk riL;k ,o Kkue; thou o;rh dju oky _f" gh Hkjr;h; folkinBk d vpk; gvk djr Fk vkj mudk gh ofnd jkV d f"kk.k d Āij lor= Lor= lokf/kdkj jgk d jrk FkA

%11% ofnd jkV d folkefnj dHk Hk jkt lrk d xyle ugh jgj mYV jktk gh viu vki dk mudk lod ekuk d jrk FkA jkti= dk Hk n.M nu dk ufrd vf/kdkj ilx fo"kk ij x:dy d vpk; i;kx e ykr FkA jktk folknku d dk; e fcuk "kr l gk;rk fn;k d jrk FkA folkefnj e o fou;iod gh io"kd; d jrk FkA folkefnj ,o f"kk.k i.kkyh d Āij /ku ,o lrk dk fdfr Hk vf/kdkj ugh jgrk FkA o li.k :i l LorU= FkA

vkt lgl=kof/k o"kk l Hk"kk Hkn" o"kk on] ikr Hkn vkfn vud Hkn dk ipkr g, Hkjr;h; lldfr dk tk leku Lo:i nVxkpj gkr g mldk rFkk leku /kkfed vpkj] lkeuJ]kdUn] leku ufrd dYiuk] leku ruoKku fo"kd; d iEijj] leku c/kHkkoj n"kd o mld ikfo"; d lc/k e vRel;rk dh leku mRdV vuHkfr vkfn ,dj"Vh;Ro fuek.k dju okyh leR ckrk dk fuek.k bl f"kk i.kkyh d jkjk gh bl fo"ky Hkin" e gvk rFkk lglkof/k o"kk rd v{k..k j[kk x;kA

onk?;u dh lekfr d i"pkr fonkb nr le; vpk; f"kk"; dk fuEukulkj min"n nr Fk & lnk lR; ckyuk rFkk viu dr0; dk igpkur g, /keuklj o;ogkj djukA lh[kh gb folk dk iekn d dkj.k Hkyuk era

lR; onA /epJA LoL;k;Wek ienA ekrnok HkoA firnok HkoA vpk; nok HkoA vfrfFk nok HkoA ;W;uo/kfu defk.k rkfu lfor0;Wu uk brjfk.kA %1%

ekrijk;k firijk;.k] vpk;ijk;.k rFkk vfrfFkijk;.k cuuk D;kfd og rEgjk dr0; gA pkjk vkj tk J'B i :k gkx mud funV ,o vPN dek dk vulj.k djukA

-_Xon e uiffrfo"kd; eku;rvk d dfri; nVUr bl idkj g & _rL; iUFk u rjfr n'drA %2% ikih ylx lR; dk ekx ugh r; dj l d rA

***uk;ek.k i';fr uk l[k; doy/kk HkoA doynhA %3%** nokkvk o bVfe=k dk Hkktu u djkdj tk vdyk gh vuU ij gkFk lQ d jrk g og di.k fujk ikih gA

leuelR uk euk;Fk; ;Fk ot l lgrA %4%

g fe=k! re lcd eu leku fopkj d vFkr ,d gh fu"p; l ifjr gk ftll rEgk lc eukFk lgt fl) gk tk,A leku ān;Wu oA %5% vFkr re lcd vUrldj.k ,d tl gkA

lxk _rL; iUFk %6% & lR; dk ekx ge lxe gkA

lofR iUFkeupje %7% ge lc d dY;k;k d l j y ekx dk gh vulj.k d jA

ofnddky e mPp ufrd eY;k d fl) vf/k'Bku l ;Dr] "khy] pkfj"; o fu'ikirk dh blk j[ku oky mPp lldfr lEiUu ylx FkA o Lolu e Hk iki l l j{k.k iku dh b"oj l vkr ikFuk d jrk FkA vFkoon



d iFoh lDr e dgk x;k g *ekrk Hkfe i=k-g iffK0;kkA , l h mnkr Hkkouk dk fodkl ofnd f"kk.k i)fr
dk gh ifj.kke gA bl lLdkfjr thou dk fuek.k fodflr f"kk.k i)fr d fcuk lHko ugh Fkka
jk'Vh; f"kk.kk uhfr 2020 e Nk=k e jpukRed lkp] rkfd fu.k; vkj uokpkj dh Hkkouk dk ikr l kfgR dju
ij cy fn;k x;k gA ub f"kk.kk uhfr e f"kk.kk vFkkr x: d lEeku ij Hkh /;ku fn;k x;k gA bl uhfr
e f"kk.kk ,o lLdfr d lEcu/k dk LFkfr fd;k x;k gA bl uhfr e folKFkh dk lEi.k ekuo cuku dk
i;k l fd;k tk;xkA bl f"kk.kk uhfr l ,d u; Hkkjr dk fuek.k gkxkA ftll Hkkjr iuh fo'o x: dk
LFkku iklr dj ldxkA bl f"kk.kk uhfr e folKFk; k dk folky; d lHkh Lrjk vkj mPp f"kk.kk e lLdr dk
,d fodYi d i e puu dk volj fn;k tk;xkA f"kk.kk d vUrjk'Vh;dj.k dk lLFkkr : i l lg;kx
vkj Nk= vkj ldk; dh xfr"kh yrk nuk d ek/;e l lxe cuk;k tk;xkA Hkkjr; Hkk'kk vk d l jk.k vkj
fodkl dk i;k l fd;k tk;xkA f"kk.kk igy dh rjg ykHk d fy, ugh vfir ;k;rk ij vk/kfjr gkxh
ftld fy, i;k l r : i l /ku miyC/k djok;k tk;xkA f"kk.kk uhfr fd l h Hkh n"kd Hkfo'; dk r;kj dju
dk lcl vge iMko gkrh gA jk'Vh; f"kk.kk uhfr dh Hkfedk e fy[kk g fd ih&ikbejh ,td"ku e Nk=k
dk Hkkjr; lkt lLdfr ekgy dh tkudkj nh tk,xkA ble vk;HkVV l ydj pk.kD; rd dk ftØ
fd;k x;k gA x.kRed f"kk.kk ij cy fn;k tk;xkA f"kk.kk vku oky ihf<;k dk r;kj d jrh gA ,d ;x
Fk tc fon"kh ukxfjd Hkkjr d f"kk.kk dk"ky d ifr vkdf'kr gkr FkA ;g uhfr f"kk.kk dk dUn gku d
Hkkjr d xkjo dk nckj gfly dju e enn djxhA bl uhfr d vUrjr ikjLifjd Kku dk mi;kx e
yk;k tk;xkA

fu'd'kr ge dg ldr g fd Hkkjr dh f"kk.kk i)fr e iuh ofnd f"kk.kk i)fr d vkn"kk dk viuku dk
i;k l fd;k tk;jg gA ofnd dky e x: dk tk lEeku fn;k tkrk Fk ml iuh LFkfr dju dk i;k l
fd;k tk;xkA folKFkh d pge[kh fodkl ij cy fn;k tk;xkA lLdr Hkk'kk d egUo dk Lohdkj fd;k tk
jgk gA x.kRed f"kk.kk ij cy fn;k tk;xkA f"kk.kk d {k=e /ku d c<r g, i;kx dk leklr fd;k
tk;xkA ;k;rk ij cy fn;k tk;xkA Hkkjr; lLdfr d vkn"kk eY;k l folKFk; k dk voxr dju dk
i;k l fd;k tk;xkA oreku e ;g Lohdkj fd;k tku yxk g fd ofnd dkyu f"kk.kk 0;oLFk gh J'B Fkh
tk folKFkh d lolkx.k fodkl ij cy nrh Fkh ftll Hkkjr fo'o x: d in ij ifr'Br FkA oreku
Hkfrdrkoknh l lkj e HkkoH f"kk.kk d lefr fu;k tu gr ekuorkoknh f"kk.kk ,d vk/kfj"kyk gA lex f"kk.kk
,o lEi.k if"kk.kk dk vkn"k vkj vk/kk ekuo fuek.k gkuk pkfg,A f"kk.kk ekuo d fy, vfuok; vko";drk
g D;kfd f"kk.kk gh ckyd d xUr0; ex dk i"klr dj ldrh gA ;fi ckyd e x.k ,o {kerk, folEku
gkrh g fdUr mudh vfHko;fDr f"kk.kk d }kjk gh lEHko gA

lUnHk lph i&

1/2 rfUkj; mifu'kn f"kk.kk/;k;

2/2 Xon 9&73&6

3/2 Xon 10&117&6

4/2 Xon 10&191&4

5/2 Xon 10&191&4

6/2 Xon 8&31&13

7/2 Xon 5&51&15

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A STUDY ON FINANCIAL PERFORMANCE ANALYSIS UNDER I GAAP AND IFRS

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Abstract:

The growth of IFRS acceptance across the world suggests the practical approach to achieving the objective of having a single set of high quality, generally accepted standards for financial reporting. Implementation of IFRS highly affected the financial performances of the companies when compared with the financial performances under GAAP of the particular countries. This study is an attempt to analyze the differences between financial performances of the selected companies under I GAAP and IFRS and test the significance of differences of financial measures under I GAAP and IFRS.

Keywords: Financial Performance, I GAAP, IFRS.

Introduction:

IFRS is a collection of a premium standards developed by IASB. IFRS provides some of the biased information from financial reporting and presentation of income statements based on consistency and reliability. For the past few years, most of the financial and accounting sector of different nations had developed their own GAAP as per their needs and purposes. The arrival of IFRS has changed the way companies work. Increasing of global interaction culture has changed the system of global business / international market, has not spared the reporting standards and felt a need for universal standards. Today, all the users of the information and interested parties are looking for global opportunities but the differences in national GAAPs acts as a barrier. So willing investors and the multinational companies does not complied with multiple accounting standards in different countries at a time. Thus move of local GAAP to IFRS comes into reality all over the world.

Implementation of IFRS enhanced the comparability of financial reports across countries and provides transparency, greater efficiency to firms reporting across the nations. Presently, more than 100 countries across the world authorize the implementation of IFRS. While evidence abounds in other countries, scarce evidence exists in India to show how IFRS adoption impacted the financial statements. There is an urgent need for the users of financial information of the companies to know the impact of IFRS on financial statements of the companies. What changes comes in the financial measures of the companies with the adoption of IFRS. So, this study is an attempt to study financial measures of the Indian companies under I GAAP and IFRS and the significance of differences of financial measures under I GAAP and IFRS.

Literature Review:

Akgun (2016) examined the affects of IFRS on process of financial reporting. The study also measured the effects of IFRS on businesses operating in the stock exchange of Istanbul. The researcher used multi regression analysis for data analysis. The study concluded that IFRS provide more accurate results as compare to local standards. The results indicated that IFRS provided more useful information to investors and contributed positively in the profitability of the companies' users.



Bhargava & Shikha (2013) evaluated the issues which are coming out with the move to IFRS and check how IFRS impacted the financial statements and ratios with a case study on Wipro by using relative consolidated balance sheet under I GAAP and IFRS. The study selected financial ratios for the analysis of the study. The study concluded that statements maintained under GAAP and IFRS have quite differences, liquidity and profitability was well depicted under IFRS system due to changes in concept of revenue identification. IFRS is a fair value principle based accounting which improved the quality of reports and enhanced the comparability and understanding of financial statements.

Bova (2008) studied the IFRS adoption in emerging markets and assessed the determinants of diversity with IFRS by using public and private Kenyan firms as a sample. The study concluded that higher level of IFRS compliance and quality of reporting were positively correlated with a public firm and in case of conflicts between GAAP and IFRS; private companies like to follow GAAPs, where as public companies to follow IFRS. IFRS was positively correlated with foreign ownership and share turnover.

Goodwin et al (2007) attempted to check the effects of IFRS on the accounting quality of firms in Australia and concluded that IFRS increased total liabilities & decreased total equity and provided higher leverage ratio. Book value and earnings were more relevant under IFRS than A GAAP and changes to IFRS accounting for intangibles was too aggressive than A GAAP

Henry et al (2009) evaluated convergence and adoption of IFRS and differentiate the firms' financial results under US GAAP and IFRS. The study concluded that most firms report stated higher income under IFRS than US GAAP.

Muniraju& Ganesh (2014) studied the convergence of IFRS in India and its applicability on Indian corporate sector with a case study on Wipro limited. And examined the impact on income statements due to changes in the Wipro co. ltd by adopting common standards. The study revealed no considerable change in NP ratio, ROE, ROA and total asset income but leverage ratio shows remarkable transform on convergence with IFRS.

Pascan&Turcas (2012) identified the impact of IFRS adoption on Nigerian listed companies by analyzing the consolidated financial statements of the companies and concluded with no clear tendency can be identified regarding changes in net income of listed entities generated by the transition from Romanian accounting regulations to IFRS.

Sarbpriya ray (2012) studied the changes and penalty on financial statements with IFRS implications and observed the effects of intended convergence of IFRS on financials of Wipro ltd. The researcher used annual reports of Wipro and analysis the data and concluded that there was not a lot deviation in net income but it's important in case of liability and equity. Returns were not appreciably affected with the move towards IFRS and liquidity, total equity & total liability had significant affected by convergence to IFRS but not major changes in the position of total assets.

Shukla (2015) studied the changes in profitability of Indian companies by adopting IFRS and taken four parameters of financial activity i.e. Financial risks, investment activities, operating activities and debt covenants with their significance in statistical measurement. All the four showed some changes due to adoption of IFRS individually but no changes by comparing these activities collectively.

Tsalavoutas (2010) evaluated the contrast of IFRS and Greek GAAP by reconciling the statements of companies. The study considered quantitative as well as qualitative approaches and suggested that IFRS puts a great impact on profitability of Greek listed companies regarding shareholders' equity and liquidity ratios. IFRS had significant contributions to financial performance, net income and return on equity.



Vera Palea (2013) investigated the effects of IFRS for separate financial statements on a sample of Italian firms and studied if splitted financial statements are useful to capital market investors and IFRS are new applicable option than GAAP. The study founded the relevance of statement under IFRS instead of GAAP. The study concluded with findings that were robust for book value, where as provided mixed evidence on net income.

Objectives of the study

1. To study the impact of IFRS on the financial performance of the selected companies.
2. To examine the financial performance of companies under I GAAP and IFRS.
3. To evaluate the significance of difference between financial measures under I GAAP and IFRS.

Research Methodology

By methodology of any research, we mean the selection of representative sample, collection of relevant data, applying appropriate research tools and techniques, analysis and interpretation of the same for scientific investigation of the problem. The contents of this section deal with the method and procedure of the study.

Sources of data collection: The financial data for the purpose of this study has been collected through secondary data sources for 10 years from 2006-2007 to 2015-2016. The data has been collected from the annual reports and websites of the selected companies.

Companies selected for this study: Researcher has selected three companies from different sectors who has adopted IFRS. These companies are Bharti Airtel from telecom sector, HDFC Bank from banking sector and Dr. Reddy Lab from Pharmaceutical sector.

Financial Ratios: this research study has analyzed the four financial ratios of the selected companies under I GAAP and IFRS. These ratios are: Net Profit Ratio, Return on Capital Employed, Return on Shareholders' Fund and Basic EPS.

Statistical techniques:

For the purpose of analysis of this research work following statistical techniques and calculation has been used.

1. Reconciliation method: to find the difference between the financial measures under I GAAP and IFRS.
2. T Test: To test the significance of differences between the financial performance under IFRS & I GAAP.

Statistical results and Discussion

An attempt has been made to know the impact of IFRS on financial performance of the companies. In this section the researcher has compared four financial ratios of the selected companies under Indian GAAP and IFRS. For this purpose, data has been collected from annual reports of the companies. This study reconciled the profitability measures to find out difference due to convergence with IFRS and test the significance of differences of financial ratios under I GAAP and IFRS by considering four profitability ratios i.e. Net Profit Ratio, Return on Capital Employed, Return on Shareholders' Fund and Basic EPS

Net profit ratio: This is the ratio which compares the earnings reported by a company to its sales. It indicates how much net income a company makes with total sales achieved. This is the most requisite indicator to check the impact of new accounting standards to financial performance of the companies. Following tables shows the reconciliation and significance of differences of financial measures under I GAAP and IFRS.



Table 1a reconciliation of net profit of the companies



Years	Dr. Reddy Lab			Bharti Airtel			HDFC Bank		
	Under I GAAP	Under IFRS	Reconciliation	Under I - GAAP	Under IFRS	Reconciliation	Under I - GAAP	Under IFRS	Reconciliation
2006-07	14.54	16.24	-1.7	22.05	25.20	-3.15	13.90	34.31	-20.44
2007-08	8.43	7.67	.76	23.67	24	-0.33	12.75	39.8	-27.05
2008-09	-13.10	-7.44	-5.66	21.04	21.5	-0.46	11.40	33.9	-22.5
2009-10	4.92	1.52	3.40	21.90	21.9	00	14.96	40.7	-25.74
2010-11	13.23	14.78	-1.55	9.57	9.92	-0.35	16.31	39.73	-23.42
2011-12	13.07	14.74	-1.67	5.7	6.23	-0.53	15.95	34.18	-18.23
2012-13	12.67	14.42	-1.75	-1.79	2.95	-1.16	16.05	33.34	-17.79
2013-14	14.45	16.28	-1.83	-2.91	3.52	-0.61	17.23	34.46	-17.23
2014-15	15.27	14.97	0.3	5.15	5.76	-0.61	17.77	35.37	-17.60
2015-16	13.47	12.95	0.52	5.32	6.35	-1.03	17.23	34.85	-17.62

Sources: Author's Calculations

Table 1a shows the reconciliation of net profit ratios of the companies. Positive reconciliation shows the low net profit ratio under IFRS whereas negative reconciliation shows the high net profit ratio under IFRS as compared to net profit ratio under I GAAP. As the above table shows that Dr. Reddy Lab has positive reconciliation in 4 out of 10 years i.e. (2007-08, 2009-10, 2014-15 and 2015-16). So there is a better net profit ratio under I GAAP for these years and rest 6 years has better profits under IFRS. But in case of Bharti Airtel and HDFC Bank almost negative reconciliation has been observed for all the years. So these companies shows better Net Profit ratio under IFRS than that of I GAAP.

Table 1b Test of Significance for Net Profit Ratio

Name of the company	Calculated T value @ 95% level of confidence	Df	Significance value
Dr. Reddy Lab	-1.224	9	0.252
Airtel	-2.499	9	0.034
HDFC	-17.550	9	0.000

Source: Author's Calculations



Table 1b shows that Dr. Reddy's Lab has significance value more than 0.05. So H₀ is accepted and there is no significant difference in the net profit ratio of Dr. Reddy lab under I GAAP and IFRS. But for all the other companies, the significance value is less than 0.05. Therefore null hypothesis is not accepted and there is a significant difference in the net profit ratio of these companies under I GAAP and IFRS.

2. Return on Capital Employed: This is a financial ratio that can be used in assessing the company's profitability and capital efficiency. This ratio can be used to understand how well a company is generating profits from its capital.

Table 2a Reconciliation of ROCE of the companies

Years	Dr. Reddy Lab			Bharti Airtel			HDFC Bank		
	Under I GAAP	Under IFRS	Reconciliation	Under I GAAP	Under IFRS	Reconciliation	Under I GAAP	Under IFRS	Reconciliation
2006-07	22.10	18.17	-3.93	31	28.58	2.42	8	18	-10
2007-08	9.85	4.34	-5.51	24.6	23.54	1.06	8.18	20.32	-12.14
2008-09	15.99	6.98	-9.01	21	21.13	-0.13	8.73	17.92	-9.19
2009-10	16.88	4	-12.88	20.8	18.7	2.1	10.33	19.72	-9.39
2010-11	26.38	23.05	-3.33	8.32	7.01	1.31	10.76	21.45	-10.69
2011-12	26.8	24.3	-2.5	6.5	6.03	0.47	11.21	16.91	-5.7
2012-13	27.65	24.55	-3.10	-6.72	4.07	-10.79	13.83	20.29	-6.46
2013-14	25.84	22.90	-2.94	-17.3	6.22	-23.52	15.17	20.65	-5.48
2014-15	24.62	21.54	-3.08	9.04	8.10	0.94	16.51	22.40	-5.89
2015-16	20.31	18.98	-1.33	7.08	7.24	-0.16	17.31	23.58	-6.27

Table 2a shows the reconciliation of return on capital employed ratios of the companies. Positive reconciliation shows the low ROCE ratio under IFRS whereas negative reconciliation shows the high ROCE ratio under IFRS as compared to ROCE ratio under I GAAP. As the above table shows that Bharti Airtel has positive reconciliation in 6 out of 10 years. So there is a better ROCE ratio under I GAAP for those years and rest 4 years has better ROCE under IFRS. But in case of Dr. Reddy Lab and HDFC Bank negative reconciliation has been observed for all the years. So these companies show better ROCE under IFRS than that of I GAAP.

Table 2b Test of Significance for ROCE

Name of the company	Calculated value @ 95% level of confidence	T	Df	Significance value
Dr.Reddy Lab	4.248		9	0.002
Airtel	-1.066		9	0.341
HDFC	-10.579		9	0.000



Above table shows that Bharti Airtel has significance value more than 0.05. So H_0 is accepted and there is no significant difference in the ROCE of these companies under I GAAP and IFRS. But for both other companies, the significance value is less than 0.05. Therefore null hypothesis is not accepted and there is a significant difference in the ROCE of these companies under I GAAP and IFRS.

3. Return on Shareholders' Funds: this is the one of the ratios of overall profitability group, which indicates the profitability of a firm in relation to the funds supplied by shareholders or owners. This ratio is very important from the owners' point of view as it helps the firm to know whether the firm has earned enough returns to repay its shareholders or not.

Table 3a reconciliation of ROSF of the companies

Year	Dr. Reddy Lab			Bharti Airtel			HDFC Bank		
	Under I GAAP	Under IFRS	Reconciliation	Under I GAAP	Under IFRS	Reconciliation	Under I GAAP	Under IFRS	Reconciliation
2006-07	24.15	28.80	-4.65	35.78	40.6	-4.82	17.67	43.34	-25.67
2007-08	9.72	8.10	1.62	29.90	29.96	-0.06	13.80	42.8	-29.0
2008-09	26	12.29	13.71	27.61	24.82	2.79	15.33	44.28	-28.95
2009-10	9.31	2.48	6.83	23.47	20.50	2.97	14.03	37.98	-23.95
2010-11	24.77	24	0.77	12.70	11.43	1.27	15.70	38.06	-22.36
2011-12	26.07	24.82	1.25	8.74	7.98	0.76	17.45	37.17	-19.72
2012-13	23.97	22.95	1.02	-12.53	4.16	-16.69	18.83	38.88	-20.05
2013-14	24.96	23.69	1.27	-19.76	4.72	-24.48	19.80	39.54	-19.74
2014-15	23.71	19.92	3.79	12.70	7.95	4.75	16.94	33.64	-16.7
2015-16	18.39	15.59	2.80	12.84	8.66	4.18	17.25	34.81	-17.56

Table 3a show that Dr Reddy Lab has positive reconciliation all the years except the year 2006-07. So it shows that Dr. Reddy Lab has better ROSF under IGAAP than that of under IFRS. Bharti Airtel has positive reconciliation for 6 out of 10 years and shows that it provides higher ROSF under I GAAP but negative reconciliation in 4 out of 10 years which shows the higher ROSF under IFRS. But HDFC Bank has negative reconciliation for all the 10 years and proves higher ROSF under IFRS.

Table 3b Test of Significance for ROSF

Name of the company	Calculated value @ 95% level of confidence	Df	Significance value
Dr.Reddy Lab	0.156	9	0.879
Airtel	-0.941	9	0.371
HDFC	-16.631	9	0.000

Source: Author's Calculations



Above table shows that Dr. Reddy Lab and Airtel has significance value more than 0.05. So H_0 is accepted and there is no significant difference in the ROSF of these companies under I GAAP and IFRS. But in case of HDFC Bank, the significance value is less than 0.05. Therefore null hypothesis is not accepted and there is a significant difference in the ROSF of HDFC Bank under I GAAP and IFRS.

3. Basic EPS : this is the ratio which tells the investors how much of a company's net income was allotted to each share of a common stock.

Table 4a reconciliation of Basic EPS of the companies

Year	Dr. Reddy Lab			Bharti Airtel			HDFC Bank		
	Under I GAAP	Under IFRS	Reconciliation	Under I GAAP	Under IFRS	reconciliation	Under I GAAP	Under IFRS	reconciliation
2006-07	60.92	58.82	2.1	21.43	10.72	10.71	36.59	36.36	0.23
2007-08	26.07	22.82	3.19	34.23	17.12	17.11	46.37	45.74	0.63
2008-09	-54.48	-30.69	-23.79	20.70	20.75	-0.05	52.95	52.85	0.10
2009-10	20.83	6.33	14.5	24.13	23.67	0.46	68.82	67.60	1.22
2010-11	59.06	65.28	-6.22	16.88	15.93	0.95	86.45	85.02	1.43
2011-12	76.76	84.16	-7.4	8.48	11.22	-2.74	112.25	110.55	1.7
2012-13	89.93	98.82	-8.89	-8.6	6.00	-14.6	145.5	142.45	3.05
2013-14	115.45	126.52	-11.07	-16.9	7.02	-23.92	182.9	177.35	5.55
2014-15	137.18	130.22	6.96	11.56	12.97	-1.41	220.5	210.75	9.75
2015-16	126.15	117.34	8.81	11.15	13.72	-2.57	254.25	244.2	10.05

Table 4a show that Dr Reddy Lab has positive reconciliation i.e. 2.1 and also positive in the years 2006-07, 2007-08, 2009-10, 2014-15 and the year 2015-16 . It shows that the company had better EPS under I GAAP as compare to IFRS. There is negative reconciliation in the years 2008-09, 2010-11, 2011-12, 2012-13 and the year 2013-14 which shows the better EPS under IFRS as compared to IGAAP. As the table shows in case of Bharti Airtel , there is a negative reconciliation for the years 2008-09 , 2011-12 ,2012-13, 2013-14, 2014-15 and the year 2015-16 which shows that EPS is better under IFRS as compared to IGAAP. There is positive reconciliation for the years 2006-07, 2007-08, 2009-10 and the year 2010-11 which proves the better EPS under IGAAP as compared to EPS under IFRS. But in case of HDFC Bank all the 10 years have positive reconciliation which shows better EPS under IGAAP as compared to EPS under IFRS.

Table 4 b Test of Significance for Basic EPS

Name of the company	Calculated T value @ 95% level of confidence	Df	Significance value
Dr.Reddy Lab	-0.605	9	0.560
Airtel	-0.443	9	0.668
HDFC	2.811	9	0.020

Source: Author's Calculations



Above table shows that Dr. Reddy Lab and Airtel has significance value more than 0.05. So H₀ is accepted and there is no significant difference in the EPS of these companies under I GAAP and IFRS. But in case of HDFC Bank, the significance value is less than 0.05. Therefore null hypothesis is not accepted and there is a significant difference in the EPS of HDFC under I GAAP and IFRS.

From the analysis of above table and explanations this study can be concluded that financial statements under IFRS provides better Net Profit ratio than that of financial statements under I GAAP. But when it comes to other profitability measures results are slightly different from the results shows in case of net profit. Return on capital employed proved better and improved under IFRS complied statements in case of pharmaceutical and banking sector but does not influenced in the case of telecom sector. Return on shareholders' funds are better under IFRS statements in case of telecom and banking sector but not in case of pharmaceutical sector. Basic EPS is better under IGAAP for all the companies. So far these are the results based on reconciliation. But when these differences are tested statistically the results are different. Results basis on significance of differences are :

1. Implementation of IFRS does not bring any significant difference on the net profit of Dr. Reddy Lab. But in case of Bharti Airtel and HDFC Bank these differences are statistically significant.
2. Implementation of IFRS does not bring any significant difference on the ROCE of Bharti Airtel but in case of Dr. Reddy Lab and HDFC Bank these differences are statistically significant.
3. Implementation of IFRS does not bring any significant difference on the ROSF of Bharti Airtel and Dr. Reddy Lab. But in case of HDFC Bank these differences are statistically significant.
4. Implementation of IFRS does not bring any significant difference on the Basic EPS of Bharti Airtel and Dr. Reddy Lab. But in case of HDFC Bank these differences are statistically significant.

Summary and conclusions

On applying statistical tools it was found that there is no significant difference between Profitability as per IFRS and Indian GAAP and null hypothesis is satisfied in most of the cases.

Although statistical tools accepts null hypothesis between profitability as per Indian GAAP and IFRS but there is still significant difference between various profitability measures. Although the percentages of difference are very short but in reality amounts are significantly changed and are material in nature. IFRS adoption has led to significant increase in profitability of the companies. It is evident that IFRS are the dominant accounting standards moving forward. Users of financial statements may find this study useful for IFRS transition.

Limitations of the study:

There were some limitations of this study. Firstly, only three companies have been considered for the profitability measure of the companies. And due to shortage of time and non availability of data only four profitability measures have been considered.

Scope for further research

Further, same research can be conducted for the measuring the IFRS impact on profitability measure of diverse companies for another period of time.

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A REVIEW ON NANOPARTICLE BASED WASTE WATER TREATMENT

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ABSTRACT

As the mother earth is confronting on natural emergency on account of an unnatural weather change, a disturbing circumstance emerge for water protection to spare our people in the future. Insufficient rainfall and high temperature records during summer prompts deficiency of fresh water. Lately, various governmental and non-governmental organizations are concentrating on logical examination to conserve fresh water for sometime later. Nanotechnology offers standout way to deal with waste water treatment by novel systems. Because of it's molecule size which is in the scope of 1-100 nm, the nanoparticles have unique physical, chemical, surface and biological properties when compared to bulk materials. Our studies based on different strategies on treatment methodology utilizing nanomaterials reveals that significant level of nanomaterials are used in squander water treatment. This review is an endeavor to represent the utilization of nanoparticles and its major roles as a capping agent, adsorbate and antimicrobial agent in waste water treatment.

Keywords: Nanotechnology, Nanoparticles, Waste Water Treatment.

INTRODUCTION

Water is the most incredible substance in this world. About one-sixth of the world's population suffers from scarcity of clean drinking water. According to United Nations, by 2025 there will be an increase in the amount of extraction of fresh water resources by 50% in developing countries and 18% in developed countries. In other side due to the increased population and developed civilization the need of water is being obtained through the waste water treatment. It is estimated that in future the urban population will reach approximately 58% by 2025, this leads to increased waste water volumes and this pay the way for the urgent need of innovative and affordable waste water treatment.

Waste water treatment is the process of converting the polluted, disinfected water into drinking or reusable water causing nil or minimal environmental hazards by using chemical or natural agents according to the toxic nature of the water. Infinite number of techniques is being practiced for the treatment of waste water, like chemical agent such as chlorine, nitrate and their derivatives, Ultraviolet light, Water sediment filters, Activated carbon, Ion exchange water softener, Ozonisation, Activated alumina 'Altered' water etc., out of which chlorine (Cl) and bromine (Br) [1] are widely used for antibacterial agents, but due to its toxicity and vapor pressure in pure form causes serious health hazards. The another important pollutant affecting the health is the ammonia which makes the drinking water unsuitable, its removal is important to prevent growth of algae, oxygen depletion etc., Even this type of ammonia contaminated water can be processed by Zeolite process by using Na⁺, K⁺ etc., [5]

Nanotechnology is another important field, and its significance is due to its particle size which is in the range of 1-100 nm have unique physicochemical, mechanical, electrical, optical, magnetic



and surface properties contributes solutions for many global level issues includes medicine, water treatment, energy harvesting, agriculture etc., There are many types of nanomaterial like carbon nanotubes, metal oxide nanoparticles, nanoparticles, composites, dendrimers, nanowires, nanofilms, fullerenes, Quantum dots etc.,[2] Out of which nanoparticles are significantly used for the waste water treatment due to their large surface area, unique adsorption properties due to their different surface sites and disordered region hence they react quickly because of this it is also used as a catalyst in many reactions. Most of the waste water from the industrial effluents are mainly made up of toxic metal ions like Hg(II), Pb(II), Cr(III), Cr(VI), Ni(II), Cd(II), As(V), and As(III) causing environmental hazards and health problems. Nanostructured materials like carbon-iron nanoparticles, nanostructured iron zeolite, magnetic nanoparticles etc., are used in the treatment of waste water for the removal of pollutants or contaminants.

TABLE 1

S.No	MATERIAL	SYNTHESIS	OTHER CHEMICALS/A DSORBATE USED	APPLICATION	OBSERVATION
1.	Iron/Copper Nanoparticles	Co-Precipitation Method	Copper Chloride Sodium-borohydride	Promising agent for removal for Phosphorous and Nitrate	High electric conductivity Highly toxic for wastes High survival rate
2.	Copper and Ferrite Foam	Hydrothermal method	Nickel	Agent for the removal of As (III) and (V)	Excellent recyclability Cost effective
3.	Copper Ferrite Nanoparticles	Acid leaching of PCB sludge Chemical exchange of Fe & Cu Ferrite process	Sulphuric acid milli-Q water	Removing agent of Lead Resolving industrial sludge	High recovery rate Good and low cost solution
4.	Copper Ferrite Nanoparticles	Co-Precipitation Mechano-chemical Thermal treatment	Degussa(standardised solvent)	Malachite green dye Removal	Higher dye degradation rate
5.	Cobalt Ferrite Nanoparticles	Co-precipitation Wet chemical method	Schewertmannite	Arsenic removing agent	High adsorption Good Repeatability Reusability
6.	Copper Ferrite oxide nanoparticles	Co-Precipitation	Peroxymonosulfate	Removes Atrovastatin TOC & ATV removal	Higher regeneration Highly efficient
7.	Copper Ferrite Nanoparticles	Reduction method	L-ascorbic acid Sodium hydroxide	Reducing and Capping agent Degradation of Methylene Blue	High affinity for Methylene blue than Congo red and Methylene Orange
8.	Magnetite & Cobalt Ferrite Nanoparticles	Co-Precipitation Method	Ammonium hydroxide Sodium hydroxide	Acid mine Drainage treatment (90% removal of Mg,Ca,Na)	Economical High recovery rate
9.	Cobalt Ferrite Nanoparticles	Co-Precipitation Method	Sodium hydroxide and Alcohol	Electromagnetic wave applications Increased Performance in Magnetostrictive sensor	Morphology, Roughness, hydrophobicity influenced by Stand-off distances
10.	Cobalt Ferrite Silica magnetic	Sol-gel autocombustion	Silica and Magnetite	Monolayer adsorption	Cost efficient High adsorption



	nanocomposite			capacity	capacity
11.	Cobalt Ferrite Nanoparticles	Hydrothermal method	Glucose	Reduction of CoO to Co and Fe ₂ O ₃ to Fe ₃ O ₄	Prevents Agglomeration Higher Reduction rate
12.	Cobalt Ferrite Nanoparticles	Sol gel auto combustion method	Samarium Maleic acid Epichlorohydrine	Removal of Anionic dye	High adsorption Highly efficient
13.	Manganese Ferrite Nanoparticles	Modified Co-Precipitation method(Massart's method)	Hydrochloric acid Sodium Hydroxide	Arsenic removal (III & V)	Higher active adsorption Adsorption rate increases as the arsenic concentration increases
14.	Cobalt Ferrite Nanoparticles	Combustion method	Oxalyldihydrazide	Cationic dye Removal	High physical and chemical adsorption rate in Pre-treatment of waste water
15.	Cobalt Ferrite Oxide Nanoparticles	Cutilla method(Hybrid technology of Petri nets, automata&Queueing system)	NOM rich 4water	Removal of Chromium from Industrial Effluent	High recycling rate Eco-friendly Cost effective
16.	Cadmium Sulfide/ Cobalt Ferrite Nanocomposite	Hydrothermal method	Cadmium diethyldithiocarbamate	Catalytic degradation of Methylene Blue, Methylene Orange and Rhodamine (Rh B)	High Sonocatalytic activity
17.	Cu@Pt/Pd/C Nanoparticles	Sieben et al method	Ultrapure water	Quantification and reduction of Hydrogen Peroxide	Very competitive,Low cost, High sensitivity,Excellent reproducibility
18.	Copper oxide nanoparticles/Arsenic	18-d Factorial method	Oryza sativa japonica (rice)	Alteration of Seedling growth, Reduction of As uptake by grains	Reduced and controlled the negative effect of Arsenic by the increased Copper concentration
19.	Green extract capped Superparamagnetic Iron oxide	Co-precipitation method	Lantan camara, Ammonia	Removal of Ni(II) ions in aqueous solution	Faster kinetics and high adsorption rate of 227.20mg/g at pH 6.0.
20.	Iron Nanoparticles	Modified physical and chemical method	Cu,Pd,Ni	Nitrogen removal	Conditions and hindrance of intermediated reduced the efficiency rate of Iron rate.

MATERIALS AND METHODS

Different methods for synthesis of iron nanoparticles

Synthesis of Iron Nanoparticles are mainly classified into three main types:

- 1.Chemical methods
- 2.Physical methods
- 3.Biological methods

Chemical methods includes Sonochemical, Thermal decomposition, Co-precipitation, Electrochemical decomposition, Hydrothermal, Micro-emulsion methods. Physical methods includes Aerosol, Gas phase deposition, Electron beam lithography, Pulsed laser ablation, Laser induced pyrolysis, Power ball milling method. Biological method includes Plant mediated, Fungi mediated and Bacteria mediated. Out of which Chemical methods are the most widely used methods because of their tuning structural parameters leads to many other desired applications.

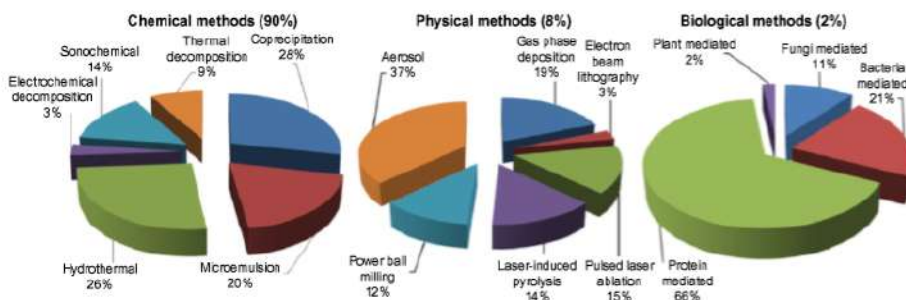


Fig 1: Various methods for the synthesis of Iron Nanoparticles [3]

Chemical methods

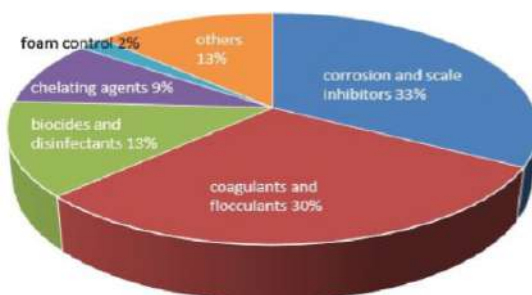


Fig 2: Chemicals in water treatment chemical market between 2009 and 2019 [7]

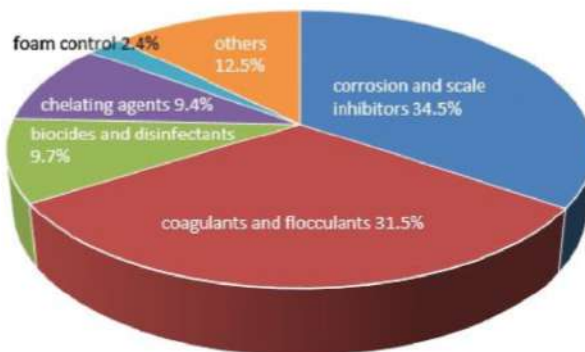


Fig 3: Zion Research Analysis 2016 [7]

Co-precipitation method



Co-precipitation is the most commonly used technique for obtaining high purity and better stoichiometric control nanoparticles. It can also produce wide variety of particle size ranging from submicron to tens of microns. There are three main mechanism (types) of Co-precipitation: Formation of mixed crystals, Occlusion, Surface adsorption. It is the simple method and a rapid preparation method. Composition and Size can be controlled and even the particle surface state and the homogeneity can be modified. The pH is recommended to be above 8 to obtain better end product as the particle size is dependent on the pH value.

Combustion method

Another method for the preparation of pure homogenous powder with nano-crystalline is Solution Combustion Synthesis. It uses salts like nitrates, carbonates, sulfates as supporting agents (as oxidants or reducing agents) and glycine, sucrose, urea and other carbohydrates. Once the reaction started with heating, an exothermic reaction occurs results in a fine powder. This process is considered as the quick and easy process, as saving time and energy. The parameters of combustion plays a vital role in producing a pure and homogenous nano-powder like type of flame, temperature, generated gases, air-fuel-oxidant ratio and chemical composition.[6]

Sol-gel autocombustion method

It is another important and attracted method for the better control of stoichiometry, nano-range crystalline size, ultra-fine hexaferrite powders. It makes use of oxidizing metal salts and combusting agent and its main significance is they are extremely facile, time & energy saving. This method uses a solution in its initial step of preparation leads to dispersion of reactants and resulting in a homogenous reaction mixture. It can considered as the thermally induced redox reaction and the released energy during this process plays vital role to form particles. It also pay the way for the multicomponent oxides with single phase and with high surface area.

Hydrothermal method

A method suitable to produce the different chemical compounds using closed physical and chemical processes at the temperature of 100°C and pressure above 1 atm. The essential parameter needed for the fine result are the duration, temperature, pressure, initial pH. The main significance of this method is that it has the ability to synthesize particles which are unstable near the melting point and high quality large crystals. Most synthesized substances by this method is Zeolite.

Thermal decomposition method

It is one of the innovative technique for the synthesis of the stable mono-dispersed nanoparticles and attracts for its easiest preparation of controlled size and shape of nanoparticles economically. The main factors such as nature of metallic ion and the force of reaction with ligands in co-ordination compounds have significant effects on the temperature and pressure. The main highlight is that no stabilizing agents are required by this method.[4]

Waste water degradation by iron/copper nanoparticles and the micro-organisms growth rate

Recent trends of waste water degradation uses NZVI (nanosize zero valent iron/copper bimetallic particles) for the water treatment[9], [13]. Various concentrations were studied in both aerobic and anaerobic conditions, results shows that on addition of 10 mg/L of NZVI/Cu incremented the number of colonies under anaerobic conditions[12], while decremented during aerobic. But there seen the sharp increase in the removal of phosphorous in both conditions. NZVI was mainly used due to its abundant and cheap non- poisonous corrosion products, promising agent for water purification and treatment applications. But NZVI formed agglomeration in a necklace shaped to overcome it, copper was added in a small amount directly on the surface of Iron. For increasing the reactivity of NZVI, thin layer of copper was planted on surface of NZVI results in efficient removal[10],[11] of phosphorous and Nitrate, which also enhanced reductive degradation of nitrobenzene under aerobic conditions and facilitate mobilizing Iron ions due to high electric conductivity of NZVI/Cu.[8]

Highly porous copper ferrite foam- a promising adsorbent for efficient removal of as(iii) & as(v) from water

A novel copper ferrite foam (CuFe₂O₄ FF) fabricated on Fe-Ni[14], acts as a promising adsorption material, efficiently remove[15],[18] the arsenic (III & V) from aqueous solution using hydrothermal method.



Fig 4: Adsorbent preparation process using CoFe foam for removal of Arsenic from water
Here the adsorption behavior was studied as a function of contact time, pH, temperature and by differing concentration, out of which pH and temperature were important factors in defining the efficiency of adsorption. Results shows that high adsorption capacity and excellent recyclability were obtained. The maximum adsorption capacity [17] of As III and As V on CuFe₂O₄ foam [16] was observed about 44.0 mgg⁻¹ and 85.4 mgg⁻¹. Regeneration experiment shows that arsenic can be desorbed efficiently using 0.10 molL⁻¹ NaOH and high adsorption was maintained for 6 generations

Efficient removal/recovery of pb onto environmentally friendly fabricated copper ferrite nanoparticles

In this copper ferrite nanoparticles were synthesized from the sludge of printed circuit boards [19], by three main steps (i) acid leaching of PCB sludge (ii) Chemical exchange of Fe and Cu (iii) Ferrite Process. In acid leaching, about 10L of 2N sulphuric acid was added to 500g of PCB sludge [22] at 323K for 60 min. Then Fe⁰ was used as sacrificial metal for the chemical exchange of Fe and Cu. To ensure the effluent standards of the supernatant, Ferrite process was performed to produce the adsorbent, which is then washed with milli-Q water, until the pH reached approximately 7 and dried at 323K for 24hrs in oven and stored. This stored adsorbent acts as effective removal agent for Pb in aqueous solution about 90% were removed from solutions at pH 4.5, and 298K. Both monolayer and multilayer adsorbent were observed using isotherm models. Desorption of Pb dependent on reagent concentration (0.005N HNO₃). Thus CuFe₂O₄ [20,21] acts as a good and low cost solution for simultaneously resolving industrial sludge and remediating aqueous Pb. The recovery rate observed was 75%.

Preparation, characterization and application of nanosized copper ferrite photocatalysis for dye degradation under uv irradiation

In this paper, copper ferrite nanosized materials were prepared by the combination of three methods [23], Co-precipitation method, followed by mechano-chemical (mechanical) treatment and then proceeded with thermal treatment. Then the average crystallite size obtained copper ferrite was between 7.8 and 14.7 nm.

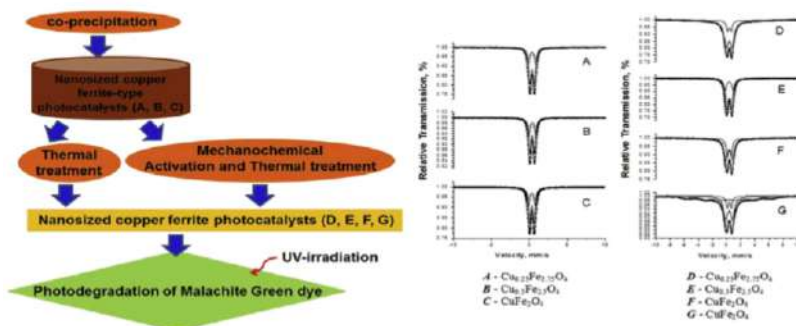


Fig 5: Graphical Abstract of copper ferrite photocatalysis for dye degradation under uv irradiation. Then the photocatalytic decolorization of Malachite Green dye. This Co-precipitated ($\text{Cu}_{0.25}\text{Fe}_{2.75}\text{O}_4$) showed the pseudo first order rate ($15.4 \times 10^{-3} \text{ min}^{-1}$) and an amount of 1g catalysis adsorbed 33.4 ppm/g of Malachite Green (a model organic dye pollutant) after the dark period, very suitable for wastewater containing organic dyes then that of standard referent Degussa P25 ($12 \times 10^{-3} \text{ min}^{-1}$).

Cobalt ferrite nanoparticles aggregated with schwertmannite: a novel adsorbent for the efficient removal of arsenic

Cobalt ferrite nanoparticles (CoFe) aggregated with Schwertmannite (iron oxide hydroxide) [24] plays a vital role in abatement of arsenic [25], and the cobalt ferrite nanoparticles enhances the magnetic properties of Schwertmannite[26] and plays as an excellent role as arsenic removal[27]. Arsenic adsorption by CoFe is highly dependent on pH. Maximum arsenic adsorption was noticed at pH 5.3. According to equilibrium study, followed by Langmuir isotherm model shows maximum adsorption capacity of 1011 ($\mu\text{g/g}$). Very efficient than other adsorbents. From the XRD pattern we obtained the peak at $2\theta = 35.45$ which confirms the structure of Schwertmannite as well as it corresponds to miller indices(311). From FTIR we obtained the prominent peak at 3400 cm^{-1} and 1625 cm^{-1} , shows the stretching of OH-bond. FESEM reveals the spherical to ellipsoidal morphology, as well as with hedge like aggregates to form dense porous network, and it also showed pin cushion morphology for material. This adsorbents was also regenerated and shows about 2% decrease in its efficiency thus it acts as a cost effective adsorbents.

Removal of atorvastatin in water mediated by CuFe_2O_4 activated peroxymonosulfate

Atorvastatin was considered as the important pollutant in waste water treatment plant as well as aquatic environment. This study[28] involves the use of about 40ppm of CuFe_2O_4 and 25 ($\mu \text{mol dm}^{-3}$ PM[29] was used to completely remove atorvastatin. During this process, 8 intermediates were observed and 4 pathways were used to treat and remove the atorvastatin using different PMs. Concentration which were increases from 25 to $150 \mu \text{mol dm}^{-3}$. Main intermediates were evolved from P_{541} , P_{557} to P_{557} and P_{416} and they were completely removed by $750 \mu \text{mol dm}^{-3}$ PMS. All the intermediates were studied using the MS^2 spectra and different pathways were used. About 61.72% of TOC removal was successfully achieved at the pH 7.0 with 100 ppm of CuFe_2O_4 with 3mmol dm^{-3} of PMS[30]. Overall, this study shows the practical knowledge of removal of ATV removal by CuFe_2O_4 activated peroxymonosulfate[31-33] at ambient temperature. In this intermediate was identified with high resolution hybrid quadrupole time of flight mass spectrometry equipped with a duo-spray iron source.

Synthesis of ecofriendly copper nanoparticles for augmentation of catalytic degradation of organic dyes

In this study[34] copper nanoparticles were produced using L-ascorbic acid (Vitamin C) and they obtained a narrow and homogenous size distributed particles. L-ascorbic acid was used both in synthesis and storage as a protective agent. Thus the synthesized CuNPs were used as reducing and capping agent and it exhibited the exceptional catalytic activity in reductive degradation of Methylene blue(91.53%) [37], Methylene red (973.89%)[38-40],Congo red (84.89%) [35-36]under optimal conditions. CuNPs were characterized. UV-visible spectrometers shows the range of 2600 and X-ray D showed the wavelength of 1.54056Å confirmed the phase confirmation and crystalline nature of NPs. It also showed maximum adsorption (Broad SPR Band) at 560nm within 10 min and diameter obtained was less than 4nm. DLS (back scattering mode) showed CuNPs showed the size of 110 zetasizer at 25°C.SEM showed CuNPs with the diameter of 42.88nm (panoramic value) and average size of 40-45nm. MoreoverCuNPs showed high affinity towards oppositely charged cationic dye Methylene blue than Congo red and Methylene orange.

Magnetite and cobalt ferrite nanoparticles as seeds for acid mine drainage treatment

In this study magnetite and cobalt ferrite NPs were prepared using co-precipitation method and used as seeds for acid mine drainage treatment[41,44-45]. It showed complete removal of AL, Mg and Mn and about 90% removal of Mg, Ca and Na[42-43,46]. Especially settling time was efficient for the removal of Mg, Ca and Na. Synthesized Magnetite NPs showed XRD peaks at 2θ of 30.4, 35.9, 43.5, 57.2 and 63.5 for miller indices (220), (311), (400), (511),(440). XRD pattern of CoFe₂O₄ was observed 2θ of 35.6 miller indices (311) as well as 18.4, 30.2,43.2 and 53.6, 57.2, and 62.8 for miller indices (220), (311), (400), (511),(440). Particle size of Magnetite Nanoparticles was 20.7nm and CoFe₂O₄ was 6.3nm. The recovery rate of nanoparticles from this Acid mine drainage treatmentwas also economical.

Fabrication of nanostructured cobalt ferrite coatings using suspension plasma spraying technique

In this work[47], Cobalt ferrite nanoparticles (CoFe NPs) was prepared using co-precipitation method. The formed CoFeNPs[48-52] showed single phase having mean particle size of 29nm. They also observed the CoFeNPs in fabrication using suspension plasma resulted in the existence, fully crystalline nanostructured.

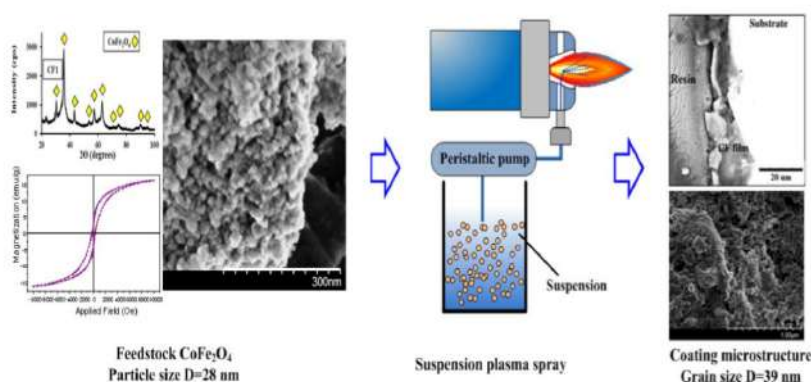


Fig 6: Overall representation of Nanostructured Cobalt Ferrite coatings using suspension plasma spraying technique.

FESEM resulted CoFe with grain size of 94 to 39nm while increasing the spraying distance, from 30 to 50 nm. In which, contact angle decreases from 107 to 67° by increasing stand-off distance.



TEM shows the presence of CoFe NPs in a feedstock powder as well as in suspension plasma sprayed coating. XRD at $2\theta = 23.23^\circ$ with cubic structure and spinal phase having Fd-3m space group.

Removal of malachite green (a toxic dye) from water by cobalt ferrite silica magnetic nanocomposite: herbal and green sol-gel autocombustion synthesis

In this paper[53] Cobalt Ferrite nano-composites (CoFe₂O₄) were prepared using self-propagating sol-gel process[56]. XRD pattern of CoFe₂O₄ showed reflection peaks at (220), (400), (220), (422), (511), (440). The crystalline diameter of CoFe₂O₄ [54-55] was obtained using Scherrer equation for various samples (according to the amounts of extract), 21.98, 19.02, 15.45, 13.24, 11.32, 5.21 for samples SA3, SA5, SA7, SA10, SA15 and SA20. SEM shows sphere like shape in all samples and sizes about 51.02 ± 1.21 nm, 44.13 ± 1.34 nm, 37.25 ± 1.65 nm, 35.08 ± 1.02 nm, 29.14 ± 0.78 nm, 15.41 ± 0.65 nm for all samples. It has been used as effective magnetic adsorbent for the Malachite green removal[57, 58] from water with monolayer adsorption capacity of 75.5 ± 1.21 mg g⁻¹ and followed pseudo-2nd order kinetic model. FTIR adsorption spectra of samples shows 398, 405, 399, and 403 cm⁻¹.

Cobalt ferrite nanoparticles for the preferential oxidation of cobalt

In this paper[59] Cobalt Ferrite nanoparticles (CoFeNPs) had been prepared using glucose assisted hydrothermal method, because they observed that glucose prevents or avoids the formation of agglomeration such that single phase CoFeNPs[60-63]. H₂TPR indicates the reduction of CoO to Co and Fe₂O₃ to Fe₃O₄ and Fe₃O₄ to metallic iron, but its been inhibited by the presence of H₂O and Co₂ without any influence in surface active sites. A crystalline size of 17 nm was observed by the Scherrer's equation, particle size of less than 100 nm. In situ DRIFTS-MS, showed formate species at 100°C, while increasing the temperature in the CoFe during the reaction of CO gas and hydroxyl groups.

Novel chitosan functionalized samarium doped cobalt ferrite for adsorptive removal; of anionic dye from aqueous solutions

In this paper Spinel CoFe_{1.98}Sm_{0.02}O₄[64] was prepared using sol-gel autocombustion technique, combustion agent maleic acid as chitosan (Cs) and epichlorohydrine (ECH) used for functionalization[65-66]. The synthesized material was used for the removal of anionic dye (Orange II-batch mode). It showed about 96.31% of color removal using 1.60 g/L adsorbent at pH 5.2. The maximum observed adsorption capacity of about 1.82 mg/g at 298K. The recovery rate was also efficient without any structural, dimensional modifications especially main adsorption bands of about 600-400 cm⁻¹ using TEM.

As(III) AND As(V) adsorption on manganese ferrite nps

In this manganese ferrite NPs synthesized using adaptation Massart's method[67]. SEM images of ferrite NPs of size of ~50 nm, it also showed agglomerates of particle size of less than 20 nm. Arsenic adsorption optimization was studied for both As(II) and As(V)[68, 69]. XRD showed 2θ at 10-80°. The morphology and EDX obtained from TEM. But they depicted that more research was needed for considering natural pH of freshwater, as this study, As (III) was attracted efficiently to Manganese NPs [70, 71] than As (V) favored by acidic conditions.

Surface modified spinel cobalt ferrite nps for cationic dye removal: kinetics and thermodynamic studies

In this CoFeNPs were prepared using combustion method and surface modified cation were done for the cationic dye removal[72]. Great adsorption capacity was observed especially for pre-treatment of waste water[73, 74]. Crystal violet dye was removed using surface modified CoFeNPs. Maximum adsorption capacity was observed at pH 9. It also showed electrostatic interaction and chemical interaction between surface and negative charged SO₃⁻ and positive charged dye from aqueous solution. Thermodynamic studies also showed ΔH° in range of 23-88 KJ/mol, which indicated complex comprising of physical and chemical adsorption.

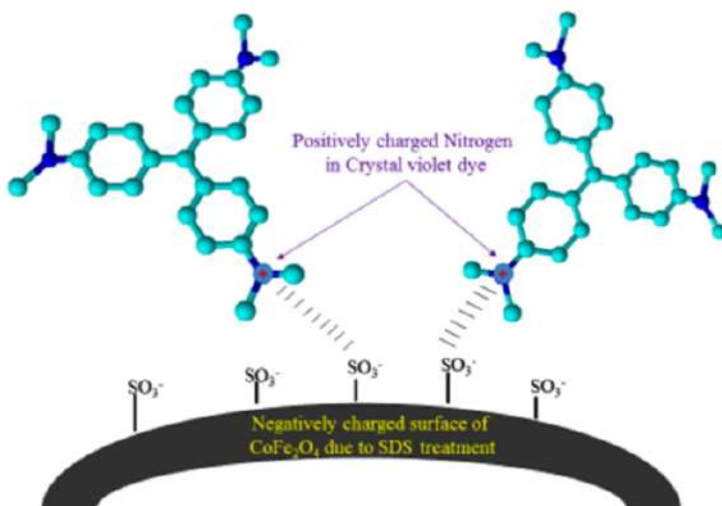


Fig 7: The process of cationic dye removal using surface modified spinal cobalt ferrite nanoparticles.

Green synthesis of a magnetic hybrid adsorbent (cofe2o4/NOM): removal of chromium from industrial effluent and evaluation of catalytic potential of recovered chromium ions

In this CoFe₂O₄/ NOM was synthesized[75]using natural [[80] organic rich water had been used as the removal of chromium ions for industrial effluents[76-79]. In this CoFe/NOM hybrid adsorbents was prepared using COCl₂.6H₂O and FeCl₃.6H₂O with 20mL of NOM rich water with pH 9.0. XRD showed at the range of 2θ at 10-80°. IR spectra showed in the range of 400-4000 cm⁻¹. FTIR showed broad spectrum at 3430cm⁻¹ (stretching of OH groups), and 596 cm⁻¹ attributed for Fe-O bond desorption and recycling rate was high compared to other adsorbents as well as ecofriendly and cost effective.

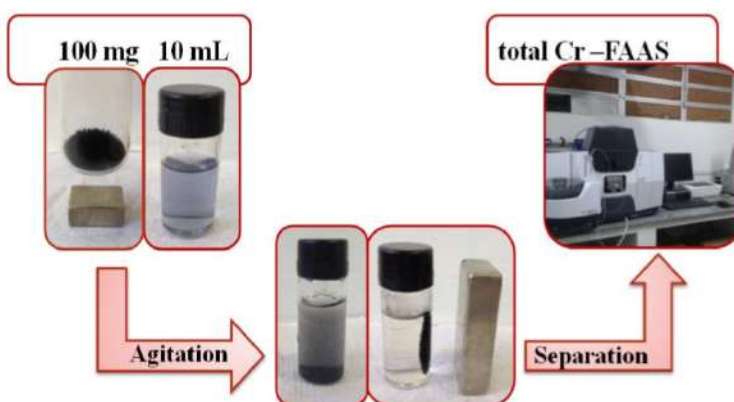


Fig 8: Pictorial representation of removal of chromium from industrial effluent.

Synthesis and structural characterization of magnetic cadmium sulfide cobalt ferrite nanocomposites and its activity for dyes degradation under ultrasound

In this cadmium CoFesulfide nano-composites (Cds/CFO)m[81] were prepared by one-step hydrothermal decomposition of cadmium diethyldithiocarbonate complex of CoFe₂O₄ at 200 deg C. The ultrasound assisted advanced oxidation process (AOP) for catalytic degradation of Methylene blue (MB) and Methylene Orange (MO), Rhodamine B (RhB)[82-85]. The CdS/CFO showed high catalytic activity than CdS nanoparticles. CdS/CFO of diameter 20 nm and surface area 40 m²/g were obtained. And ultrasound degraded MB, MO, RhB within 5,9,5 mins in presence of H₂O₂ as a hydroxyl radical (OH⁻) source. This nanocomposites had high sonocatalytic activity than pure CDs.

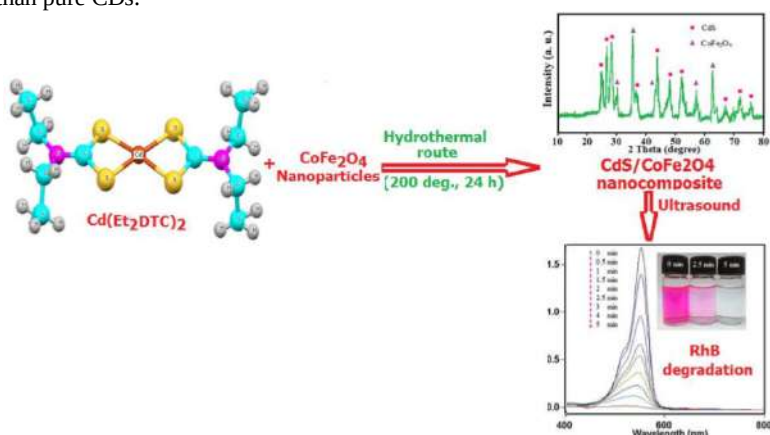


Fig 9: Preparation of cadmium Sulphide CoFe Nano composites and its application as dye degradation for water treatment using ultrasound analysis.

Analytical applications of Cu@PtPd/C nanoparticles for the quantification of hydrogen peroxide

In this Cu@PtPd/C[86] (Copper,Platinum,Palladium and Carbon) were used for the reduction and quantification of hydrogen peroxide, due to its electrocatalytic activity[87-89]. In which Cu@PtPd/C were prepared using Sieben et al method. The glassy carbon composite electrode modified with core-shell Cu@PtPd/C Nps were used to quantify the hydrogen peroxide using no enzymatic mperometric sensor. Ultrapure water (Millipore and Milli-Q system) was used as an electrolyte and the results showed the highest rate of reduction of Hydrogen peroxide and Quantification increased as the reduction rate increased.It showed high sensitivity, excellent reproducibility, low-cost and easy to prepare.

Copper oxide nanoparticles and arsenic interact to alter seeding growth of rice:(oryza sativa japonica)

In the environment, Arsenic causes many ill-effects to rice like phytotoxicity,decreases production rate. It also causes harmful health hazards to the person who consumes these arsenic affected rice. In this Copper oxide nanoparticles combined with arsenic by using 18-d factorial experimental method[90]. Main observation was seen at Seed germination and seedling growth, where Arsenic(As) as individually decreased germination percentage. Both CuO and As causes reduced seedling shoot and root length, these interactions causes effect on number of rootbranches(NRB) of rice seedlings[91]. But high concentration of CuO[92] reduced the negative effect of As on the NRB. Observations showed controlled Arsenic effect by the high concentration of Copper oxide Nanoparticles[93] which in turn causes the altered seedling growth.

Fast kinetics and high adsorption capacity of green extract capped superparamagnetic iron oxide nanoparticles for adsorption of ni(ii) ions

In which Superparamagnetic iron oxide Nanoparticles were synthesized[94] by Co-precipitation method for the adsorption of Nickel ions. Lantana camara extract and ammonia were used as a stabilizing and precipitating agents respectively. Iron precursor solutions like Ferrous sulphate heptahydrate and Ferric chloride hexahydrate were used. These results showed faster kinetics and high adsorption capacity of 227.20 mg/g at pH 6.0. They successfully removed Ni(II) ions from aqueous solution. The green extract Lantana Camara extract used here imparts specific desirable functionalities on Nanoparticle's surface[95-97].

Role and application of iron in water treatment for nitrogen removal: a review

In which the material Iron was reviewed [98] about its efficient role in nitrogen removal using various method and with different combination. Mostly Iron Nanoparticles were prepared by the modified Physical or Chemical methods, and mainly aimed to prevent passivation; to provide continuous activation of passive layers; to provide accessible surface area and to improve mass and electron transfer efficiency. Mostly, premagnetization were done to reduce the nitrate activity and selectivity by means of increasing mass transfer. Macrophorous alginate substrate base Fe Nps[99-100] prepared by chemical methods to prevent agglomeration. Mesoporous spheres of Cu on Iron/Aluminium oxide with iron content prepared for the applications of denitrification. Nitrate decline was successfully achieved faster using electrochemical and ultrasonic methods. Size of the nanoparticles also plays an important role in efficiency of Iron NPs, nanosized particles showed more reactive than micron-scale powder, with high specific area, increasing the surface reactivity. Different combinations were done out of which Cu-Pd/nFe showed Nitrogen Selectivity, Nitrate removal and acts as a bimetallic catalyst. Kaolinite-Fe/Ni were done showed simultaneous removal of Cu(II)[101-102] and nitrate. Fe-Pd-Chelating resin showed selective reduction of nitrate to nitrogen. For the removal of chemical nitrate, Electron transfer, Iron as catalyst, pertinent chemical reactions were done[103]. To remove the biologically coupled Nitrate, Electron transfer and Chemical reaction were used.

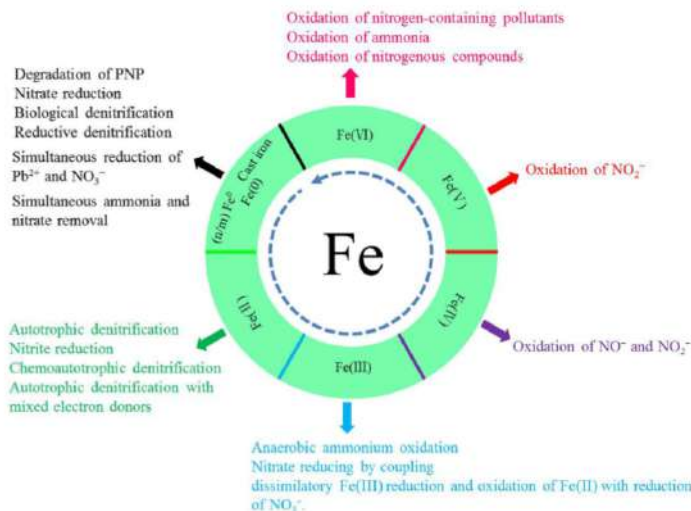


Fig 10: Importance of Iron based Nanoparticles in water treatment.

Though Iron nanoparticles achieved higher rate of removal of Nitrogen, there were some constraints like the experimental conditions, size of the particles, hindrances due to other products, and intermediates.



CONCLUSION

Water plays a significant role in our daily basis. The importance of water is an incredible substance in this world. Due to the increased population, improved civilization, developed industries and increased need, leads to the scarcity of water in and around the world. As a result the amount of waste water generated is another critical issue which further impure the fresh water or usable water as waste water. The need of properly degrading is highly needed. Though there are many techniques to treat waste water, nanotechnology plays a vital role in the treatment of water. As nanoparticle has fine crystal size and large surface area, it acts as a very suitable material for the absorption of toxic substances which cannot be met by another techniques cleverly. In this paper, the importance of water treatment and various chemical methods have been discussed. Various techniques to treat the industrial effluents with the help of nanoparticles like copper, cobalt, and ferrite combination played a capping agent, absorbate, antimicrobial or antibacterial role which removed the pollutants or toxic substances completely. Another important use of this nanoparticles are they are highly having recovery rate, which acts as cost efficient and economical.

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A COMPARATIVE STUDY ON THE EFFECTS OF AEROBIC, ANAEROBIC AND YOGIC EXERCISE ON VITAL CAPACITY

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Abstract:

AIM: The purpose of the present study was to compare the effects of aerobic, anaerobic and yogic practices on vital capacity. **Selection of Subjects:** Total Eighty (20 aerobic, 20 anaerobic, 20 yogic and 20 control) female girls studying in Women's College AMU, Aligarh, were selected randomly for this study. Their age ranged in between 15 to 20 years. **Hypothesis:** It was hypothesised that there would be no significant effects of aerobic, anaerobic and yogic exercise on vital capacity. **Statistic:** For analysis of the data Mean & SD were calculated and to examine the significance effects of aerobic, anaerobic and yogic exercise on vital capacity, ANCOVA test was applied, and level of confidence was set at .05 levels. **Results:** The statistical analyses showed significant increase in vital capacity of aerobic, anaerobic and yogic group.

Introduction

Physiological system is highly adopted to exercise. Each task has major physiological component and fitness for the task require effective functioning of appropriate system. Involvements in systematic training bring about desirable changes in physiological ability which enhances the athlete's performance in game¹.

With the effect of the exercise training the autonomic function of the heart and respiration also get effected which is seen with the alterations in, blood pressure, pulse rate, vital capacity etc².

Exercising will increase vital capacity because the muscles require additional nutrients when they perform tough exercise, which requires the lungs to take in more oxygen. The lungs will need to expand further to take in this extra oxygen which will increase vital capacity³.

Purpose of the study

The purpose of the present study was to compare the effects of aerobic, anaerobic and yogic exercises on vital capacity.

Methodology

For the purpose this study eighty (N=80) female students were selected randomly from Women's College, Aligarh Muslim University, Aligarh. U.P. India. Their age was between 15 to 20 years. These subjects participated voluntarily in this programme and before the start, all of them were examined by the physician to ascertain that they were free from any other medical problem and were fit enough to undertake



the aerobic, anaerobic and yogic training programme for 12 weeks. The subjects were randomly divided into four groups and each group contained twenty (n=20) subjects. Group I underwent aerobic training, group II underwent anaerobic training, group III underwent yogic training and group IV acted as control.

Aerobic activity programme

The training session were conducted for 6 days a week for three months. Every training session was of 60 minutes with a warm-up of 10 minutes 40 minutes of main course and 10 minutes of cool-down session, intensity level of the training was set at 50% to 60 % for initial days then increased gradually to 70%.

Anaerobic activity programme

The training sessions were 6 days a week for three months, with a warm-up of 10 to 15 minutes, 30 minutes of main course including rest and recovery and 10 to 15 minutes of cool-down session, intensity level of the training was set at 50% to 60% for initial days, then increased gradually to 80 to 85%.

Yogic programme

The yogic sessions were of 60 minutes every day, for 6 days a week for three months. Every training session was with a warm-up of 05 minutes 50 minutes of main course and 05 minutes of cool-down session, The yogic program was of standing asana, sitting asana, asanas in lying position and pranayama with the gradually increased frequency and duration from its initial to final stage.

Collection of Data

Vital Capacity

Pre-test data was collected two days before the commencement of the training program and post-test data was collected next day after the completion of the training program.

To measure the vital capacity, Wind Mill dry Spiro-meter was used, supplied by Fabrication Enterprises (USA), issued by Department of Physical Education AMU, Aligarh. All the subjects were tested in sitting position. The inner dial of the Spiro meter was set on zero mark at the beginning of the test. The subjects took two deep breaths before starting the test and then after fullest inhalation the subjects placed the mouth piece of the Spiro meter in their mouth, taking care to see that no air escaped through the edges of the mouth piece. The subjects exhaled slowly and steadily while bending forward slightly until the maximum volume of air could be expelled inside the Spiro-meter. The subjects were instructed to take care that they blew out only through the mouth and not through the nose even partially, however the nose of each subject was clipped by a nose clip to prevent the air flow from escaping through the nose. **Score:** The score of vital capacity for each subject were recorded in litre.

Statistical Procedure

For analysis of the data, Mean and SD was computed. Comparison was made on the basis of different groups to examine the significance effects of aerobic, anaerobic



and. yogic exercise on vital capacity, for this purpose, ANCOVA and LSD test were used. For testing the hypothesis the level of confidence was set at .05 level of significance.

Findings

Table 1
ANCOVA

Source	Type I Sum of Squares	df	Mean Square	F
Group	1.146	3	.382	7.249*
Error	3.951	75	.053	
Corrected Total	6.676	79		

*significant at 0.05 level

$F_{0.05}(3,75) = 2.73$

It is evident from table-1 that, among the experimental groups i.e. Aerobic group, Anaerobic group, Yogic group and Control group there exists a significant difference within the groups. Thus the null hypothesis was rejected at 0.05 level of significance. Since the F-Value is significant (7.249), a pair-wise comparison of means was made as shown in table- 2.

Table 1.2

LSD Test

Aerobic Group	Anaerobic Group	Yogic Group	Control Group	Md	CD At 5% Level
2.715	2.703			.012	0.139
2.715		2.759		.044	0.139
2.715			2.452	.263	0.139
	2.703	2.759		.057	0.139
	2.703		2.452	.251	0.139
		2.759	2.452	.307	0.139

*significant at 0.05 level

Table-2 is revealing significant increase in Vital Capacity of three groups than the control group. The highest significant paired mean difference was recorded between



Yogic & Control Group (.307) on the other hand the lowest significant paired mean difference was recorded between Anaerobic & Yogic Group (.057). The graphical representation of the post Vital Capacity means of the three groups is presented in Figure 1.

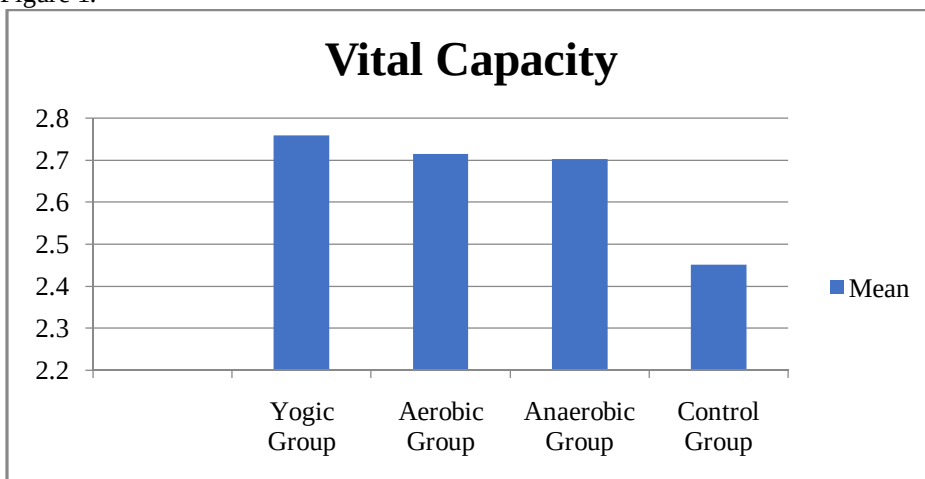


Fig.1- Mean comparison of Vital Capacity at different methods of training

Discussion of Findings

Vital Capacity

The results of the statistical analyses shows that all the training programmes are almost equally effective in altering vital capacity of the subjects. The statistical analyses is showing insignificant difference in the post experimental vital capacity of the three experimental groups. However the post experimental vital capacity of all the three groups is significantly greater than the control group. The present study was supported by the study of **Dr. Rajkumar P Malipatil (2018)** who also concluded that the aerobic training for ten weeks is responsible for the improvement of Vital Capacity & Cardio-respiratory endurance. **PranatiHota et. al. (2017)** also found that aerobic exercises 5 days per week for 6 weeks are effective in improving cardio respiratory parameters such as vital capacity in asymptomatic population of women and men. **(Dr.JethyaJatoth 2017)** also discovered the significant changes after twelve weeks of low intensity continuous training on vital capacity. **Anjumanara Khatun and Dr. Nita Bandhpadhya (2016)** also concluded that aerobic training is found to be more effective in changing the Vital capacity in comparison to the effect of hatha yoga training and combination of hatha yoga and aerobic training on Vital capacity.

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THE BOOK OF GOLD LEAVES: THROUGH THE PARADIGMS OF ALTERNATE HISTORY

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Abstract:

Jammu and Kashmir was a Princely State during British rule in India. The State was attacked by Northwest Frontier Province, supported by Pakistan, shortly after the freedom of India. On 26th October 1947, the then Maharaja of State Hari Singh acceded to India. This paper involves a qualitative analysis of *The Book of GoldLeaves* by Mirza Waheed, within the theoretical paradigm of alternative history. The focal point of the paper is the analysis of the said text through the prism of alternate history. Moreover, the paper also sums up and elucidates how historical facts like 1990's insurgency, flagrant oppression, traumatising of people, exodus of Kashmiri Pandits, art and culture of Kashmir are depicted through a work of literature vividly.

Key Words: Insurgency, Zaal, Fetishized, Quandary, Ravishing, Alternate History.

Introduction: Ab'ul Hasan Yaminud-din Khusrav, better known as Amir Khusrav, a Sufi poet of India has summed up enchanting beauty of Kashmir in a single Persian couplet:

“ Agar Firdous Bar Roo- E-Zameen Ast,
Hameen Ast-o Hasmeen Ast-o Hameen Ast”

(If there is a paradise on earth, It is this, it is this, it is this)

Jammu and Kashmir was a Princely State during British rule in India. After India's independence from British rule and during the partition of sub-continent, Hari Singh, the then ruler of the State was unable to make a decision for the future of his State. The State was attacked by Northwest Frontier Province, supported by Pakistan. On 26th October 1947, Hari Singh acceded to India. The Princely State got divided into three parts – Pakistan Administered Kashmir, Jammu and Kashmir (now a Union Territory) and Aksai Chin (under Chinese control). Both the countries India and Pakistan since 1947 have a megalomaniac desire and are fetishized for the land of Jammu and Kashmir. The two countries have their own state narratives and discourses about the issue, several wars were fought without any concrete outcome; the native people of the land are always at the receiving end and suffer flagrant oppression.

Methodology: This literary research work involves a qualitative analysis of *The Book of Gold Leaves* within the theoretical paradigm of alternate history. The said work is replete with diverse themes like love story, 1990's insurgency, flagrant oppression, traumatising of people, exodus of Kashmiri Pandits, Art and culture of



Kashmir, fetishization for land of Kashmir valley. The critical tool of analysis will be used by the researcher to comprehend the ways in which the said text offers the historical account of 1990's through a literary work. Which will eventually lead to a better understanding of the distinctive features of *The Book of Gold Leaves*. The work analysis the various constructed discourses about the Kashmir insurgency which snowballed during 1990's, having its roots in political system.

Mirza Waheed, Kashmiri born and raised- author, journalist and novelist. He has worked for the BBC for ten years, left in 2011 to give time to writing. His novels constitute- *The Collaborator* (2011), *The Book of Gold Leaves* (2014), and *Tell Her Everything* (2019). Waheed spend first 18 years of his life in Kashmir, witnessing the turbulent times of 1990's in Downtown city.

The genre of Alternate History, sometimes referred to as Counterfactual History or Alternative History grew during early 1990's from a marginal category to a mainstream genre in the United States. David Dale in the *Australian Sydney Morning Herald* called the alternate history genre not just a "growing branch of literature" but also a "passionate cult on the internet." The most widespread influence for the exponential growth of the genre of the alternative history is the influence of postmodernism on history and historiography. In Postmodernism the separation of the historical and the literary are being challenged. In the previous century both were considered as the branches of the same tree of knowledge; till the time of postmodernism they were separated into diverse disciplines- literary studies and historical studies. In postmodernism both the disciplines are viewed more or less having similarities in being 'linguistic constructs' and 'conventionalized in their narrative forms'. Moreover, both the studies are equally intertextual employing the texts of the past 'hypertext' to built their own 'hypertext.'

Brent Stypczynski in his "No Roads Lead to Rome: Alternate History and Secondary Words" states,

The genre does nothing that historians are not doing every day, but it does provide a solid unchanging history, in its own way. The author of the alternate history sets in stone the change(s) he wishes to make in out accepted history. From that point on until every copy of the novel or short story vanishes, that particular view of history is permanents after a fashion. From this perspective, alternate history appears to offer a solid stable ground for our history, rather than causing our foundations to slip away.

The boundary between history and fiction often becomes blurr in *The Book of GoldLeaves* giving way to an alternative history. Inam-ul-Haque and Azhar Iftikhar in their article "The Fetishization of Forbidden Land in Mirza Waheed's *The Book of GoldLeaves*." States,

[Waheed] has appropriated the insurgency of 1990's to project sufferings of Kashmiri people and to amplify their brutally muzzled voices for freedom in the contemporary age. He fictionalizes the reality which makes it more real and alive than the mundane historical accounts of the quelled rebellion of 1990's. As the boundary between historiography and literature overlaps, a true picture emerges at the forefront of literature and politics.



The novel *The Book of Gold Leaves* is divided into four parts- 'Shadows by the River', 'Echoes', 'In Another Country', 'A Terrible Beauty is Born.' Chapters in the novel are not numbered but named, the very first chapter named 'Faiz' introduces the Shia protagonist, 20 years old, a school drop-out; now an artist of par excellence in paper-mache. The heroine of the novel Roohi is 21 years old, sunni, qualified, daughter of a retired government employee Kabir Khan. Roohi is living in her dream world, praying and waiting for her Prince charming. The love-story of Faiz and Roohi in war-torn place unfolds a lot of other concealed themes. The escalating insurgency smashes the dreams of two lovers to smithereens. Parallel to the love story runs the story of upcoming turmoil. The love birds meet in the shrine of 'Khanqah-i-Maula', which is not only a shrine but epitome and grandeur of art. On Thursdays which is 'Shab-e-Jummah' the evening before Friday, the praises of Prophet Muhammad (s.a.w) are sung in the shrine and all the neighbourhood reverberates with it, the prayer hall of the shrine has different stories to tell of its past, its paints have travelled from Tajikistan to artists' workshops in this part of the world. It reveals the times when Kashmir, Kashgar, Samarkand, Tashkent, Bukhara, Baghdad, Khorasan and Shiraz were tied together by verse and colour. The shrine being not only a place of worship but a reminder of old legacy, shrine is place of childhood memories, site of peaceful Congregational prayers, place of demonstrations and protests; open to all irrespective of gender and sects. By the end the shrine becomes a forbidden land for the native people. Waheed writes, "Thus, they dream and dream. Together and alone. A tightening of the chest their shared language. They meet and talk, the evening prayer their pretext and sanctuary the shrine their witness and refuge." (67)

Kashmir being most militarized zone in the world right now, uncertainty looming large on the psyche of native people, traumatized by deaths, custodial killings, disappearances, curfews, hartals, tortures, half-widows and arson; all these historical facts are vividly depicted in the novel via various incidents. The nightmarish condition of Kashmiri people and malaise of the society are testified in an artistic manner. In one of the letters Roohi writes to Faiz, "People are being killed like flies. I mean, these are actual people killed on the streets every day. I don't know if you've heard but they read out the toll on the evening news as if they were talking about the amount of rainfall during the day." (210) The novel also shows how pristine nature is ravished by the conflict and juxtaposes it with environmental degradation done by people. River Jhelum which was once in Agha Shahid's words "the Jhelum's waters so clean/ so ultramarine", is now "... of late, it has also started carrying the dead, many tales of cruelty drowning in its downward rush, and with them, the dark deeds of the oppressor." (23) The river which earlier made the city Srinagar and its dwellers, people now are unmaking it over the centuries, thinking that they "have tamed the river." According to Inam-ul-Haque and Azhar Iftikhar,

Two strands run throughout the novel, one is focused on the heavenly blessed landscape of Kashmir and the other is on the violent occupation of this land by the Indian Army. Waheed augments the aesthetic effect by juxtaposing both



the pictures together. His approach indeed closest to the realities of Kashmir, shows a bruised land in a heightened solemnity.”

The mass exodus of Kashmiri Pandits is depicted vividly. In the novel the Muslim Mir family and the Hindu Dinanath family have lived harmoniously for years together, keeping their religious differences intact. While leaving their home land Dinanath says to Mir Zafar (elder brother of Faiz), “ It feels like I’m taking an axe to my chest and ripping my heart out. But I have a family, Zafar Saeb, I have daughters... you see, many have already left.” (263) Shanta Koul , the principal of the Govt. Girls High School, the school still exists in Downtown area, whose school is taken over by Army, before leaving Kashmir Shanta comes to bid farewell to her school- turned military camp. Shanta suffered and is traumatized – the two men she loved most in life- her father and her lover Syed Afaq Bukhari both got killed during insurgency. She talks at length to Major Sumit Kumar about the school and what she and other Muslim teachers sacrificed for the development of the school.

Sumit Kumar the Army Major is a conscientious man , compelled by authorities to do inhuman tortures and to perpetuate fear psychosis by various tactics like ‘ Zaal’ (the machine which traps human beings). Often in his solitude he remembers his grandfather and sayings of Gandhiji. He is in quandary, used as a pawn by the power corridors. Shanta tell Sumit while leaving, “ Go back, Sumit. No one wants you here... you can’t have much interest in the people here and I can understand that. It’s not part of your up bringing your imagination, your story.” (153)

In the end the couple dies and protesting people are chanting slogans symbolizes the unflinching determination of the people of the land; Faiz’s magnum opus ‘ Falaknuma’ remains unfinished, so remains his talent. So is the conflict and issue unfinished. Narratives are pouring in from all corners but without any respite to people. Intrigues and counter intrigues emerge without reaching its acme.

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A COMPARATIVE STUDY ON EQUITY DIVERSIFIED MUTUAL FUND SCHEMES UNDER DIRECT GROWTH PLAN OF PRIVATE AND PUBLIC SECTOR MUTUAL FUNDS

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Abstract:

This study is an effort to analyze and compare the performance of private and public sector Equity Diversified mutual fund schemes under direct growth plan with a view to see its impact on investor's decision making. In this study 10 Equity Diversified Mutual Funds schemes are taken as sample and the selection of schemes was on the basis of public and private mutual funds and Returns of last 5 years. The risk free rate taken is 7.75%. In order to give an increased return in domestic savings of investors and improvement in allocation of investment in different sectors, the need and scope for mutual fund as an investment option has increased immensely. Investment in Mutual fund is restricted to Tier 1 and Tier 2 cities whereas the rural and semi urban communities. One of the reasons behind it is lack of awareness in rural and semi urban areas. There is, therefore, a strong need for improving the awareness. The Private Sector Mutual Funds have recorded much better performance as compared to the Public sector Mutual Funds mainly due to better Funds allocation, better Management and efficient performance of Portfolio Manager. This result was arrived at after calculating and comparing the Sharpe, Treynor, beta and Jensen ratio.

Keywords: Mutual Fund, Beta, Standard Deviation, Sharpe's Index, Jensen.

I. INTRODUCTION

Mutual funds are the most attractive financial investment instruments which are performing very actively in the growth of the country's economy, now-a-days. A mutual fund is a financial instrument where the puddle of money is collected from many investors for the purpose of investing in securities, such as stocks, savings bonds, money market instruments and other assets. Mutual fund schemes work for the purpose of providing regular income and capital protection to their investors. The investor can invest their amount in portfolios of different sectors depending upon their interests and risks. The purpose of this study was to assess the performance of mutual fund schemes in India (i.e., whether the schemes are outperformed or underperformed than the benchmark along with their competency among themselves or each other respectively). By this evaluation, the awareness among the investors increases. This project explores the comparison and performance of five individual public and five individual private sector equity diversified mutual fund schemes which are direct growth oriented and open-ended.



II. NEED FOR THE STUDY

The main purpose of this paper to know the intention of providing ample information for the potential investors to take decisions regarding the investments, a comparative analysis of equity diversified mutual fund schemes of 10 selected Private and Public sector mutual fund schemes was done. This study was done during February-May 2019, using the data of March, 2018 – March, 2019 and the analysis and recommendations are limited to the same period. The results of analysis may vary with time but the methodology adopted is applicable irrespective of the time.

III.SCOPE OF THE STUDY

The study is particularly based on equity diversified direct growth scheme of selected private & public sector equity diversified mutual fund schemes (HDFC, ICICI, RELIANCE, AXIS, LARSEN & TOUBRO, SBI, BARODA, CANARA, IDBI, UNION mutual fund schemes) for the period of 1 year i.e., from 28, March, 2018 to 29, March, 2019.

IV. OBJECTIVES OF THE STUDY

1. To compare the performance of selected private and public sector equity diversified mutual fund schemes with their benchmark index.
2. To analyze Risk and Return using portfolio performance evaluation model (Sharpe ratio, Treynor ratio, Jensen ratio, Beta).
3. To study the performance of equity diversified mutual fund schemes.

V. LITERATURE REVIEW

1. **Manoj Kumar Dash &Dr.Gouri Shankar Lall (2018), in the article titles, “Performance Evaluation Of Equity based Mutual Funds in India”** stated that if one or more schemes are performing poorly that can affect the investment decision of investor may get out from process of wealth creation scenario. The performance evaluation is necessary which helps in making rational decisions for saving investors.
2. **Ratish Gupta & Shruti Maheshwari (2017), in the article titled, “An Empirical study on performance of Diversified Equity mutual funds with special reference to Large Cap and Mid Cap Funds”** depicts that small investors can expect a double digit returns if they keep a healthy ratio of large cap and mid cap funds in their portfolio. An investors can select a fund based on their investment objective, return expectation and risk appetite. This study attempts to evaluate risk and return of the various large cap and mid cap funds using financial performance evaluation techniques like Sharpe measure, Treynor, R^2 , Standard deviation and beta.
3. **R.Nandhini&Dr.V.Rathnamani (2017), in the article titled “A Study on the Performace of Equity Mutual Funds (With special reference to equity large cap and mid cap mutual funds)”** stated thatthe investors are seeking for higher potential growth rates available in major emerging market areas may consider



globally diversifying their overall investment portfolio with mutual funds that hold Indian equities.

4. **Geeta Rani &Dr. Vijay Singh Hooda (2017), in the article titled “Performance Evaluation of Mutual Fund Schemes: A Study of Selected Topper Schemes”** stated that to evaluate the performance of mutual fund schemes ranked one by CRISIL. The performance is analysed for selected funds schemes, mean returns and their standard deviation and ascertained through the measures in this regard- Sharpe’s Ratio, Jensen’s Ratio and Treynor’s Ratio. Finally, Tata equity P/E fund is performing better among the selected schemes.
5. **N. BhagyaSree, Mrs. B. Kishori (2016), in the article titled, “A Study on Performance evaluation of Mutual Fund Schemes in India”** stated as the analysis results 14 out of 30 mutual fund schemes are outperformed the benchmark returns and some are underperformed due to diversification problem. Result of Sharpe ratio shows all positive which provides greater than risk free rate. Jensen measures positive alpha for 19 out of 30 mutual fund schemes which indicates superior performance of schemes.

IV. RESEARCH METHODOLOGY

Data Collection: The data for this study is collected on the basis of secondary sources. For the purpose of the study the NAVs (Net Asset Values) are collected for one year i.e., 28,march,2018 to 29,march,2019 from the official websites of 10 schemes respectively, for the calculation of Average Returns. These schemes are selected by their best performance in the market in public and private sector. The Secondary sources of data is collected from Text books, Official Websites, Journals & Articles are used as reference for the comparison of the selected public and private sector schemes.

Tools & Techniques: For the performance of the mutual fund schemes various measurement of the portfolio are used as Sharpe ratio, Jensen Ratio, Treynor Ratio.

Risk-Free Rate of return (Rf): The risk free rate is the rate of return with no risk (zero risk). In this study the Risk free rate of return is taken as 7.75%.

V. ANALYSIS AND INTERPRETATIONS

I. Returns Earned by the schemes:

Returns Analysis of Equity Diversified Mutual Fund Schemes with Benchmarks (market Returns) as on 28, March, 2018 to 29, March, 2019



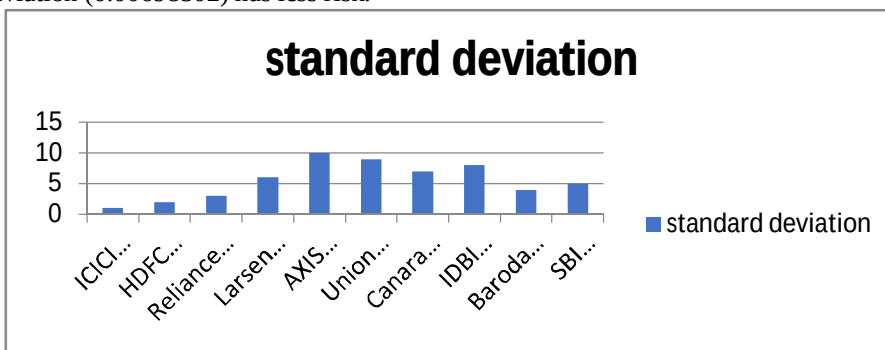
SCHEME NAME	Average Returns R(x)	Portfolio Returns R(x)*100	Average benchmarks R(m)	Market Returns R(m)*100	Alpha
Public Sector Equity Diversified Mutual Fund Schemes					
Union Multi Cap Fund - Growth - Direct	0.000329949	0.0329949	0.000328641	0.0328641	-0.040282118
Canara Robeco Equity Diversified Fund-Direct Plan -Growth Option	0.000555879	0.0555879	0.000328641	0.0328641	-0.026376984
IDBI Diversified Equity Fund - Direct - Growth plan	0.000145217	0.0145217	0.000328641	0.0328641	-0.001889011
Baroda Multi Cap Fund) - Plan A Growth	0.000113643	0.0113643	0.000328641	0.0328641	0.102279974
SBI Magnum Multicap Fund - Direct Plan - Growth	0.00030566	0.030566	0.000328641	0.0328641	-0.044373748
Private Sector Equity Diversified Mutual Fund Schemes					
ICICI Prudential Multicap Fund - Direct Plan - Growth	0.002086107	0.2086107	0.000644802	0.0644802	0.131305018
HDFC Equity Fund - Direct Plan - Growth Option	0.000635005	0.0635005	0.000644802	0.0644802	-0.01482943
Reliance Multi Cap Fund (Reliance Equity Opportunities Fund)-Direct -Growth	0.000495847	0.0495847	0.000644802	0.0644802	-0.017043229
Larsen & Toubro Equity Fund - Direct plan - Growth plan	0.000191648	0.0191648	0.000644802	0.0644802	-0.004726827
AXIS MULTICAP FUND - Direct plan - Growth	0.000585574	0.0585574	0.000644802	0.0644802	-0.01803456

The table, portrays the value of average returns obtain by selected mutual fund schemes as averse to the return on the market index for the period of 28.03.2018 to 29.03.2019. In the graph 4.1 the average returns of public and private sector mutual fund schemes are presented, in this analysis ICICI Prudential multi cap fund (0.2086107) is performing more better than other schemes, as the schemes does not reach the risk free rate (7.75%). The private sector equity diversified schemes has high level of returns compared to public sector equity diversified schemes. As the table, portrays the average returns obtain by mutual funds schemes as averse to the returns on the stock market index (NSE & BSE) for the period of one year i.e., April, 2018 to March, 2019. 7 mutual fund schemes out of 10 selected schemes have not reached till the market returns. In public sector mutual fund scheme the Union multi cap fund (0.033) and Canara Robeco Equity fund(0.055) reaches the market returns(0.033) and also in the private sector mutual fund schemes only ICICI Prudential multicap fund(0.21) reaches more than the market returns(0.065). The returns are lower than the risk free rate i.e., 7.75%. Out of 10 selected public and private sector schemes IDBI diversified equity fund(0.0146) and L&T equity fund(0.0193) and Baroda multi cap fund(0.0113) are performing very poor. Further the performance of private sector mutual fund schemes has been better than public sector mutual fund schemes thus the first objective under study is confirmed. All the mutual fund schemes are performing in moderate level with their benchmarks as their alpha is lying between 1.0 and -1.0.

Systematic Risk (Beta and Standard deviation):

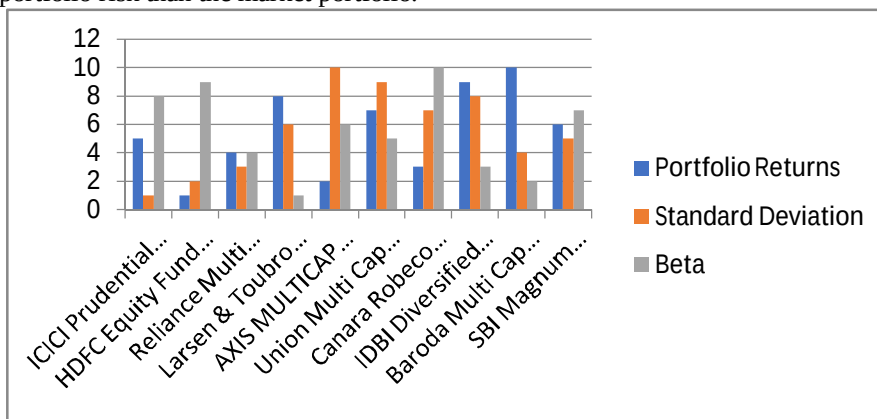
Standard Deviation measures the volatility of risk from the expected average returns of the mutual fund schemes. If the standard deviation of a mutual fund indicates higher

value then it has high volatility means higher risk. Here, ICICI Prudential multi cap fund (0.017770418) has higher standard deviation compared to other mutual fund schemes. The public sector mutual schemes has low volatility (Union multi cap fund 0.007058, Canara Robeco equity diversified 0.007459, IDBI diversified equity fund 0.0070645, Baroda multi cap fund 0.00803454, SBI magnum multi cap fund 0.007702) compared to private sector mutual fund schemes (ICICI prudential multi cap fund 0.01777, HDFC equity fund 0.009344, Reliance multi cap 0.009044, Larsen & Toubro equity fund 0.0076912) In private sector, Axis multi cap fund with lower standard deviation (0.00698502) has less risk.



Performance of Returns and Risk

Based on the above chart, ICICI prudential multi cap fund has high returns(0.2086107) and high standard deviation(0.1777) but the beta(0.014927) is less than 1, for risk taker this scheme is most preferred. If the beta is less than unity it is considered as defensive and if the beta is more than unity it is considered as aggressive. Larsen & Toubro equity fund (4.11744) in private sector and IDBI diversified equity fund (1.368613) and Baroda multi cap fund (3.77319) in public sector are performing aggressive, as beta is more than unity which implies higher portfolio risk than the market portfolio.



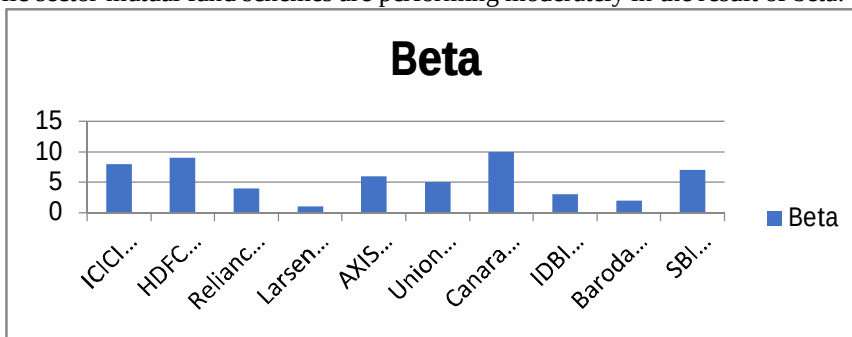
II. Analysis of risk and Return using portfolio performance evaluation model (Sharpe ratio, Treynor ratio, Jensen Ratio)

Scheme Name	Standard Deviation	Beta	Sharpe Ratio	Treynor Ratio	Jensen Ratio
Public sector equity diversified mutual fund schemes					
Union Multi Cap Fund - Growth - Direct Plan	0.007058044	0.094609538	-6.305585513	-0.470408172	-0.040282118
Canara Robeco Equity Diversified Fund-Direct Plan -Growth Option	0.007459232	-0.100028981	-2.937581242	0.219057515	-0.026376984
IDBI Diversified Equity Fund - Direct - Growth plan	0.007064562	1.368613352	-8.914678645	-0.046016137	-0.001889011
Baroda Multi Cap Fund) - Plan A Growth	0.00803454	3.773099099	-8.23142333	-0.017528217	0.102279974
SBI Magnum Multicap Fund - Direct Plan - Growth	0.007702271	0.057358582	-6.09352748	-0.818255927	-0.044373748
Private sector equity diversified mutual fund schemes					
ICICI Prudential Multicap Fund - Direct Plan - Growth	0.017770418	0.014924794	7.378031288	8.784757495	0.131305018
HDFC Equity Fund - Direct Plan - Growth Option	0.00934412	-0.063743699	-1.49821492	0.2196210708	-0.01482943
Reliance Multi Cap Fund (Reliance Equity Opportunities Fund)-D -G	0.009044231	0.835041313	-3.086531072	-0.033429843	-0.017043229
Larsen & Toubro Equity Fund - Direct plan - Growth plan	0.007691233	4.117449773	-7.584635649	-0.014167799	-0.004726827
AXIS MULTICAP FUND - Direct plan - Growth	0.00698502	0.069743011	-2.711889157	-0.271605711	-0.01803456

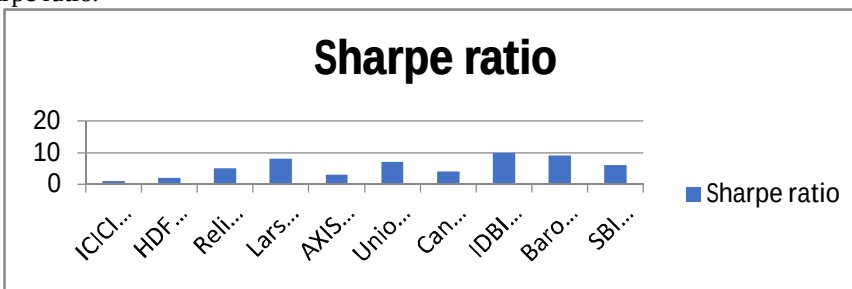
III. Performance of equity diversified mutual fund schemes as on april, 2018 to march, 2019

Scheme Name	Ranking of Sharpe	Ranking of Treynor	Ranking of Jensen	Ranking of Beta	Ranking of standard deviation
Public sector Equity Diversified Mutual fund Schemes					
Union Multi Cap Fund - Growth - Direct Plan	7	9	9	5	9
Canara Robeco Equity Diversified Fund-Direct Plan -Growth Option	4	3	8	10	7
IDBI Diversified Equity Fund - Direct - Growth plan	10	7	3	3	8
Baroda Multi Cap Fund) - Plan A Growth	9	5	2	2	4
SBI Magnum Multicap Fund - Direct Plan - Growth	6	10	10	7	5
Private sector Equity Diversified Mutual fund Schemes					
ICICI Prudential Multicap Fund - Direct plan- Growth	1	1	1	8	1
HDFC Equity Fund - Direct Plan - Growth Option	2	2	5	9	2
Reliance Multi Cap Fund (Reliance Equity Opportunities Fund)-D -G	5	6	6	4	3
Larsen & Toubro Equity Fund - Direct plan - Growth plan	8	4	4	1	6
AXIS MULTICAP FUND - Direct plan - Growth	3	8	7	6	10

Ranking by beta: Beta indicates the measure of systematic risk which shows how schemes respond to their market portfolio. To sensitivity of schemes returns in relation to their market returns has unity value. If beta is less than unity indicates defensive and more than unity indicates aggressive. Larsen & Toubro equity fund has the highest beta value(4.11744) and also IDBI diversified fund (1.36861) and Baroda multi cap fund (3.77309) are the choices for the risk taking investor where (beta>1.0). ICICI Prudential multi cap fund (0.014928) has least beta value which is in favorable stage for the investors. By the result of Beta, HDFC equity fund (-0.063743699) and Canara Robocoequity diversified fund (-0.100028981) has negative values. Both the private and public sector mutual fund schemes are performing moderately in the result of beta.



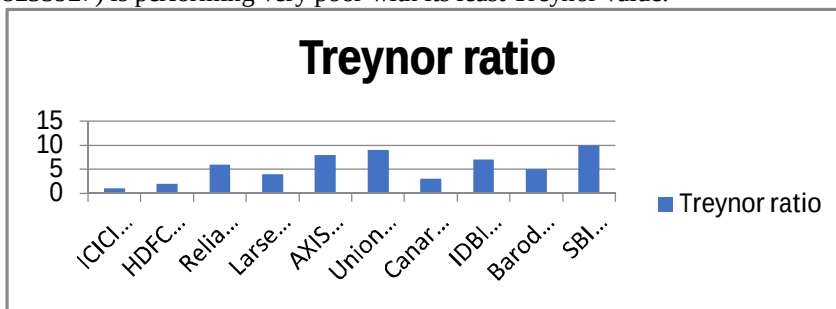
Ranking by Sharpe index: Sharpe index describes the higher the value, the more excess returns we receive for the extra volatility over the risk free rate of return. Sharpe index results except ICICI Prudential multi cap fund (7.378031288) all other mutual fund schemes has negative value. The public sector mutual fund schemes are performing better compared to the private sector mutual fund schemes in the result of Sharpe measure. Column 1 of table 3.9 shows the ranks of Sharpe ratio for the schemes. It is an excess returns are not earned over risk free return (7.75%) per unit of risk i.e., per unit of standard deviation. Positive value of schemes indicates better performance. But the Sharpe ratio contains negative value which indicates poor performance. In the chart above y-axis represents Sharpe ratio and x-axis represents mutual fund schemes. **ICICI Prudential equity fund** is the best scheme among the peers as it has maximum Sharpe ratio.



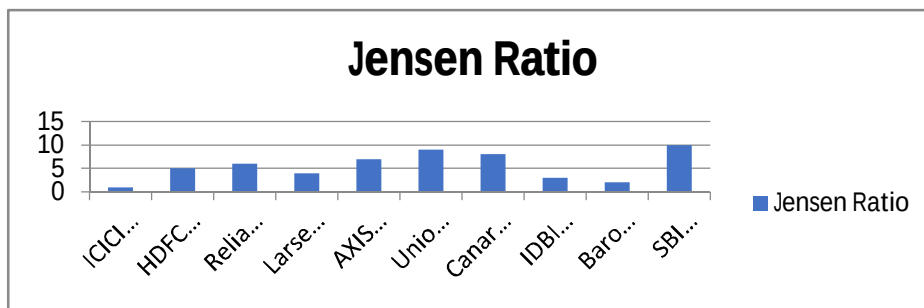
Ranking by Treynor ratio: The Treynor ratio is ranked based on the measures which are presented in table 4.9. The Treynor ratio determines the excess returns generated for each unit of risk. It measures the volatility in the market for the value of investment



adjusted risk. Highest value of Treynor's index shows better performance of portfolio and vice versa. In the chart 3.7 below y-axis represent Treynor Ratio and x-axis represent Mutual Fund Schemes. The results shows ICICI Prudential multi cap fund (8.78475745) and HDFC equity fund (0.219621708) and Canara Robeco equity diversified fund (0.219.57515) are performing better compare to other mutual fund schemes due to their higher treynor index value. SBI Magnum multi cap fund (-0.818255927) is performing very poor with its least Treynor value.



Ranking by Jensen (Alpha): The alpha outlines the stock's unsystematic returns at the level of risk assumed, the fund would have an alpha equal to zero. A positive alpha indicates returns greater than expected for the risk taken. Alpha is determined by comparing the fund's actual performance with the risk-adjusted expected return. The fifth column of Table(4.9) shows the Jensen Alpha values for 10 selected open ended public and private sector Mutual fund growth schemes. Higher Alpha value indicates greater performance. Among the public sector mutual fund, higher alpha was found with Baoda multi cap fund(0.102279974), While in Private sector mutual funds higher performance was evidenced in ICICI prudential equity fund (0.131305018). The worst performer was SBI agnum multi cap fund (0.044373748) – Public Sector mutual fund and Axis multi cap fund(-0.01803456) private sector mutual fund. A negative alpha value indicates the failure on the part for taking better investment decision. Private sector mutual fund schemes showed better performance in comparison to Public sector mutual fund schemes as per the results shown by Jensen measure.





CONCLUSION:

The favorite sector for Equity Diversified Mutual Fund schemes is Energy followed by banking, technologies, communication. It shows that investment for longer period would get absolute higher return than the risk free rate of return. As per the study we conclude that the performance of selected equity diversified direct growth plan mutual fund schemes by using their benchmark returns under BSE and NSE for public and private sector mutual fund schemes respectively and also risk free rate of return. It also concludes that ICICI Prudential multi cap fund in private sector and Baroda multi cap fund and IDBI diversified equity fund in public sector are performing moderately compared to other 7 schemes. It also states that private sector mutual fund schemes are performing better than the selected public sector mutual fund schemes.



EMPATHY TOWARDS NATURE: INDIAN ANCIENT AND EGALITARIAN

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Abstract

India is a nation with a diverse and composite culture that is a result of several thousand years of trial and error. Though globalisation has edited the lifestyles of the masses; the indigenous lifestyle in India has still retained its traditional life practices. The paper aims at studying existing literature to ponder on the idea of sustainable daily life.

This paper is relevant as it provides inputs on the cultures and communities of India and how their intrinsic knowledge of design is a part of the living history that can teach the modern world to have a sustainable lifestyle in a way that an all round development can be achieved. It studies relevant literature to put forth the idea of an evolved modern world where design and technology create an all round development and not a unidirectional one.

This paper follows the historical method to observe and analyse the meaning of life as mentioned in the ancient Indian scriptures and follows into the tribal egalitarian societies to bring forth the inherent sustainability of their daily life practices as an inspiration for modern design that is time bound and limited.

Keywords: Sustainability, Indigenous, Lifestyle, Design, Environment

Introduction

Man has come a long way from the earliest cave paintings to the social media of today. This long journey of thousands of years has been possible because of man's desire to grow, to make maximum use of resources; an act of defiance against laws of nature by abiding to the very laws of nature that it defied. To overcome the acts of inertia, man has developed tools and techniques, utilising the very nature man was fighting against. This act of turbulence is the base of Human civilisation as a whole; cutting through rock to make caves and buildings; tunnelling under rivers and oceans for transport. The moment the primitive man learnt to stand on his two legs, the hands were free for grabbing opportunities. Unlike the other animals who obey the forces on all fours, man decided to stand up, and hence create a circle of possibilities around him. This has been the core of human development; from the cave dwelling hunter gatherer to the urban landscaper defying gravity and rising vertically to match with the immense ambition of man.

All the ancient societies that flourished for thousands of years much before us could prosper due to a single reason. They were ambitious in planning but were also rooted in



the possibilities and limitations of nature. They developed around fertile river basins, and were dependant on the forces of nature to prosper. They were dependant on the water and the flooding for their agriculture. From the first man who settled around agriculture to the massive civilisations of Mesopotamia, Egypt and Indus valley, man lived alongside the forces of nature, respecting the ultimate truth and cosmic order (*Rita* in the Vedas) and prospering hand in hand with nature.

Ritasya Drilaha Dharunani Santi Puruni Chandra Vapushe Vapunshi I

-Rigveda 4.23.9

(The foundations of Rita are firmly fixed, shining in beauty; manifold are its beauteous forms.)

The cosmic order that maintains harmony is in turn iterated in the concept of *Dharma* (literally translated as that which upholds). *Dharma* can be defined as something that upholds the truth and is upheld by the truth in return; the truth being the cosmic order that is inherent and manifest in everything there is. To ensure a harmony, the ancient cultures stress on maintaining the balance in the world. It is this balance which has been the foundation of all ancient cultures. This relationship has been given the form of anthropomorphic or zoomorphic figures as a representation of the reverence for forces of nature. From the winged goddess Ishtar of ancient Mesopotamia to the representation of Goddess Lakshmi on an owl; from the Pashupati seal of ancient Harappa to the Bison Horn Marias of Madhya Pradesh; the inherent rhythm and reverence for the unfathomable has always been the main characteristic of the above thought process.

The ancient civilisations have long disappeared, but the non verbal language of material culture has found a continuous representation for the indigenous lifestyle of the people. This has given form to a way of life which is ancient and has been transmitted across generations due to the fact that it is manifest in daily lives of the people.

In today's world, where urbanisation and globalisation are the buzzwords that run societies, it is this knowledge that has retained the true way of life. Over the past century, the modern human civilisation has become entirely dependent on fossil fuel; and has in turn depleted the millennia old storehouse of carbon. As we move further and further away from a life that regards the forces of nature and works alongside rather than entirely against it; it is the indigenous knowledge and old customs and festivals that still celebrate the position that man has had as an inherent part of the universe.

Going back to the wisdom of the Indian ancient scriptures, it is said in *Shatpath Brahmana* that Man as a living being has certain debts to be repaid throughout his life. One of them is the *Bhuta Rin* (debt to the elements of nature manifested in plants and animals).

From this gap in the old and new way of life, comes the term coined as Sustainability. According to the official website of Environmental Protection Agency of the USA, "Sustainability is based on a simple principle: Everything that we need for our survival and well-being depends, either directly or indirectly, on our natural environment. To pursue sustainability is to create and maintain the conditions under which humans and nature can exist in productive harmony to support present and future generations."

Materials and Methods

This paper will now follow the historical method to observe and analyse the meaning of sustainability and a wholesome life in the ancient Indian context; that is reflected in the



daily lifestyle of the egalitarian societies. It will observe the existence of songs of nature and daily activities; and even the daily rituals that pertain to the spirit of sustainability.

Discussion

In the words of the great Indian polymath Rabindranath Tagore (1930), creation can be described as a consciousness of the tiniest cell of the value of existence, which it tried to enhance and maintain in many branched paths of creation. Creation was then facilitated by relationships both intra and inter, which in turn bound the physical object to the world. Man was born as a result of the process of evolution spanning millennia; and progressed towards perfection. The Circle of action of man, as facilitated by standing on two feet, helped man own the entire geography of the Earth, notwithstanding the boundaries of climate; adapting to create his own special skin and temperature by borrowing from the forces of nature in the form of food, shelter and clothing. After the settlement of man around agriculture and the advent of the ancient civilisations, there came knowledge of using different elements of nature to create tools for daily use.

According to Mode and Chandra, (1984) from the bone needle of the Stone Age to the iron axe of the Iron Age, “all art was functional or utilitarian, no matter whether its object was to give aesthetic shape to tools and articles of everyday use, or to bolster the ideology of social structures by the production of ritual objects and paintings. In spite of the vocational segregation in the later stages, in the words of Ashutosh Bhattacharya (1978), “the way of life throughout the Sub-continent is more or less identical and the social functions performed are also not very different in various regions in spite of the fact that there are different languages and apparently different cultures.” This further stresses that culture had developed across the indigenous people as a response to the stimulus that is nature. As evident in the folk songs which are a reflection of the daily lives of the people, their lifestyles were centred on the forces of nature. Something as simple as a child’s nursery rhyme from Assam states:

O crane, who has taken away your hand?

The mango, when I tried to pick it.

Where is that mango?- It fell into the wood.

What became of the wood?- The fire consumed it.

Where are the ashes?- The washerman carried them away.

The daily lives of the indigenous people have nature inherent in their very essence. Apart from children’s songs, there can be cited another example of something called work songs. “They are generally group songs and sung by a group of workers while performing the same work together such as husking paddy, grinding pulses, reaping the harvest, rowing boats, and so on.”

Some of them sung by the Marathi during grinding are:

1. *Rise, my companions, for the dawn grinding,*
The star of Venus stands above our heads.
2. *The rain falls, sister, the clouds thunder and thunder,*
The farmer like a king rejoicing begins to sow his land.

The indigenous life, as seen in the examples, is in rhythm with nature. The creation myths and belief systems of the folk traditions are similarly in tandem with the immediate surroundings and sustainable lifestyle of the people. According to Das (1956), the concept of soul is the primary foundation of the belief system. Among the



Baiga tribe, it is believed that “the food that a Baiga gives away during his lifetime is stored in his house in the other world, and his soul subsists on it there till the viands are exhausted, when it has to come back to this world and be reborn. Among all such indigenous peoples, the belief of God is also as a Creator of the whole universe; and tribes such as the Birhors and Murias of Chota Nagpur worship Sun and Mother Earth (*TallurMuttai*) as their supreme Gods respectively. Among many tribes of the same region, every village has “a sacred grove where the tutelary deities of the village reside, and where they are worshipped. This grove is generally a patch of the primeval *sal* forest, left intact to serve as a sort of refuge for the local spirits, when the village was first established by clearing the surrounding area of its natural vegetation.” This belief system also acts as a biological database for the biodiversity of the region.

From the tribal way of life, let us focus on the current problems with the Urban Industrial way of life that is completely dependent on fossil fuels. In the words of Paturi (1974), it has been said that the modern man’s use of technology for everyday purposes has decreased his efficiency at the price of energy. This brings the question of development versus design; development being a natural process of adaptation that takes its time, whereas design of the modern society being something that quickly conforms to the immediate need. For example, “Iron rusts; but the durable goods of our economy must not be allowed to rust.” Thus we choose aluminium which is durable but requires “six times as much energy as does the production of iron.” If we look at nature, we will be able to see that “production and decomposition cancel each other out.” The leaf that falls off decomposes to create fertilizer for the tree; which in turn sustains the bacteria and smaller plants. “If we do not stop producing things ceaselessly without giving any thought to the problem of their ultimate disposal (not in the sense of ‘laying aside’ but of ‘making disappear’), no programme for the protection of the environment, however costly, will succeed in solving the world wide refuse problem.”

With regard to sustainability, Fletcher (2008) talks about recycling as an option, but not the only one. This needs to be replaced by something called Industrial Ecology. It is ecology in the lines of a natural ecosystem, where waste for one industry becomes food for the other. “In some instances this has lead to industries being built up in clusters or dependent communities around each other so that the outputs from one facility form the raw materials for another”; much like the tribal village which is an ecosystem in itself.

According to researchers William McDonough et al, all industrial products need to fit into two cycles: either biological (where the waste is biodegradable) or industrial (where waste is managed by recycling completely and continually). Further discussions reveal that the best option for sustainability is to produce “Local and Light”, where “Local and Light are both principles inspired by ecosystem properties and dynamics.” Hence, Nature needs to be used as a model to inspire human design; “judge or measure the ‘rightness’ of our innovations; and thirdly be used as a mentor.

Another interesting approach of design for the environment is to make “emotionally durable” products. According to Jonathan Chapman (2005), the characteristics of emotional durability are Narrative (personal history with the product), Detachment, Surface (the product ages well), Attachment, Enchantment, and Consciousness.



A good example of the above points being realised would be the choice of raw materials for making daily objects among the tribal societies. For example, the bamboo forests of the North East India provide the indigenous people with raw materials for everything from water pipes and smoking pipes to strainers for tea and rice, sieves and fans, to conical trap for fishing. Life begins with the cutting of the umbilical cord using a bamboo knife and ends with the dead resting on a bamboo bed for one's final journey.

The indigenous lifestyle also makes use of several other materials such as stone, wood, bones and shells to create objects of design, aspect to local availability of the raw materials. All the processes require minimum external energy and make use of the human physical strength and aesthetic sense.

Results

Thus, after the course of the study it is understood that we need to learn from nature to be local, durable, and light in our approach; share our products with the community; and know the balance between fast and slow production and consumption (both are required, much like in nature). These are the characteristic features of the indigenous lifestyle of the country. It is about time that we go back in time to see for real how much or how less we have actually progressed.

It will be very wrong to think that man is separate from nature. It is about time that man goes back to the old way of living, and thus makes his surrounding as sustainable as possible. Only then can true development be brought forth. The future has to be hand in hand with nature, and not by cutting off from it. That will be similar to chopping off the branch one is sitting on.

Much as the very daily lifestyle of the indigenous people is carried on with the basic principle of reverence to nature and acceptance of the power of the elements; so should the urban man tread lightly and not disturb the thin line of balance that keeps the world going.

Conclusion

To conclude, it needs to be pointed out that the path of progress should realise that it is not the material things that keep it going, but it is the inner spirit that sustains; and that the living is to be more valued than the non living. It should know where to stop and look back, or else the doom cannot be stopped.

Going back to the ancient wisdom of India, the following prayer sums up the ideal approach for life:

*Yaekovarnobahudhasaktiyogat
varnananekannihitarthodadhati
vichaitichantevisvamadausadevah
sa no budhyasubhayasamanaktu.*

(He who is one, who is above all colours, who supplies the inherent needs of men of all colours, who comprehends everything from the beginning to the end, let that Illuminator unite us in a relationship of auspicious wisdom and good will.)

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ROLE OF ASSESSMENT IN POST COVID-19

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Abstract:

Online teaching and learning provides a platform to reinforce skills by practicing. Assessment is extremely vital for teaching and learning, because it establishes the accomplishment after all learning outcomes by the students. Computer-based assessment is in demand for long time; however, on-line assessments are less practiced. This can be due to the problems of validity and reliability. During the COVID 19 pandemic, the tutorial structure has taken a paradigm shift in several areas, each across the nation and internationally. This example demands a technique of assessment that has to be valid, reliable and possible. The requirement of the hour is to boost on-line assessment by technology enhancement. This paper is the reflection of existing scenario in educational system and requirement of on-line assessment tools.

Keywords: Online assessment platforms, COVID 19 Pandemic, Technology enhancement

Introduction:

According to the wordbook of Education Reform, "In education, the term assessment refers to the large choice of strategies or tools that educators use to judge, measure, and document the educational readiness, learning progress, talent acquisition, or instructional desires of scholars." on-line Teaching and Learning is delivered either asynchronously or synchronously, wherever the latter is finished in time period, face to face and on-line.

Assessment refers to learner performance. It helps us decide if students are learning or not and in which area improvement is required. Assessment focuses on the individual learner, the educational community or the evaluation. During this pandemic scenario academics and learners are troubled to find out through technology and therefore the most significant issue is to assess what students learn. Assessment tools and techniques are to measure a student's educational talents, skills, and/or fluency in an exceedingly given subject or to live one's progress toward educational proficiency in an exceedingly specific subject field. Educators use assessment tools to form privy selections concerning methods to reinforce student learning.

Technological enhancement in terms of assessment is required as in this pandemic both teachers and students are learning while struggling. The Technological content pedagogical knowledge is equally important while assessing the student's performance.



It will not only help in enhancing students knowledge but also by defining the areas in which a student's needs to work upon.

Online Assessment Platforms

1. Easy LMS

Easy LMS is well-liked on-line assessment software package, specializing in instructional technology. This on-line quizzing and on-line assessment software package are noted for its user expertise and client support. The net assessment creation tool comes filled with a myriad of various customization options, providing a lot of bigger easy use. The straightforward LMS on-line assessment tool is easy for each academics and students, creating for an awfully easy expertise. The quizzes are obtainable on all platforms and are totally optimized for phones, computers, and tablets.



2. Nearpod

Nearpod is an internet assessment tool with a particular target education, creating it an outstanding tool for academics. It's a strong tool that permits academics to form careful on-line assessments, while not a lot of time, effort, or previous quiz creation data. The self-titled "ed-tech tool" has quite ton to supply. It's not solely an internet quiz creation tool, as you'll be able to collect your whole instructional method and lessons through it. All instructional experiences, polls, and questionnaires are all totally customizable and permit for careful reports. This will be used for careful reports to optimize your instructional quizzing method. It permits for several quizzing and question varieties; however what sets it apart is its draw and facultative answer options.



3. Kahoot

Kahoot could be a student response app that's a category favorite because of its spirited game-like interface. It straightforward to feature multiple-choice queries on the web site, or make a choice from the already created quizzes, and provides to students the sport PIN. It conjointly has feature of adding videos, images, and diagrams to the queries. Students are totally engaged whereas presenting the quiz queries and that they race to not solely get the solution correct, however comprehend in 1st. it's a game-based schoolroom response system, wherever academics will produce quizzes exploitation web content.





4. Padlet

Padlet is associate electronic bulletin board wherever academics and students will transfer documents, text, videos, images, so far more. Padlet has colorful background choices and layouts to assist organize content. There is such a big amount of ways that to use a Padlet wall—it's the right thanks to permit students a alternative in however they demonstrate their data, all collected in one simply accessible place. It provides associate primarily blank canvas for college kids to form and style cooperative comes. It's an incredible tool for group action.



5. Google Forms

It is a Google Drive app that permits you to form documents that students will collaborate on in real time exploitation good phones, tablets, and laptops. It's feature of making forms with hyperlinks, images, and videos. It wide used for measurement and quizzes. It's a free on-line tool that permits you to gather data simply and expeditiously. Google Forms permits academics to form multiple alternative queries within the kind of a survey and enhance it with pictures and videos in an exceedingly couple of minutes.



6. Edmodo

Edmodo is an academic technology company giving a communication, collaboration, and training platform to K-12 colleges and academics. The Edmodo network allows academics to share content, distribute quizzes, assignments, and manage communication with students, colleagues, and oldsters. Edmodo is extremely teacher-centric in their style and philosophy; students and oldsters will solely be a part of Edmodo if invited to try and do thus by a lecturer. Academics and students pay giant amounts of your time on the platform, each in and out of the schoolroom. Edmodo is liberated to use, however it conjointly offers premium services.



Possibilities in Post Covid-19 Education

Online learning may well be a blessing throughout this pandemic situation for all education levels. However, going ahead, at intervals the post-Covid-19 times, on-line assessment tools develop a positive atmosphere in educational institutes. As colleges and schools round the world have closed attributable to corona virus (COVID-19) pandemic, students and lecturers entering into the "new reality" for the predictable future. Many educational institutes and colleges connecting students and lecturers through on-line platforms and tools. National and native governments are sharing the content via tv and radio throughout dedicated hours. Beneath these crucial circumstances, lecturers have had to quickly adapt to teaching throughout this new reality to create positive that students interact in learning.

Prior to the COVID-19 crisis, all modalities of learning assessment had been powerfully addicted to students' physical presence – either for administration or for perceptive the



learners' daily progress. Presently colleges and schools closure results in the need of the web learning and assessment. Whereas all kinds of assessment of student learning desires the validity and reliability and therefore the necessity for formative assessment quickly is particularly crucial as a results of learning has got to result outside of the physical room and lecturers. Several aspects are concerned within the determination of the particular nature of the technological apply undertaken at intervals any context.

These aspects embody such things as:

- The views of the people concerned within the development;
- The potential of the people concerned within the development;
- The vary of technological data, skills and resources on the market at any time;
- Data and skills from alternative domains as appropriate;

Tools for on-line assessment mirror the necessity of the hour and are accessories for lecturers and students during this covid-19 pandemic.

Conclusion:

Assessment strategies are the techniques and tools for the gathering of data, to search out the progress of scholars, to what extent they reached the specified learning outcomes. This paper explains regarding existing assessment tools. The tools facilitate the learners for recalibrating and provide insights to differentiate instruction. On-line assessment computer code package is quickly procurable, and it's vital to pick out the only tool for specific needs. Even supposing in several places it's presently unattainable for lecturers and students to return along within the same area, it's necessary for teaching and learning to still avoid learning losses and to remain not off course in decreasing learning financial condition. Technological improvement will facilitate all students to continue on their learning mechanical phenomenon, providing them, their lecturers with the required data to support the educational method.

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**CHANGE IN THE USAGE OF PERSONAL CARE, HYGIENE AND GROOMING PRODUCTS
AMONG WOMEN DUE TO COVID**

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ABSTRACT:

The pandemic is much more than a health crisis as it has turned into an unprecedented socio-economic crisis. There were drastic changes in every sphere of life starting from education system in schools and colleges, work from home system for offices, changes in life style, buying patterns of consumer, increase in usage of internet and many more. The present study aims to analyze how the pandemic has changed the usage of personal care, hygiene and grooming product among women due to lockdown. The survey conducted on a representative sample of 75 women residing in and around Kolkata shows that there has been considerable reduction of earnings in many families resulting in shift of focus from luxury/comfort goods to basic necessities. An analysis of shopping budget also reveals that funds have been curtailed from purchase of non essential grooming products and have been allocated towards purchase of personal care and hygiene products by the respondents.

KEYWORDS: Pandemic, Income, Women, Sanitizer, Lifestyle, Personal Care.

INTRODUCTION

A remarkable and unpredicted 2020 will never be forgotten by the entire world. The corona virus or COVID-19 pandemic is the defining crisis and the greatest challenge faced by humanity since the World Wars. Since its emergence in Asia late last year, the virus has spread to every continent. But the pandemic is much more than a health crisis as it has turned into an unprecedented socio-economic crisis. It has the potential to create devastating social, economic and political effects that will leave deep and longstanding scars. The UNDP has assumed technical lead in the UN's socio-economic recovery, alongside the health response led by WHO, and the Global Humanitarian Response Plan, and working under the leadership of the UN Resident Coordinators. India's visionary Prime Minister immediately responded to the crisis and lockdown of the country was announced to avoid community spread. It was followed by mandatory lockdowns in the hotspots and till July this lockdown is continuing. The United Nations (UN) and the World Health Organization (WHO) have praised India's response to the pandemic as 'comprehensive and robust' terming the lockdown restrictions as aggressive but vital for containing the spread of virus and building necessary healthcare infrastructure.

In the pandemic period, there were drastic changes in every sphere of life starting from education system in schools and colleges, work from home system for offices, changes in life style, buying patterns of consumer, increase in usage of internet and many more.



The present study aims to analyze how the pandemic has changed the usage of personal care, hygiene and grooming product among women due to lockdown.

LITERATURE REVIEW

Altun (2020) studied the change created by Covid19 regarding hygiene perception of the consumers and reflections of these changes on e-commerce. This study has been carried out in order to point out the differences in consumer behaviors before and after COVID-19 and draw attention to the new consumer channels which have emerged based on this behavioral change that has taken place. It is concluded from the findings that e-commerce is one of the key changes in consumer's perception of 'new normal'.

The study by Shaaban and Alhajri (2020) found that the consumption of personal care products varies widely and different products are consumed simultaneously. Reporting adverse effects of cosmetic products necessitates the consideration of safety concerns related to cosmetic use.

Beiu et al (2020) aimed to review in their study the potential dermatological adverse effects that may arise due to frequent hand washing, as well as practical tips for preventing these uncomfortable skin reactions. This study concluded that the potential development of hand dermatitis is preventable and manageable by using the appropriate skin care products. Regular skin hydration is a key component in preventing hand dermatitis as a consequence of frequent washing.

Barani and Sushmaa (2020) try to realize what marketing strategies are creating an impact on the beauty and personal care industries in the course of COVID-19. The panic has led to rise in protective private care, demands skincare merchandise have also increased and domestic supplies are more valued by the customers. The internet has brought new techniques of advertising that are becoming increasingly powerful and efficient as compared to the conventional techniques (word-of-mouth referrals, print advertising etc).

Basu et al (2020) highlighted the impact of imposed nationwide lockdown on the society and environment alike along with analysis of lifestyle changes. This study analyzed the changes that the society has undergone during lockdown to mitigate the spreading of the infection and also addressed the changes that have become part of our lives during lockdown – hygiene and health consciousness, work from home (WFM), online teaching, digital shopping, changing internet habits and societal changes. They found that there has been a remarkable shift in consumption pattern of the masses due to lockdown.

Loxton et al (2020) made an analysis of consumer spending data, largely focusing on Australian and American markets. The study analyzed the volume and timing of consumer spending patterns; the volumes of spending on specific, highly-demanded consumer goods during the investigative period; and the distribution of spending on luxury and non-durable goods to identify the traits of consumer behaviors. They concluded that till the survey date the consumer behavior due to the COVID-19 crisis appeared to be quite identical with behaviors exhibited during historic shock events.



OBJECTIVES OF THE STUDY

The main objectives of the study are to study consumer behavior through a survey conducted on women residing in West Bengal on the following issues:

- To analyze whether lockdown has changed the usage pattern of personal care and hygiene product among the respondents.
- To analyze whether lockdown has changed the usage pattern of grooming product among the respondents.
- To assess if there is a shift in interest from grooming products to personal care and hygiene products.

DATA AND METHODOLOGY

For the purpose of study, a close-ended questionnaire was designed and survey was conducted during the month of May 2020 while the ongoing lockdown was being extended. The survey observed the changes related to usage of personal care, hygiene products and grooming products due to lockdown among women. The representative sample chosen for the survey was 75 women residing in Kolkata and its outskirts of the age group between 20 to 60 years. The research instrument contained questions related to specific preferences of personal care, hygiene products and grooming products. The savings pattern and discounts on these products were analyzed and any significant changes in buying decisions were also assessed. The data so obtained were processed and meaningful interpretations are drawn.

FINDINGS FROM THE SURVEY

Demographic profile of the sample:

Observations	Alternatives and no. of respondents (N=75)
1. Age	20-29 years: 49 30-39 years: 9 40-49 years: 9 Above 50years: 8
2. Educational Qualification	Bellow Secondary: 7 Gone to College: 20 Graduate: 20 Post graduate/ Professional Qualification: 28
3. Occupation	Unemployed: 19 Self employed: 10 Service: 15 Business: 4 Housewife: 22 Others: 5
4. Average monthly income before lockdown	No personal income: 33 Bellow 10000: 22 10000-30000: 11 30000-60000: 6



	Above 60000: 3
5. Average monthly income during lockdown	No personal income: 43 Bellow 10000: 16 10000-30000: 9 30000-60000: 5 Above 60000: 2

The survey is conducted among women of different age groups from 20 years and above. Out of 75 women 49 respondents (65%) are young ladies of age group of 20-29; 12% of respondents belong to the age group of 30-39 years and 40-49 years each; and 10% of respondents are above 50 years. Women from various occupations with varying monthly average income have been taken into consideration (particularly focusing before and after lockdown). Almost one fourth (25%) of the samples are unemployed, 20% are in service, 29% are housewife, 13% are self employed and few (5%) are also doing business. It is found that almost 45% of the women had no income before lockdown which has been increased to 60% during lockdown. Analyzing the income columns pre and post pandemic, it is observed that the average monthly income has diminished for most respondents due to lockdown.

Effect of Lockdown

Observations	Alternatives and no. of respondents (N=75)
1. During lockdown which product would you prefer more?	Personal care and hygiene product: 75 Grooming product: 0
2. Which product do you think is more essential for you?	Personal care hygiene product: 75 Grooming product: 0
3. If lockdown continues for next six months then which product will you need more?	Personal care hygiene product: 75 Grooming product: 0
4. Which product do you think is affected more due to work from home system?	Personal care hygiene product: 0 Grooming product: 75

When it is about essentiality and preference during lockdown, 100% responses are in favor of personal care and hygiene products. 100% of the respondent women are in need of personal care and hygiene products if the lockdown continues for next six months whereas, 100% respondents agreed that work from home system affected demand for grooming products.



Personal shopping schedule during complete lockdown:

Observations	Alternatives and no. of responses
1 Which of the following types of products did you purchase during April?	Soap: 60 Shampoo: 56 Detergents: 58 Hand Sanitizer: 75 Tissue paper: 29 Eyeliner: 0 Nail paint: 2 Face cream: 8 Hair serum: 5 Lipstick: 2
2. Which products do you think have minimum usage or can be avoided during lockdown?	Hair shampoo: 2 Hand wash: 2 Lipstick: 64 Soap: 2 Nail paint: 45 Perfume: 38 Sanitizer: 0 Eye and face make up: 62 Hair gel: 54
3. Specifically, what types of personal care and hygiene products are you using mostly in this pandemic period?	Hand wash: 75 Body soap: 58 Shampoo: 57 Hand sanitizer: 75 Face tissue paper: 18 Deodorant: 12 Body lotion: 9 Sunscreen: 6
4. Specifically, what types of grooming products are you using mostly in this pandemic period?	Lipstick: 10 Kajal: 24 Eyeliner: 8 Nail paint: 18 Hair color: 7 Foundation: 1 Hair gel: 2 Make up cosmetics: 3

It is observed from the survey that just after the announcement of lockdown in March, the buying patterns of consumers have changed. Through this survey, the effect on purchase of personal care, hygiene and grooming products during lockdown is considered among women (for the month of April). The most frequently purchased products are hand sanitizers (100%), soaps (80%), shampoo (75%) and detergents (77%) whereas, the least purchased products are eyeliner (0%), lipstick (2%), nail paint (2%), face cream (10%) and hair gel (6%). Lipstick, nails paint, eye and face makeup and hair gel have minimum usage during lockdown whereas, hair shampoo, hand wash and soap have more usage. On the other hand, hand sanitizer cannot be avoided at all which is reflected through 100% response regarding its usage during lockdown. The



survey shows that hand sanitizers and hand wash are being frequently used during the pandemic period. Body soap and shampoo are used by 78% and 76% of the sample respectively whereas; deodorant, body lotion and sunscreen are having minimal usage. On the other hand, the survey shows that usages of grooming products are significantly lesser than personal care and hygiene products during the lockdown period. Among grooming products kajal and nail paint have comparatively more usage (by 32% and 24% respectively) than lipstick (13%), eyeliner (10%) or hair color (9%). Foundation, hair gel and makeup cosmetics have been minimally used by the sample surveyed.

Personalcare andhygiene products

Observations	Alternatives and no. of respondents (N=75)
1. How often do you wash your hands in a day?	Never: 0 Once: 0 Twice: 0 Very often: 75
2. How conveniently are personal care and hygiene products available in your locality?	Excellent: 22 Good: 42 Sometimes there is crisis: 11 Very Poor: 0
3. How confident are you that the personal care and hygiene product that you are using are clinically safe against germs?	Not at all: 2 Lowly: 1 Moderately: 51 Highly: 21
4. Are highly priced product or reputed brand that decides it's criterion in your decision on personal care and hygiene product?	Not at all: 6 Sometimes: 56 Always: 13
5. To maintain social distancing do you think online shopping is needed for personal care and hygiene product?	Yes: 48 No: 8 Not necessary: 10
6. Before lockdown how much concerned were you been regarding personal care and hygiene products?	Not at all: 1 Little concern: 28 Some concern: 12 Always concern: 34
7. Do you get any discount while purchasing personal care and hygiene product? If yes discount range is	Yes: 43 No: 32 Discount Less than5%: 13 5%-10%: 22 10%-20%: 4 More than 20%: 4

Washing hands frequently has become mandatory during the pandemic. For being hygienic 100% respondents are washing their hands often every day. As corona virus pandemic has impacted consumer's preferences and habits regarding health and hygiene issue, personal care hygiene products are available in every corner of the country. Around 56% of the respondents opine that the availability of personal care and hygiene products are good in their locality and 30% feel it to be excellent. But almost 15% are saying still there are crisis of availability of personal care and hygiene products in their



locality although there is no such case where these products are not available at all. Almost 70% of respondents moderately believe that personal care and hygiene products are clinically safe against germs whereas 28% have high belief on these products. Few respondents (2%) are there who don't believe on safety provided by the personal care and hygiene products. Reputed brands and highly priced products always influence consumers. Only for a few (8%) respondents feel that brands of personal care and hygiene products are immaterial and they do not decide of purchasing products based on reputation criteria. On an average 75% are more or less conscious about price and brands of the products and further 16% are highly concerned about reputation of personal care and hygiene products. For maintaining social distancing, it is mandatory to stay at home which mostly increases internet based shopping online rather visiting stores personally. Almost 65% of the respondent women also prefer online shopping to maintain physical distance from the masses. It is observed that the sample has become cautious regarding hygiene products due to the pandemic which was not previously noticed from the responses. Many respondents also report that they are getting discounts in their locality while purchasing healthcare and hygiene products.

Grooming Products

Observations	Alternatives and no. of respondents (N=75)
1. How often do you use grooming product in a day?	Never: 18 Once: 41 Twice: 15 Very often: 1
2. How conveniently are grooming products available in your locality?	Excellent: 7 Good: 50 There is crisis sometimes: 13 Very Poor: 5
3. Do you give priorities to highly priced brand while purchasing grooming product?	Not at all: 11 Sometimes: 49 Always: 15
4. Even in lockdown, if the grooming companies facilitate online shopping of color cosmetics, will you prefer to buy such product?	Yes: 42 No: 33
5. During lockdown how much concern do you have regarding grooming products?	Not at all: 19 Little concern: 43 Some concern: 7 Always concern: 6
6. Do you get any discount while purchasing grooming product? If yes discount range is	Yes: 62 No: 13 Discount: Less than 5%: 10 5%-10%: 38 10%-20%: 12 More than 20%: 2

Almost every woman uses grooming products and make-up cosmetics to look pretty and confident. From this survey, it is seen that 55% women use grooming product at least once in a day and 21% uses it more than once every day. 67% women say that grooming



products are conveniently available in their neighborhood, out of which 9% are getting excellent availability whereas, 17% says there are crisis and 6% feel that the availability is poor. Many women usually make judgment about the quality of products on the basis of price. This survey shows that only few women are price insensitive.

Cosmetics and grooming products are facing downturn during the pandemic period. The survey shows that the demand of grooming products might increase when the companies are able to deliver the grooming products to homes of their consumers. This is evident as more than 55% women are ready to do online shopping of grooming products during the pandemic period. During this lockdown most of the respondents (60%) are little concerned regarding grooming products. This is evident as 25% says that they are not at all concerned whereas only 6% opine that they are always concerned about grooming products. More than 80% of respondents are getting discounts in buying grooming products among which 63% are getting discounts of less than 10%. But the discount has not yet been able to create burning interest in the hearts of the respondents.

Money spent by respondents

	Pre-Lockdown period	During Lockdown Period
How much money is usually spent by you every month on personal care and hygiene products?	Bellow 500: 26 500-1000: 29 1001-2000: 6 Above 2000: 14	Bellow 500: 18 500-1000: 32 1001-2000: 9 Above 2000: 16
How much money is usually spent by you every month on grooming products product?	Bellow 500: 34 500-1000: 27 1001-2000: 9 Above 2000: 5	Bellow 500: 52 500-1000: 20 1001-2000: 3 Above 2000: 0

COVID-19 has changed nearly every aspect of daily lives and consumer spending is no exception. It is observed that spending on all non-essential products and services have been reduced considerably.

Decision

Observations	Alternatives and no. of respondents (N=75)
1. Do you think that there is a change in your buying pattern i.e. a shift from emphasis on grooming products to personal hygiene products during lockdown?	Yes: 55 No: 20

During lockdown the buying pattern and habits of the consumers have changed to some extent. There is a change in buying pattern regarding shifting from grooming products to personal care hygiene products as the survey shows that 75% have acknowledge their shift.

CONCLUSION

A survey among women belonging to middle and lower middle class families shows that the lockdown has a remarkable impact on the consumption of personal care, hygiene and grooming products. There has also been considerable reduction of earnings in many families resulting in shift of focus from luxury/ comfort goods to basic necessities.



Home confinement has reduced the importance of grooming products considerably for women. The pandemic has also enhanced importance of personal care and hygiene products in their lives. An analysis of the personal shopping schedule during lockdown reveals that hygiene products like hand sanitizers and hand washes, which were less relevant till February, have become absolutely essential for the masses. An analysis of shopping budget also reveals that funds have been curtailed from purchase of non essential grooming products and have been allocated towards purchase of personal care and hygiene products by the respondents. This shift in consumption pattern has caused much trouble for the grooming industry and offer of discounts on their products have not yet been able to revive their demand among the women surveyed.

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ACCURACY OF CBCT IN THE DETECTION OF INTRABONY AND FURCATION DEFECTS – A SYSTEMATIC REVIEW

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Abstract

Background: To overcome the inherent shortcomings of the clinical examination and 2D imaging modalities in the detection of the periodontal defects, CBCT enables 3D visualization of the bony contour and it seems likely that the utilization of this technology in the periodontal settings will improve the diagnosis and the decision making process in treatment planning. However, this has been discussed controversially in the literature and mostly in in-vitro settings. **Objective:** The aim of the systematic review is to identify the best available external evidence to assess the accuracy of CBCT in the diagnosis and the optimization of the treatment planning for intrabony and furcation defects. **Methodology:** Following the PRISMA statement a systematic electronic and hand literature search based on all the publications until 2019 was performed by two reviewers, on database MEDLINE (PubMed), Google Scholar, Web of Science, SCOPUS, Science Direct and EBSCO using the combination of MeSH terms, free terms and key words. The comprehensive search strategy yielded 113 publications of which twenty one articles met the inclusion criteria. **Results:** The results of the individual studies illustrated over and underestimation of the CBCT measurements when compared to the conventional radiographs and clinical detection. These findings may point to “over” and “under” diagnosis which would lead to overtreatment or lack of appropriate therapy. **Conclusion:** Overall, it was validated that CBCT appears to be a promising impending option for periodontal imaging, however, all CBCT examinations must be justified on an individual basis by demonstrating that the potential benefits to the patients outweigh the potential risks.

Keywords :- Cone beam CT, direct/ intrasurgical measurements, DVT, furcation defects, intrabony defects, periapical radiographs

Introduction

The indulgent understanding and recognition of periodontal health problems has gained substantial importance due to the development in diagnostic field. It is essential for the clinician to precisely diagnose the underlying disease to eliminate the causative factors through modern periodontal therapies and determine the prognosis of the disease. IOPA and panoramic radiographs are the most established imaging techniques¹, but the current measurement techniques are insufficiently sensitive to measure 1mm of bone loss until 1.9mm of bone resorption has occurred². Also the two dimensional images of the three dimensional object further lead to problem in terms of validity, accuracy and precision³.

The need for the assessment of dentoalveolar structure in three dimensions has paved way for new research initiatives and readdress some of the diagnostic imaging needs in periodontology in terms of early detection and quantitative assessment. CBCT a new frontier in 3D imaging owing to its volume imaging in a more simple and rapid fashion than the conventional medical CT, it has found a wide application in dentistry. Recently, it has been reported that CBCT is useful in



visualizing interproximal defects, furcation defects, diagnosing dehiscence and fenestrations defects, diagnostic and treatment outcome evaluations of periodontitis, evaluate post-surgical results of regenerative periodontal therapy and in planning the outcome of implant dentistry⁴. Despite the fact that there is rapidly accruing literature on CBCT, there is still no current evidence based guidelines on its necessity and use for periodontal diagnosis, treatment planning and implementation. Before CBCT could be considered as the integral part of the diagnostic chain in periodontal disease assessment, the need of the hour is to evaluate the diagnostic accuracy of CBCT in detecting intrabony and furcation defects and also if it could optimize the treatment plan and eventually result in a better treatment outcome of the patient, thereby justifying the higher radiation dose received by the patient.

The previous systematic reviews were conducted on vitro and in vivo studies except one⁵, the present systematic review is an update of the current in vivo literature evaluating the accuracy of CBCT in the diagnosis of intrabony defects and furcation involvement compared to the direct surgical measurements and conventional 2D intraoral radiographs.

Material and Methods

Protocol and registration

The PRISMA (The Preferred Reporting Items for Systematic Reviews and Meta-Analyses) guidelines were followed to report this systematic review.

Eligibility criteria

A comprehensive literature search was conducted through electronic databases PUBMED, GOOGLE SCHOLAR, COCHRANE, WEB OF SCIENCES & EBSCO to address the specific question according to the PICO criteria: What is the accuracy of CBCT (O) in the diagnosis of furcation and intrabony defects (I) in patients with generalized chronic periodontitis (P) when compared to the direct surgical measurements and conventional 2D intraoral radiographs (C).

Search Strategy

The search strategy was run from 19- 28 November 2019 through the above mentioned databases using the following controlled vocabulary and free key words : as “periodontitis” and “periodontology”, “furcation involvement” and “intrabony defects and vertical defects” ; “CBCT” , “cone beam computed tomography” , “dental radiovisiography”, “clinical probing or clinical detection” , “periapical radiographs”, “intraoral radiography” “accuracy”, “diagnosis” , and “treatment planning” The search terms were connected with the Boolean operators either “AND” or “OR”. The search was restricted to the studies published in English language from the year of origin of the earliest studies to identify and collect evidence that answers the PICO question.

Study Selection

Two independent reviewers (with Cohen’s kappa value was 0.93) first screened the titles and abstracts using the aforementioned search strategy and were considered eligible based on the following inclusion criteria:

1) Studies evaluating the accuracy of CBCT compared to 2D radiographic measurements and presurgical/ or direct surgical measurements, 2) In vivo studies, 3) Advantages of CBCT in clinical periodontal treatment, especially regarding furcation therapy and regenerative therapy (intrabony defects), 4) Studies with qualitative/quantitative information on how CBCT influenced the diagnosis and /or treatment planning, 5) Studies with information on imaging protocol (i.e. voxel size, field of view FOV ,Kvp , slice thickness), 6) Presence of gold standard; however, was not considered mandatory for the studies to be included.

Papers were excluded based on the following criteria : 1) studies that were primarily conducted for any other dental field (orthodontics, endodontics, maxillofacial surgery, implant therapy and prosthodontics) regarding the use of CBCT. 2) For any other periodontal evaluation like apical periodontitis (other than furcation or intrabony defects . 3) Any other diagnostic method used other than CBCT (CT, micro CT, MRI, USG etc. 4) CBCT used only for the measurements of



soft tissues. 5) In vitro studies and ex-vivo studies. 6) Case series, case reports and reviews were excluded but were screened for any additional information.

Unpublished Data and Hand search

The full texts of the articles were obtained that fulfilled the above mentioned criteria. An additional hand search of pertinent journals and bibliographies of the selected paper and reviews for inclusion eligibility was conducted. Duplicates were removed after the reviewers reached consensus. OpenGrey Databases were also screened for any relevant unpublished data that has not been identified by electronic strategy.

Data Extraction

The data extraction of all the included studies was done focusing on the following details: author of the study, year of publication, state or country, study population, sample size, number of groups, diagnostic methods used, imaging parameters (irrespective of the diagnostic modalities), Criteria by which defect was defined (intrabony defect as: one walled, two walled or three walled defect and furcation defect according to the furcation involvement classification. eg. Hamp et.al. or Glickman's classification system), calibration of the measurements and the examiners, Gold standard, Outcome measures, results and conclusion.

Qualitative Assessment

All the included studies were qualitatively assessed according to Quality Assessment of the Diagnostic Accuracy Studies – 2 (QUADAS-2) tool by the two examiners independently. This tool is designed to be used in the systematic reviews of diagnostic accuracy by the agency for Healthcare Research and Quality, Cochrane Collaboration and the U.K. National Institute for Health and Clinical Excellence⁶. All the four domains were (Patient selection, Index test, Reference standard, Flow and timing) fulfilled where each domain was judged in terms of risk of bias and the first three domains were assessed in terms of concern about applicability. Studies with more than two domain with high risk were considered as high risk, those with one domain as medium risk and those with no domain of high risk as low risk.

Outcome

The primary outcome measure is the qualitative assessment for the accuracy of CBCT in the detection of intrabony and furcation defects when compared to intrasurgical measurements and two dimensional conventional radiographs. Any additional benefit in terms of cost reduction and treatment recommendations / decision making was considered as the secondary outcome.

Results

Search Results

According to the aforementioned search strategy, a total of 471 publications were identified. After removal of duplicates and initial screening of the papers based on the titles, abstracts and keywords, yielded 39 potentially eligible papers for full text evaluation by two independent reviewers (observer agreement = 95 % and kappa = 0.88). Full text analysis led to the exclusion of 19 papers as they did not meet the inclusion criteria. Additionally, hand search resulted in the inclusion of one paper. The excluded studies have been sequentially listed with the reasons for exclusion for the studies (**Table 1**). **Figure 1** represents the PRISMA flow diagram illustrating the selection procedure of the included papers. Eventually, 21 published articles were found to be eligible for inclusion in the present systematic review.

Qualitative Assessment

All the included studies were judged to be at low risk of bias as intended by QUADAS-2⁶. (**Table 2**) The shortcomings of the included studies were incomplete information on CBCT parameters and absence or no mention of the calibration of the examiners and examiner blinding.

Study characteristics

Amongst the included publications, fifteen studies discussed furcation involvement⁷⁻²¹ and six studies discussed intrabony defects²²⁻²⁷. The study design of all the included publications was prospective except two studies that retrospectively evaluated furcation involvement^{11,19}. The



mean age of the patients in most of the included publications was 57.0 years, 45 years, 43.5 years, 44.5 years, 59.03±13.08 years, 38.05±4.77 years or the patients aged between 18 – 85 years.

Studies that evaluated furcation defects

All the patients had a diagnosis of generalized chronic periodontitis. The studies investigated 25-174 furcation entrances, amongst which 4 studies^{10, 17,20,21} evaluated mandibular molars for furcation involvement, six studies^{7-9, 12,14,18} evaluated maxillary molars (both first and the second molars) and the remaining five studies^{11,13,16, 15,19} evaluated both maxillary and mandibular molars.

Patients with more than 30% of the sites involved exhibited PPD ≥ 5mm, CAL ≥ 5mm or all the teeth with PPD ≥ 4mm or at least one maxillary / mandibular molar with persisting increased PPD ≥ 6mm and Grade II/ III furcation involvement indicated for the periodontal surgery were eligible for the inclusion.

For studies^{11,19} that retrospectively evaluated furcation involvement, the patients with comprehensive periodontal examination with diagnostic quality IOPA / Bitewing radiographs covering posterior dentition and CBCT scans with the coverage of the entire maxilla and mandible were included. Initial periodontal treatment in terms of scaling and root planning was performed 3- 6 months before inclusion in the study.

Studies that evaluated intrabony defects

All the six studies evaluated 266 intrabony defects of which 4 were one wall, 17- two wall, 23 - three wall and 36 were combined defects. In these studies, patients with at least one interproximal site with PD ≥ 5mm and a vertical defect ≥ 3mm on an intraoral periapical radiograph (IOPA) were considered eligible for the inclusion. Patients with untreated carious lesion or filling material at the CEJ, metal restoration in CBCT irradiation area or any medical condition that did not allow conventional periodontal treatment were excluded from the study.

After initial periodontal treatment, surgical treatment was initiated which involved direct surgical measurements^{22,23,25,26} and bone grafting procedure followed by surgical reentry²⁷.

Results in individual studies

Comparison of CBCT and two -dimensional imaging

Amongst the included studies, of the 11 studies (**with gold standard**)^{8, 9, 13,17,18,27, 22, 23, 25, 26} six studies^{50, 22, 23, 25, 26, 17} compared the CBCT data to the 2D imaging either conventional /digital (RVG)/bitewing radiographs for the assessment of the periodontal bone defects. The accuracy was not significantly different between the examined modalities and CBCT technique was found to be superior in the detection of the intrabony defects. A study reported that the CBCT measurements were found to be within 1 or 2 mm of the surgical measurements than the RVG measurements²².

Two of the studies reported that both CBCT and periapical radiographs could offer accurate information on the M-D width of the defect and additionally allowed accurate measurements of the B-L width of the periodontal defect, however CBCT showed no added advantage for the vertical measurements of the intrabony defects (CEJ-BD and depth of the defect). ()

Three studies^{22,24,26} analyzed the interclass coefficient (ICC) to assess the interexaminer agreement for the linear measurements by CBCT and the periapical radiographs and reported the higher interexaminer agreement of CBCT than those for IOR for all the assessment.

Amongst the 10 included studies (**with no gold standard**) only 2 studies^{7,24} utilized the periapical radiographs for the assessment of the periodontal bone defects. Of these, one study that investigated the use and potential benefit of CBCT in assessing and concomitant treatment decision in maxillary molars, found CBCT to outplay IOR for the selection of an appropriate treatment plan. Also, a retrospective included study demonstrated that, CBCT provided more accurate assessment with bone loss measurements upto two decimals in mm whereas IOR detected only the presence of Glickman's class II and III FI.

Comparison of CBCT data and clinical findings

1) Detection and Classification of FI



Amongst the studies that compared the severity of FI by clinical detection with CBCT images, one study using a dichotomous scale (present /absent) reported a high intraobserver agreement between the clinical and CBCT evaluation of the FD suggestive of that there is no effect of clinical experience and CBCT proficiency on the measurement errors ¹⁵. On the contrary, a similar study reported that all the disagreements were related to FD diagnosed in CBCT but not clinically ¹⁶.

Amongst the 4 studies that reported (85, 87, 89, 95) for the accuracy of CBCT in the detection of degree of FI. Of these, one study (85) demonstrated that all the furcation Grade II and III defects in mandibular molars were revealed using the CBCT technique. Regarding the incipient defects (grade I Hamp < 3mm) the measured dimensions on CBCT generated images were slightly higher.

Amongst the retrospective studies with no gold standard ^{11,16}, one study reported a significant correlation between periodontal probing and CBCT for the classification of FI especially for the distopalatal side of the maxillary molar. 18.7% cases were overestimated and 26.7% cases were underestimated on clinical detection and validated the use of CBCT ¹⁶. On the contrary, the other study found a discrepancy in the clinical detection compared to the CBCT recording of FI in multirooted teeth ¹¹.

In mandibular molars, Grade II and III defects were revealed using the CBCT technique and that the measurement on the buccal side was statistically significant when compared to the lingual side. For the incipient defect, (Grade I Hamp < 3mm) the measured dimensions on CBCT generated images were slightly higher ¹⁰.

For the maxillary molars, a study showed discrepancy in the detection of FI, wherein only 31.4% of degree I FI and 54.7% of degree II and II-III were underestimated ¹².

Detection of Infrabony defects

CBCT offered additional benefit over the traditional IOR and tend to underestimate the periodontal diagnosis. The overall concordance between the IOR and CBCT on periodontal and infrabony defect assessment was good for diagnosis (79.3%), moderate for prognosis (69.5%), poor and the lowest(44.7%) for infrabony defect classification and moderate for infrabony defect treatment (64.2%) ²⁴.

Discussion

Several in vitro studies have evaluated the accuracy of CBCT in the diagnosis of periodontal bone defects. Mengel et.al. demonstrated that CBCT images were better in the detection of periodontal bone defects compared to the periapical radiographs²⁸. Patel S (2009) and Misch KA et.al conducted studies and concluded that CBCT offers significant advantage as all the defects can be precisely detected and quantified²⁹. Likewise, Vandenbergh et.al suggested CBCT to be used only for relatively complex periodontal treatment planning especially in cases where an interdisciplinary approach to treatment planning is necessary³⁰.

In in vitro studies, CBCT data were compared to the true situations methods like histological evaluation ³¹ or ex-vivo defect impression ²⁹ were used as the gold standard or reference method. The lesions were artificially created either mechanically by drilling holes in the region of interest ^{28,29,33} or chemically by applying acid to the interradicular bone ³². These artificially created osseous defects when subjected to CBCT scanning, IOPA and direct measurements showed similar efficacy in identifying periodontal defects. This can be attributed to the fact, that the lesions were created in the known position and is possible to establish a valid reference point. Also, the geometric alignment of the intraoral radiographs on dry skull is easier and was performed under the conditions without the impact of patient movement which may interfere with the image quality. Also the artificially created osseous defects may not have the same topography and irregular borders as the natural periodontal defect. Therefore, extrapolating these results to living humans seems somewhat farfetched. Owing to these drawbacks the results per se should not be directly assigned to the clinical situation.



The only possibility to obtain a reference is to use the intrasurgical measurements in in-vivo studies. In this review, the in-vivo studies that were included, explored the relationship between the conventional radiographs, presurgical or/intrasurgical measurements and the CBCT measurements for both the intrabony defects and the furcation defects. We also tried to evaluate in this review the impact of various factors on the accuracy of CBCT measurements for the periodontal defects.

One such factor we found in our review is the surface location of the tooth that could impact the reported accuracy of the tooth. We found two studies^{18,26} that explored statistically significant difference between the mesial and distal site measurements made during the surgical intervention for maxillary molars owing to the fact that the distal site accessibility is difficult while performing periodontal surgeries, CBCT on the contrary provides good accessibility to visualize the sites which were otherwise difficult to access during the surgical intervention.

Another factor that showed discrepancy in the diagnostic accuracy of the CBCT measurements is the tooth location. Only one study reported it to be lesser for the anterior than the posterior teeth²⁶. The study attributed these findings to the thinner buccal and lingual plates in the anterior teeth than that present in the posterior teeth and the thinner bone has a lower image resolution thereby decreasing the precision of the linear measurements. Yet another study (with no gold standard) reported an agreement of 72.6% between the observers for both the jaws and was slightly higher in the maxilla (73.0%) compared to mandible (71.7%)¹⁵.

Yet another factor that we found in this review is the impact of clinical experience and experience with CBCT on FD detection which could influence the accuracy of the CBCT measurements. The previous literature (in vitro and ex-vivo studies) concluded that the effect of individual observer activity on measurement error was not statistically significant and that CBCT showed high accuracy in FD detection^{33,34}.

In this review we found one study (with no gold standard) reported highest agreement for the distopalatal site (for O1 –55% and for O2 – 69%) between clinical (probing) and CBCT assessment for both observers while the highest difference was noted for the mesiopalatal site (44%) and buccal site (30%) suggestive of, that the detection of FD is not observer dependent.¹⁵

For The Parameters Assessed

As far as intrabony defects are concerned, CBCT underestimated bone loss (CEJ-BD) and defect depth measurements when compared to the direct measurements. The difference in the measurements has been attributed to thorough debridement of the osseous defects that has removed some bone at the base of the defect resulting in deeper CEJ-BD measurements^{27, 23,26}. Although, CBCT offered no added advantage over the periapical radiographs for MD however for width of the defect, CBCT allowed accurate measurements which the periapical radiographs could not due to lack of visualization for the B-L width of the defect.

For the FI bone level measurements, the intrasurgical measurements were confirmed by the CBCT measurements for all the parameters BL-V, BL-H, RT and FW. However, few parameters (BL-V, BL-H and FW) were underestimated by the CBCT relative to their respective intrasurgical values, the difference was lower than 0.5mm minimum accuracy of periodontal probing which is acceptable in periodontal application. These errors in the measurement were consistent with the findings of the other in vitro studies^{35,28} which showed that the error between the CT and the actual measurements were 0.16 to 0.41mm. Thus CBCT could reflect the true state of the FI and may provide more evidence for periodontal diagnosis and treatment planning. For the RT, CBCT was helpful in understanding the location of the root separation which may further had a significant influence on the prognosis and treatment planning as short RT may be a positive factor in prognosis than the longer RT^{9,17,36}.

Treatment Recommendations

We found only one study that discussed about the treatment recommendations with CBCT when compared to the conventional approach in maxillary molars with FI illustrated that, additional



CBCT analysis eased with the precise decision about the resective intervention with a specification of the root that are planned to be kept thereby avoiding any redundant surgical or endodontic intervention (41% in agreement while the another 41% CBCT based treatment decision were more invasive than the clinical ones)⁷.

In a similar study for infrabony defects, CBCT was found to be superior to IOR for the infrabony defect morphology (overall concordance being lowest of all the assessment i.e. 44.7%) and beneficial for the treatment decision that involved periodontal regeneration (concordance being 43.3%) and tooth extraction (96.4%)²⁴.

Agreement and disagreement for the evaluation methods

Using the dichotomous assessment model – yes/no, a study documented that, FI were more often detected by means of CBCT than by means of clinical probing. The agreement between the evaluation methods was present in 46.9% of cases¹⁶. The overall agreement for FI classification between the CBCT data and intrasurgical findings was strong ($\kappa=0.917$)⁹ consistent with the finding of the another study that reported 84% of the CBCT data were confirmed by intrasurgical measurements ($\kappa=0.926$)⁸. Yet another study, reported higher correlation between the CBCT and direct surgical measurements for all the hard tissue measurements than the correlation between IR's and surgical measurements and also ascertained that, CBCT is an equivalent substitution for direct surgical measurements of bony changes occurring after bone replacement graft procedure, especially defect fill and defect resolution.

Possible explanation for the discrepancies in the measurements

In this review, we found discrepancies in the measurements between the evaluation methods can be speculated to probing force, probing angulations, anatomic complexities such as superimposition of the palatal root at the furcation and the presence of intrapulpal infection. This disparity in the clinical and CBCT data recording of FI in multirooted teeth will certainly affect the assigning of prognosis to the affected tooth which can further influence the treatment planning for periodontal therapy. Interestingly, a study¹⁶ reported some factors for the discrepancy in the evaluation methods like the double measurements that were made during the clinical examination are associated with the higher variability in molars than the single rooted teeth³⁷. Also, since the clinical measurements were performed after the completion of the nonsurgical periodontal therapy, the discrete furcal attachment loss must have been masked by the presence of long junctional epithelium. Yet, another plausible explanation for the highest mismatch at the buccal furcation entrances of the mandibular molars is the location of the furcation entrance³⁸ and the diameter of the furcation entrance³⁹.

Implications for further research

We found certain unexplored areas in this review which mandates further studies to be conducted. One such area is the classification systems were devised to classify bone loss in the furcation areas by clinical examination yet attempts were made to classify interradicular bone loss in the radiographic assessment using the Hamp's classifications system for FI^{8,9,12,14,27}. Another area is the shortcomings of CBCT like scatter radiation, partial volume averaging and beam hardening artifacts that could compromise the diagnostic accuracy, especially for the patients with metallic restoration, orthodontic appliances and implant prosthesis¹⁹. Also, we scrupulously found high heterogeneity between the included studies which could be due to the difference in the purpose, study design, technical parameters and method of measurement and therefore no valid meta-analysis could be made. So, prospective randomized clinical trials based on well defined methodologies and use of "gold standard" methods are needed to further optimize the use of this imaging modality in periodontal diagnosis and treatment planning.

Conclusion

Within the limitations of the included studies, it can be concluded that the diagnostic accuracy of CBCT was higher when compared to conventional radiographs in the detection of the intrabony and the furcation defects. Also we found that CBCT and the intrasurgical measurements were in



good agreement which signifies that CBCT can be an excellent adjunctive diagnostic tool in optimizing periodontal treatment planning and may also obviate the need for surgical re-entry for assessing the regenerative therapy. It can be elucidated from this review that CBCT analysis facilitates a clear decision for further periodontal treatment planning in all the investigated teeth. Furthermore, the net potential diagnostic benefit to the patient must outweigh the individual detriment that the exposure might cause.

Proposed guidelines must be followed an adjunct to the dentists professional judgments on how to use the diagnostic imaging for their patients as an individual dentist is in the best position to make a individual judgement because of their knowledge^{40,41}.

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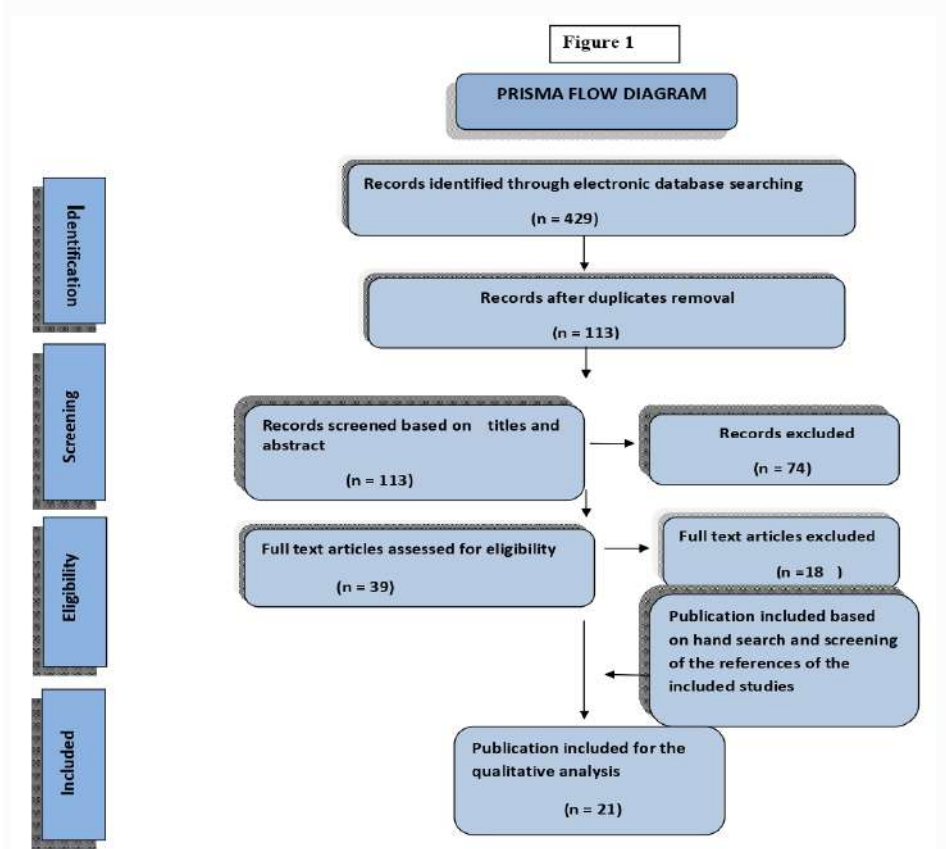




Table 1: Tabular Representation Of The Excluded Studies And The Reason For Exclusion

Reference no.		Reason for the exclusion
42	Naifoh et. al. 2006	Case report
43	Takane M et. al. 2010	Case report
44	Gupta et. al. 2014	No comparison between clinical and CBCT findings
45	Zhou et. al. 2014	No comparison between clinical and CBCT findings
46	Walter et. al. 2014	No comparison between the clinical and CBCT findings
47	Salineiro et.al. 2017	Animal study
48	Zhang et.al. 2017	Periodontal evaluation by CBCT
49	Cao J et. al.	Chinese article
50	Sali DD et. al. 2016	No mention about the accuracy of CBCT
51	Nemoto Y et. al 2018	No comparison between the clinical and CBCT findings
52	Sreih R et. al. 2019	Included both periodontal defects and implant measurements.
53	Bodhare G et. al. 2019	No comparison between the clinical and CBCT findings

Table 2 : Tabular Representation For The Risk of Bias Assessment (QUADAS -2 TOOL) Of the Included Studies

Study	Risk of bias					Applicability concerns			
	Patient selection	Index test	Reference standard	Flow and timing	Total	Patient selection	Index test	Reference standard	Total
Grimard et.al. 2009	Low	Low	Low	Low	Low	Low	Low	Low	Low
Walter C et.al.2009	Low	Low	Low	Low	Low	Low	Low	Low	Low
Walter C et.al.2010	Low	Low	Low	Low	Low	Low	Low	Low	Low
Raichur PS et.al. 2012	Low	Low	Low	Low	Low	Low	Low	Low	Low
Qiao J et.al. 2014	Low	Low	Low	Low	Low	Low	Low	Low	Low
Darby et.al 2014	Low	Low	Low	Low	Low	Low	Low	Low	Low
George MA et.al. 2014	Low	Low	Low	Low	Low	Low	Low	Low	Low
Fei LI et.al. 2015	Low	Low	Low	Low	Low	Low	Low	Low	Low

Cimbaljevic et.al. 2015	Low	Low	Low	Low	Low	Low	Low	Low	Low
Pajunigara et.al. 2016	Low	Low	Low	Low	Low	Low	Low	Low	Low
Zhu J et. al. 2016	Low	Low	Low	Low	Low	Low	Low	Low	Low
Cimbaljevic et.al. 2016	Low	Low	Low	Low	Low	Low	Low	Low	Low
Suphanantach S et.al. 2017	Low	Low	Low	Low	Low	Low	Low	Low	Low
Padmanabhan S et.al. 2017	Low	Low	Low	Low	Low	Low	Low	Low	Low
Zhang et.al 2018	Low	Low	Low	Low	Low	Low	Low	Low	Low
Patil SR et.al. 2018	Low	Low	Low	Low	Low	Low	Low	Low	Low
Abhishek singh Nayyar 2018	Low	Low	Low	Low	Low	Low	Low	Low	Low
Parvez MF et.al. 2018	Low	Low	Low	Low	Low	Low	Low	Low	Low
Pandey V et.al 2019	Low	Low	Low	Low	Low	Low	Low	Low	Low
Warda et.al. 2019	Low	Low	Low	Low	Low	Low	Low	Low	Low

Table 3: Study Table Representing The Study Characteristics Of The Included Studies

Author year / state /country /	Journal	Study design	Age gp. Of the included patient	Sample size	Severity of the disease	Case definition	No. of sites evaluated
Gumard et.al. 2009/ San Antonio/ Texas	J periodontal	Prospective clinical study	35- 65 years	32 patients (12 females & 17 males)	Moderate to severe chronic periodontitis	At least one interproximal site with the probing depth ≥ 5 mm & a vertical defect ≥ 3 mm on an IR.	35 IBD were evaluated
Walter C et.al.2009	J Clin Periodontal	Prospective clinical study	Average age of 57.5years (range 42-80 years)	12 patients (3 women & 9 men)	Generalized chronic periodontitis	All the teeth with periodontal probing depth ≥ 4 mm	66 furcation entrance (in 11 first & 11 second maxillary molars)
Walter C et.al.2010/ Basel / Switzerland	J Clin Periodontal	Prospective clinical study	Average age of 57 years (range 42-81 years)	14 patients (5 women & 9 men)	Generalized chronic periodontitis	All the teeth with periodontal probing depth ≥ 4 mm	75 furcation entrance (in 14 first & 11 second maxillary molars)
Raichur PS et al. 2012/ Dharwad / India	J Clin Exp Dent.	Prospective clinical study	Average age of 45 years(30-60 years)	7 patients (3males & 4 females)	Moderate to severe chronic generalized periodontitis	Not clear	28 sites with infrabony defects were evaluated
Qiao J et. al. 2014/ Beijing / China	J Clin Periodontal	Prospective clinical study	Average age of 43.5 years	15 patients (6males & 9	Generalized chronic periodontitis	At least one maxillary molar with PPD ≥ 6 mm	51 furcation entrance (11 first & 9 second maxillary



				female)			molars)
Darby et al. 2014/ Melbourne /Australia	Int J Dent Hygiene	Retrospective study	Age group 18-85 years	27 patients	Moderate to severe chronic periodontitis	Patients who had both clinically diagnosed furcation involvement and CBCT scans	154 sites with FI were evaluated
George MA et al. 2014 /Timisoara /Romania	Proc. Of SPHE	Prospective clinical study	Average age of 45.48 years (23-65 years)	19 patients (11 males & 8 females)	Generalized advanced chronic periodontitis	Patients presented with furcation defects	25 mandibular molars (15 first, 8 second & 2 third molars)
Fu LI et al 2015/ Beijing /China	Quintessence International perio	Prospective clinical study	Average age of 39 years old	44 patients (22 women and 22 men)	Chronic generalized severe periodontitis (33 patients) & generalized aggressive periodontitis (11 patients)	At least one tooth with PD ≥ 5mm with the IBD ≥ 3mm in IOPA & with BOP	44 IBD (3 – one wall, 9 two wall, 12- three wall and 20 combined defects)
Krauth K et al. 2015 /Bangalore /India	Int J Dent & Oral Heal	Prospective clinical study	Age range of 41-80 yrs	17 patients (3 women and 14 men)	Generalized chronic periodontitis	Patients with at least one maxillary molar with persisting increased PPD (≥ 6 mm) and/or advanced FI	20 first and 12 second maxillary molars with 96 furcation entrances
Painigra et al. 2016/ Indian Society of Periodontology	Journal of Indian Society of Periodontology	Prospective clinical study	Average age of 38.05 ± 4.77 years	40 patients (21 females and 19 males)	Generalized chronic periodontitis	More than 30 % of the sites involved exhibited PPD ≥ 5mm, CAL ≥ 5mm with at least one molar with Grade II FI	200 Grade II furcation defects
Zhu J et al. 2016/ Beijing / China	The Chinese Journal of Dental Research	Prospective clinical study	Not mentioned	11 patients	-	Patients with maxillary molars classified as degree II FI	21 maxillary molars (12 first molars and 9 second molars) with 39 sites with FI (9 buccal, 10 mesopalatal, and 20 distopalatal sites)
Milena M et al. 2015 / Belgrade / Serbia	Quintessence International perio	Prospective clinical study	Age range of 35- 60 years (mean age - 44.5 ± 8.4 years)	15 patients (4 men and 11 women)	Chronic generalized severe periodontitis	Patients with > 30 % sites of all the present teeth were affected, with an attachment loss and bone loss > 5mm	174 furcation sites (38 maxillary molars at three furcation sites and 30 mandibular molars at two furcation sites)
Čubrilojević et al. 2016/ Belgrade / Serbia	Balkan Journal of Dental Medicine	Prospective clinical study	Average age of 44.5 years	15 patients (4 men and 11 women)	Chronic generalized severe periodontitis	Patients with at least 2 infrabony defects of ≥ 6mm in both the jaws indicated for the surgery.	168 furcation sites (30 maxillary molars at three sites and 36 mandibular molars at two furcation sites)
Supanachai S et al. 2017/		Prospective clinical study	Not mentioned	25 patients	Moderate to advanced chronic periodontitis	Patients with at least 2 infrabony defects of ≥ 3mm deep on a periapical radiograph	116 teeth with 123 sites with infrabony defects
Padmaasubhan S et al. 2017 / Bengaluru / Karnataka	Contemporary Clinical Dentistry	Prospective clinical study	Age range 20 - 60 years	14 patients	Generalized moderate to severe chronic periodontitis	Patients with 6mm in at least one mandibular molar with Grade II or III FI indicated for periodontal surgery	25 mandibular furcation defects with 25 furcation sites (17 buccal defects and 8 lingual defects)
Zhang et al 2018/	BMC Oral Health	Retrospective	Age range 13-86	83 patients	Generalized moderate to severe	Subjects with diagnostic quality	
Houston/ USA		study	years With the mean age of 59.03 ± 13.08 years old	(41 males and 42 females)	periodontitis	IOPA/bisewing radiograph covering posterior dentition and CBCT scans with coverage of entire maxilla and mandible were assessed bilaterally for the FI in first molars.	
Pani SR et al. 2018/ Rajasthan / India	Int J Oral Health Sci	Prospective clinical study	Mean age 40 years (age range 18-56 years)	32 patients (14 females and 18 males)	Generalized aggressive chronic periodontitis		36 IBD: 8 in the anterior, 10 in the premolar teeth & 18 in the molar teeth of which 8 – 2 wall ; 11 – 3 wall ;16- combined & single case of 1 wall defect.
Abhishek Singh Nayyar 2018/ Maharashtra /India	Int J Head neck patho	Cross- sectional study	Age range 35- 50 years	12 patients (6 males & 6 females) were included	Advanced chronic periodontitis	-	12 teeth (6 anterior & 6 posterior)
Parvez MI et al. 2018/ Karnataka / India	Int J Res Med Sci	Comparative study	Age range 30- 55 years	17 subjects	moderate to severe periodontitis	patients having periodontal pockets with probing pocket depth of >5-6mm and grade II furcation	-
Pandey V et al 2019 /Barkhand /India	Annals of International Medical and Dental Research	Prospective clinical study	Age range of 35- 60 years	45 patients	Chronic generalized severe periodontitis	Patients with PPD ≥ 6mm in at least one mandibular molar & grade II or III furcation involvement	60 furcations involved mandibular molars
Warda et al. 2019/ Alexandria / Egypt	Alexandria Dental Journal	Prospective comparative study	Age range of 30- 60 years	23 patients		Patients with periodontal disease with one or more advanced furcation defects defined as horizontal radiolar loss of periodontal tissues of degree II or III	19 mandibular furcation defects

IBD- Infrabony defects , PPD – pocket probing depth , BOP- Bleeding on probing, CAL- clinical attachment loss, IOPA- Intraoral periapical radiograph, FI – furcation involvement , CBCT- cone beam computed tomography



Table 3 : Tabular Representation Of Defect Definition, Gold Standard and Method of Evaluation Of All The Included Studies.

Study no. /Ref	Defect definition	Gold standard	Method of Measurement	
			Clinical	Radiographic
Grimard et.al. 2009/ (27)	IBD measured from the CEJ or the base of an existing restoration to the most coronal point of the AC of the defect & to the base of the defect.	Direct surgical measurements	Clinical measurements were made by using a manual 1.5mm probe.	Digital IR's with mm grid composed of 1mm copper square & a phosphorus plates. CBCT images were analyzed in three dimensions (X.Y.Z).
Walter C et.al.2009/ (7)	FI was characterized according to Hamp et.al (1975) using a modification of the furcation classification degree II which was divided into degree II and II-III.	Absent	FI was measured at three sites (buccal, mesiopalatal & distopalatal)using a Naber's probe (PQ2N, Hu Friedy)	IOPA were taken using a film holder with 90°angulation using a parallel technique. CBCT was analyzed in three planes FI was calculated in horizontal plane as distance between the outer root surface & the interradicular bone to the nearest mm.
Walter C et.al.2010/ (8)	FI was graded according to the Hamp et.al (1975)	Intra surgical measurements	FI was measured at three sites (buccal, mesiopalatal & distopalatal)using a Naber's probe (PQ2N, Hu Friedy)	CBCT was analyzed in three planes & FI was calculated in horizontal plane as distance between the outer root surface & the interradicular bone to the nearest mm.
Raichur PS et.al. 2012/ (22)	Intrabony defect measured from the CEJ-BD CEJ-AC	Direct surgical measurements	Direct surgical measurements were made using the UNC 15 probe	PR was taken using a size #2 CCD intraoral digital sensors & a standard unit X-ray. CBCT images analyzed in three dimensions with the slice thickness of 1mm.
Qiao J et.al. (9)	FI defined as horizontal inter-radicular loss of periodontal tissue of degree 2 or 3 (Hamp et.al. 1975)	Intra surgical measurements	Intra surgical measurements for FI was made at three sites (buccal, mesiopalatal & distopalatal)using a Naber's probe (PQ2N, Hu Friedy) marked at 3mm interval	CBCT images were analyzed in three axes (X.Y.Z) with the slice thickness of 0.5mm & FI was calculated in horizontal plane as distance between the outer root surface & the interradicular bone to the nearest mm.
Darby et.al 2014/	Files with clinically diagnosed FI (recorded as	Absent	Clinical FI measurements was recorded using Naber's probe.	CBCT scans were taken with the slice thickness of 1mm and all furcation sites measured as radiolucent
(11)	grade 1,2 or 3)and CBCT scans			region and were graded by the no. of sagittal slices in which the radiolucencies was present.
George MA et.al. 2014/ (10)	Mandibular furcation defects were recorded and classified as Grade I,II and III(Hamp et.al. 1975)	Absent	Clinical measurements were made using a Naber's probe (PQ2N, Hu Friedy) marked at 3mm interval	CBCT images were analyzed in three sections. the Furcation defects as distance between the external tooth surface & the limit of the interradicular bone in mm on horizontal section.
Fei I I et. al. 2015 / (23)	IBD measured from the bottom of the defect to the CEJ by means of bone sounding	Intra -surgical measurement	Intrasurgical measurements were made with the periodontal probe (UNC-15)	CBCT images were analyzed in three planes. Digital IOPA obtained by long cone paralleling technique
Kranti K et.al. 2015/ (12)	Advanced FI, defined as horizontal inter-radicular loss of periodontal tissues	Absent	FI were measured at three sites (buccal, mesiopalatal and distopalatal) of the suspected maxillary molars using a Naber's probe marked at 3mm intervals (HU-Friedy)	FI was calculated in the horizontal plane measuring the distance between the outer root surface and the interradicular bone to the nearest mm.
Pajniagara et.al. 2016/ (13)	Particular quadrant with Grade II FI (both vertical & horizontal component) with the custom made acrylic occlusal stent to standardize the measurements	Intra-surgical measurement	Pre and post surgical clinical measurements were made with the William's probe .vertical component measured from the CEJ till the resistance in the mid- buccal area. Horizontal component was measured with the Naber's probe & was penetrated till the resistance was felt	On CBCT, vertical component was measured in the sagittal view . a horizontal line joining the CEJ was made from the mesial to the distal of the tooth. A line perpendicular to the first line is made running from the middle of the furcation to the alveolar crest . the distance between the alveolar crest and the point where the line meets was measured. For the horizontal component, a line was drawn from the most buccal end of one root to the other & a perpendicular line is drawn from the centre of the first line till the bone trabeculae starts.
Zhu J et.al. 2016/ (14)	Degree II FI graded according to the Glickman's classification	Absent	Method for the clinical measurements is not clear	Four CBCT parameters were assessed HBL at FE measured as distance between the interradicular bone and FE in the Z plane HBL- max measured as horizontal distance between



				the FE and the deepest defect. VBL-max measured as the vertical distance between the most apical point of the bone defect and the roof of the furcation in the X plane. Root trunk length (RT) measured as vertical distance between the CEJ and FE .
Melina M et.al. 2015/ (16)	FD was measured by inserting the probe horizontally into the furcation to the deepest point of the defect	Absent	Clinical evaluation was performed using the Naber's probe (PQ2N, Hu Friedy)	CBCT images were assessed in all the three planes.
Cimbaljevic et. al. 2016 / (15)	The existence of FI was established when periodontal pocket detected by inserting the probe horizontally into the pocket	Absent	Clinical evaluation was performed using the Naber's probe (PQ2N, Hu Friedy	FD was assessed on CBCT images in all the three planes and the existence of FD was recorded when the radiolucency was observed between the roots of the teeth
Suphanantach S et.al. 2017 / (24)	Infrabony defect was classified as one wall, two wall or three wall defect. Periodontal diagnosis was classified as early, moderate & advanced periodontitis. Periodontal prognosis was classified as good, fair, poor, questionable & hopeless	Absent	Clinical evaluation was performed using the UNC -15 probe (Hu-Friedy PCPUNC 15)	IOR comprising full mouth periapical radiographs & vertical bitewings of the posterior teeth using long cone parallel technique. CBCT images were assessed in all the three
Padmanabhan S et.al. 2017/ (17)	Clinical grading of FI was done according to the Glickman's classification	Intra-surgical measurements	Baseline clinical measurements were made (PPD and CAL) using UNC -15 probe (Hu-Friedy PCPUNC 15) and FI was measured at two sites using Naber's probe.	IOPA were taken of selected mandibular molars before the surgery CBCT measurements were performed by measuring the deepest vertical and horizontal (Width and depth) furcation defects at each furcation defects.

			Direct surgical measurements were made using an endodontic file with stopper and a calibrated digital vernier calliper was used . measurements included : Height : from furcation fornix to the base of the alveolar bone Width : greatest dimension of separation between the two roots above the crest of the alveolar bone Depth: crest of the alveolar bone till the interradiacul bony resistance was felt.	
Zhang et.al 2018/ (19)	Subjects with comprehensive periodontal examination (assessment of FI according to Glickman's classification)	Absent	Clinical evaluation includes assessment of FI according to modified Glickman's classification	IOPA / bitewings radiographs were taken with receptor holding device and the paralleling technique and were assessed for the presence of radiolucency at the furcation area and the radiographic bone level . CBCT images were analyzed in sagittal and axial planes for the Presence of FI Depth of FI (measured by drawing a line tangent to the adjacent root surface and the distance from this line to the deepest point of bone loss)
Patil SR et.al. 2018/ (25)	IBD measured as distance from the CEJ – BD	Intra-surgical measurements	Intrasurgical measurements were made using a periodontal probe.	Linear measurements were recorded on the radiographic images (IOPA & CBCT) as : CEJ- BD CEJ- AC infrabony component was measured by subtracting the CEJ- AC from CEJ- BD
Abhishek singh Nayyar 2018/	IBD	Intra-surgical measurements	Defect depth was measured using the UNC 15 probe to the nearest mm from the coronal extension of	CBCT images were obtained for the same areas of interest, which was exposed to the conventional radiography for the diagnosis & meeting the study



(26)			the alveolar crest to the deepest level of the defect.	criteria.
Parvez MF et.al. 2018/ (18)	FD was measured in maxillary molars at 3 sites by preparing an occlusal stent upto the CEJ & were classified according to Hamp et.al. 1975	Intra-surgical measurements	Intrasurgically, distance between the cement-enamel junction and alveolar crest was measured by a single experienced professional using Williams graduated periodontal probe placed in a line parallel to the long axis of the tooth. The horizontal component of furcation was measured using colour coded Naber's Probe.	CBCT images were obtained with a slice thickness of 0.2mm and slice interval of 0.2mm will be obtained.
Pandey V et.al. 2019/ (31)	FD depth was measured from the crest of the alveolar bone till the interradicular bony resistance was felt or between the inner aspect of the crest of the alveolar bone on either side & grading was done according to the Glickman's classification(1953)	Absent	Clinical measurements for furcation depth were made on the buccal and the lingual side of the mandibular molar by using an endodontic file with a stopper & a calibrated digital vernier calliper was used.	CBCT measurements were analyzed in the coronal section measuring the deepest vertical and the horizontal furcation defect at each furcation entrance(which was used as the anatomical location to align the cross sections of different planes).
Warda et.al. 2019/ (20)	Furcation defects, defined as horizontal radicular loss of periodontal tissues of degree II or III according to Hamp et. al. 1975	Intra-surgical measurements	Clinically, the horizontal furcation measurements were taken using the Naber's probe starting at the furcation entrance to the greatest horizontal depth (from the buccal aspect)	CBCT images were analyzed and FI were calculated in horizontal and the vertical plane and the width of furcation entrance.

FD- furcation depth , CEJ- cementoenamel junction, BD- base of the defect, AC- alveolar crest , FE- furcation entrance, HBL- horizontal bone loss , VBL- vertical bone loss, RT- root trunk ,

Table 4 : Tabular Representation Of Outcome Parameters and Results Of All The Included Studies.

Study.	Outcome parameters	Results
Grimard et.al. 2009	Bone defect fill Bone defect resolution	CBCT correlated strongly with the surgical measurements whereas IR's correlated less favourably
Walter C et.al.2009	Treatment recommendation based on the clinical and radiographic findings for FI.	27% of the clinical findings were confirmed in the CBCT 29% were overestimated , 44 % revealed an underestimation.
Walter C et.al.2010	Accuracy in the diagnosis of FD (class I,II &III)	84% of the CBCT data were confirmed by the intra-surgical findings 14.7% (11 sites) were underestimated and in only 1.3% (one site) CBCT data lead to an overestimation compared to the intra-surgical measurements.
Raichur PS et.al. 2012	Determine the difference in the dimensions of the IBD as measured by the three techniques	No differences in the mean measurements between RVG, DVT, SUR techniques in the CEJ-AC group whereas the same measurements showed a significant difference in the CEJ-BD group. No significant difference was observed between DVT and direct surgical measurements.
Qiao J et.al. 2014	Bone loss in horizontal direction (BL-H) Bone loss in vertical direction (BL-V)- in X section Length of root trunk (RT) – in X and Y section Width of the furcation entrance (FW) in Y and Z section .	Surgical findings confirmed 82.4% of the CBCT data. Agreement was high in buccal furcation entrance. Regarding RT & FW, CBCT was consistent with their respective intrasurgical findings. BL-H and BL-V was underestimated CBCT.
Darby et.al. 2014	Degree of discrepancy in detecting FI between CBCT image analysis and clinical probing of multirooted teeth	22% of the FI measurements from the probing and CBCT were in agreement while 58% of the clinical FI recordings were overestimated and 20 % were underestimated when compared to CBCT analysis.
George MA et.al. 2014	Correlation between the clinical and the imaging parameters with CBCT examination of furcation defects.	84% of the defects detected by CBCT were confirmed by clinical measurements. All the furcation grade II and III defects were revealed by CBCT. The incipient defects on the CBCT images were slightly overestimated.



Fei LI et. al. 2015	Identification of Bone loss Depth of IBD M-D width of IBD B-L width of IBD by clinical, periapical radiography & CBCT	CBCT measurements for the B-L width & the M-D width of the defect were similar to the intra-surgical measurements. CBCT measurements for the CEJ-BD and the depth of the defect were significantly underestimated compared to intra-surgical measurements.
Kranti K et.al. 2015	To investigate the use of CBCT in assessing the FI in maxillary molars.	Overall, only 28% of the clinical findings were confirmed in the CBCT, while 30.2% were overestimated and 41.7% were underestimated.
Pajunigara et.al. 2016	To evaluate the dimensions of FI clinically (pre & post surgery), intrasurgically and by CBCT (pre & post surgery)	Presurgery and postsurgery clinical measurements and CBCT measurements underestimated intrasurgical measurements in both vertical and horizontal aspects..
Zhu J et.al. 2016	To evaluate the extent and the severity of the FI in maxillary molars measured in CBCT and the reproducibility of these measurements	Of the 39 FI classified as degree II by clinical probing, 17.9 % (7 sites) were confirmed as degree II by CBCT. Distopalatal sites showed the lowest coordinate rate of 10 % between the clinical and CBCT assessment.(20.5 % & 15 %)
Milena M et.al. 2015	FD assessment based on dichotomous scale (presence /absence) and agreement between the clinical & the CBCT findings.	The agreement between the evaluation methods was present in 46.9% of cases (63.3% in maxilla, 45% in mandible).
Cimbajevic et. al. 2016	FD was assessed based on dichotomous scale (presence /absence)	
Suphanantachai et.al. 2017	Agreement between the IOR & CBCT for periodontal diagnosis, prognosis, infrabony defect type & defect treatment.	The overall concordance between IOR and CBCT for periodontal diagnosis, prognosis, infrabony defect type and infrabony defect treatment were 79.3%, 69.5%, 44.7% and 64.2%, respectively. CBCT had excellent interexaminer agreement and higher percentage of complete agreement among examiners than IOR for all assessments.
Padmanabhan S et.al. 2017	Accuracy of CBCT in assessing mandibular molars FI compared to direct surgical measurements	Both the methods are similar in measuring the furcation height ,width and the depth. Also in 52% , 36 % and 64 % of cases for furcation height ,width and depth respectively CBCT measurements are lower than the intrasurgical measurements. The study also indicated good agreement between the CBCT and intrasurgical measurements in measuring furcation height, width and depth .
Zhang et.al 2018	To compare & correlate assessment of FI by	All the three methods demonstrated more frequent FI of mandibular first molar relative
	three methods : clinical , intraoral radiographs and CBCT measurements	to maxillary counterpart . Of the maxillary first molars, buccal surface was more vulnerable for FI For comparison between CBCT and clinical detection, in 18.7 % cases of FI , there was over detection and in 26.7 % cases of FI there was under detection by clinical measurement. For comparison between IOR and clinical detection, in 25.6 % cases of FI, there was under detection and 18.2% cases of FI there was over detection by IOR .
Patil SR et.al. 2018	Bone loss (CEJ-BD) Defect depth M-D width of the defect B-L width of the defect	M-D width of the defect measured intra-surgically was similar to that measured on IOPA. No significant difference between the CBCT and surgical measurements.
Abhishek Singh Nayyar 2018	Comparison of measurements in the anterior and the posterior teeth at selected sites: B(buccal), P/L (palatal/lingual), M(mesial) , D(distal), MB(mesiobuccal) DB(distobuccal), PM(mesiopalatal) DP(distopalatal)	P/L sites in the anterior teeth showed a mean CBCT value of 4.044mm& the mean surgical value of 4.1822 revealed a statistically significant difference along the distal sites with the mean CBCT value of 3.3677and the mean surgical value of 3.5217.
Parvez MF et.al. 2018	Comparison of the clinical and the CBCT measurements of the FD in the maxillary molars at three sites (mid-buccal, mesiobuccal and distobuccal)	There was no statistically significant difference between CBCT measurements and surgical measurements (p≤0.05).
Pandey V et.al 2019	Comparison of the clinical and the CBCT measurements of the FD	The comparison of furcation involvement clinically and CBCT measurements in buccal side was statistically significant (p=0.0255), and was not significant statistically (p=0.3696 NS) on lingual side.
Warda et.al. 2019	Comparison of intrasurgical and CBCT measurements for FI as: BL-H – bone loss in the horizontal direction BL-V- bone loss in the vertical direction FW- width of furcation entrance	There was no statistically significant difference between the CBCT and intrasurgical measurements (p- value of 0.101, 0.201and 0.901 for FW, BL-V and BL-H respectively.)

RVG- radiovisiography, DVT- digital volume tomography, SUR- surgical , MD- mesiodistal width, BL- buccolingual width



A LITERATURE REVIEW OF 'APPLICATIONS OF OPERATIONS RESEARCH IN HEALTH CARE MANAGEMENT

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Abstract: Owing to scarce resources and increased population it has become quite difficult for the governments, especially those of developing countries to provide quality health services to their citizens. As a result of which Innovative operations research (OR) techniques have been developed for a wide range of healthcare applications such as operating room planning, emergency department staffing, breast cancer screening, radiotherapy treatment planning, long term care planning, home healthcare planning. Research in Healthcare can not only help hospitals in better managing their patients but also in providing better treatment while achieving efficiency in doing so. This paper describes the literature review of applications of Operations Research in health care.

Keywords: Public Health, Operations Research, Optimization, Healthcare Planning, Patient Scheduling, Staff Rostering, Forecasting

1. Introduction:

a. What is OR?

Operations Research consists of optimization techniques employed to make the best use of the scarce resources for the objective of maximizing profit or minimizing cost in an organization. It first originated during the Second World War where resources were scarce for the military **operations** and **research** was done to make the best use of these resources.

Operations research is a term that can be used with mathematical and statistical methods and computer systems, which characterizes the orientation, interdisciplinary philosophy, which aims to quantify the relevant aspects of the situation in the modeling and manipulation of the model approach to develop decisions, plans, and policies. The systematic methodology of OR focuses on the problems developed conflicting objectives, strategies and alternatives. OR is, ultimately, the scientific method, which is applied to complex tasks to assess the overall impact of different policy options to consider actions, providing a better basis for making business decisions. The OR approach to solve the problem comprises the following six sequential steps:

- i. Formulate the problem,
- ii. Construct a mathematical model,
- iii. Derive the solution from the model,
- iv. Test the model



v. Establish control over the solution, and

b. Health care: Health care is one of the largest industries in the developed and developing countries, as well as it is a service-oriented industry. It is a particularly significant service industry given not only the criticality of quality and safety in delivering patient care. Healthcare has become one of India's largest sectors both in terms of revenue and employment. Healthcare comprises hospitals, medical devices, clinical trials, outsourcing, telemedicine, medical tourism, health insurance and medical equipment. The Indian healthcare sector is growing at a brisk pace due to its strengthening coverage, services and increasing expenditure by public as well private players. The total industry size is expected to reach \$280 billion by the year 2020. According to the Investment Commission of India the healthcare sector has experienced phenomenal growth of 12 percent per annum in the last 4 years. Rising income levels and a growing elderly population are all factors that are driving this growth.

Besides being extremely understaffed the healthcare sector in India does not even have enough beds for its patients. With a world average of 3.96 hospital beds per 1000 population India stands just a little over 0.70 hospital beds per 1000 population. Moreover, India faces a shortage of doctors, nurses and paramedics that are needed to propel the growing healthcare industry. Lifestyle diseases have led to an increase in the spending on healthcare delivery.

Healthcare has become one of India's largest sectors both in terms of revenue and employment. Healthcare comprises hospitals, medical devices, clinical trials, outsourcing, telemedicine, medical tourism, health insurance and medical equipment. The Indian healthcare sector is growing at a brisk pace due to its strengthening coverage, services and increasing expenditure by public as well private players. Indian healthcare delivery system is categorized into two major components public and private. The Government, i.e. public healthcare system comprises limited secondary and tertiary care institutions in key cities and focuses on providing basic healthcare facilities in the form of primary healthcare centers (PHCs) in rural areas. The private sector provides majority of secondary, tertiary and quaternary care institutions with a major concentration in metros, tier I and tier II cities. India's competitive advantage lies in its large pool of well-trained medical professionals. India is also cost competitive compared to its peers in Asia and Western countries. The cost of surgery in India is about one-tenth of that in the US or Western Europe.

Demographic change and increasing health expenditures in the world make the healthcare research a hot topic. Hospitals in the world are becoming larger to take advantage of the scale economy but also become more complex to design and to operate. Ageing population makes constant diseases increasingly significant and leads to the need of better disease prevention, diagnostic, treatment planning and proactive cares. Patients are more and more concerned by healthcare safety and traceability. Healthcare systems are also changing and new health services such as home healthcare and telemedicine are growing. Most hospitals used to empiric management are not prepared for and innovative systems engineering approaches are needed. Recent development of advance medical technologies makes the systems engineering approach possible. The



increasing availability of healthcare relevant data makes possible better disease prevention, diagnostic and healthcare system operations. Innovative OR techniques have been designed for a broad range of healthcare applications such as operating room planning, emergency department staffing, breast cancer screening, radiotherapy treatment planning, home healthcare planning, long-term care planning and scheduling.

Facing these challenges, the very first attempts of the hospitals are to apply modern management techniques from other industries. This leads to numerous hospital projects on lean management, quality control, inventory control, etc. Most of these projects had limited impacts due to their strong dependence on experiences of consulting firms gained from other industries and hardly took into specific features of. Hospitals realized more and more the need of original research taking into specific features of healthcare industry. Various scientific communities quickly embraced major healthcare challenges from different perspectives. Emerging hot topics of the robotics & automation community include lab automation, lab-on-chip, surgical navigation, nanoscale drug delivery, medical imaging analysis, etc. Other communities such as OR and Industrial Engineering have been very active in healthcare management research. Major Operations Research and Industrial Engineering journals publish more and more papers in healthcare and OR/IE conferences often have very popular sessions in healthcare such as surgery planning/scheduling, nurse rostering, emergency department analysis, ambulance location/dispatching and so on.

Operations research is increasingly recognized as essential to strengthen health programs. For example, expanded stop tuberculosis (TB) strategy research clearly acting as a key element of successful programs of TB. It has various definitions depending on the scenario, scientists, and the type of search. The International Union against TB and Lung Disease and many of its research partners define OR as research into strategies, interventions, tools or knowledge that can enhance the quality, coverage, effectiveness or performance of the health system or program in which the research is being conducted. Mistry et al. [2004] derived a local agenda for OR: modeling the effects of newer technologies, active case detection, and changes in timing of activities, and mapping hotspots and contact networks; modeling the effects of drug control, changing the balance of ambulatory and inpatient care, and adverse drug reactions; modeling the effects of integration of TB and HIV diagnosis and management, and preventive drug therapy; and modeling the effects of initiatives to improve infection control.

c. OR in health care: In healthcare OR is not a new field; many health care researchers and planners use concepts and methodologies which, in the business world, are often associated with the practice of operations research. These concepts and methodologies most often deal with problems in the areas of: Healthcare operations improvement; Inventory and Supply chain management; Facility location and layout; Prevention, detection and treatment of diseases; Resource allocation; Clinical diagnosis and decision making; and Treatment design and planning.



Operations Research in context to Health Care is “Any research producing practically useable knowledge (evidence, findings, information, etc.) which can improve program implementation (e.g. effectiveness, efficiency, quality, access, scale up, sustainability) regardless of the type of research (design, methodology, approach) falls within the boundaries of operations research”.

OR is being utilized substantially more in hospital management, resource-constrained operations or treatment planning. Major healthcare optimization issues include logistics, disease diagnosis, service planning, medical therapeutics, resource scheduling and preventive care.

There are two main approaches for carrying out OR in healthcare. The first approach involves the analysis of secondary data as retrospective record reviews and utilizing such data that is already generated in the programs. Such data in the field often are not used to its maximum potential and much problem identification and gaps can be found out by reviewing the program reports and data sets.

The secondary approach is carrying out primary level research. There are four types of operation research studies as defined by the Population Council- exploratory/diagnostic, field intervention, evaluative and cost effectiveness studies, all not always mutually exclusive but often linked.

HEALTHCARE PLANNING

Planning is setting up of objectives and the devising strategies to attain those objectives. Healthcare planning is basically providing proper and adequate healthcare facilities where it is needed the most. In a country like India where there is a resource crunch and the population is huge (especially the aging population) it is very important to use proper healthcare planning. Also, when the life span is increasing and the birth rates are dwindling, there needs to be extra budget and healthcare resources to meet the need.

So it is our responsibility to make sure that none of these resources get wasted and there is optimal use of these resources as healthcare is a very sensitive topic to deal with as it involves the life of a human being. Many have started to use operational research as a technique to optimize these resources and minimize costs.

Operations research is used right from proper allocation of beds in the emergency room to the proper allocation of nurses in the intensive care units to selection of hospital location to forecasting the future demand.

2. Literature Review

An area that has received considerable attention among OR scholars is workforce scheduling, and in particular, nurse rostering. The problem of working hours of construction for nurses to meet fluctuations in demand is extremely difficult. Service plans must comply with the requirements of the work of nurses distinguish permanent and temporary staff are qualified to provide holidays and day, night and nurses evenly over the weekend and set preferences for class officers. Linear, mixed integer and goal programming with constraint programming methods have been developed to generate nurse rosters. Reviews of literature on nurse rostering are available in Burke et al. [2004] and Lim et al. [2012].



Appointment scheduling has also been a rich research area over the past decades (e.g. see Gupta and Denton [2008]). The process of assigning time slots for serving out- and inpatients arises in diagnostic and treatment units deals with uncertain service times, no-shows, cancelations, and walk-ins. A good appointment schedule keeps patient waiting times short and minimizes staff overtime taking into account the patient load and the available resources (i.e. staff, rooms, and equipment)? In view of this numerous authors developed models with the objective of

- i. How many patients to schedule?
- ii. How to allocate appointment slots throughout working day?
- iii. What is the optimal sequencing of heterogeneous patients.

Recently, Granja et al. [2012] developed an optimization model based on simulation approach to the patient admission scheduling problem using a linear programming algorithm. Richard et al. [2016] provided an improved method for solving the so-called dynamic patient admission scheduling (DPAS) problem. Atle et al. [2016] presented an exact method for Patient Admission Scheduling (PAS) problem based on a recursive logic-based Benders' decomposition where each sub problem is formulated as an integer linear program. Turhan et al. [2017] addressed two Mixed Integer Programming based heuristics namely Fix-and-Relax and Fix-and-Optimize where PAS problem instances are decomposed into sub-problems and then the sub-problems are optimized.

Kidney dialysis therapy initiation for evaluating cost and effectiveness is investigated in Lee et al. [2008]. They used Approximate Dynamic Programming and Simulation to determine an optimal therapy and a strategy for maximizing patient welfare. Chen [2009] proposed the kidney allocation problem. He assumed that the decision has to be made within a fixed time horizon because a kidney is perishable and the kidneys are limited. He addressed that the objective of kidney allocation problem is to determine the allocation rule to maximize the total expected value achieved. The arrival, demand pattern of patients is random. When we replace kidneys with airline tickets and patients with travelers, we get the airline yield management problem. When we replace kidney and patient by job and worker respectively, it has the typical scheduling problem. Recently, Thamer et al. [2015] developed a risk score to assist shared decision making for kidney dialysis initiation. Then Bagshaw et al. [2017] addressed strategies for the optimal timing to start renal replacement therapy in critically ill patients with acute kidney injury

Operating theater planning and scheduling (OTPS) has also received much attention in the past 60 years. The strategic (long term) planning level addresses capacity planning given a forecast of patient demand. Typically, the operating theaters and the time allocated to each activity of the department at the time. The tactical (mid-term) planning level deals with the creation of weekly/monthly (rough) schedules for elective surgeries. Operational planning, the operational plan for the next day, generating a sequence of operations in each operating room early and distribution activities and some resources. Finally, the online planning level deals with rescheduling previously planned surgeries as a result of unforeseen events such as delays, emergencies, and cancelations. The rich



and still growing literature on OTPS covers a wide range of OR methodologies (heuristic approaches, and simulation) for deterministic and stochastic environments. Reviews of literature up to 2010 on Operating Theater planning and scheduling are available in Cardoen et al. [2010]. Recently, Wang et al. [2014] investigated an operating theater allocation problem with uncertain surgery duration and emergency demand. In Wang et al. [2014], the operating room allocation problem with cancellation risk is mathematically formulated as follows:

Strategic operating theater planning belongs to the group of resource allocation and capacity planning problems. This group involves decisions concerning the mix and volume of patients treated by a hospital and the amount, capability, and type of resources for the delivery of healthcare. Hospital layout planning is also at the strategic level, but has received much less attention. The goal is to design a hospital, a clinic or a department in order to minimize the movements of patients and accompanying resources such as medical staff and equipment. Quadratic integer programming models were proposed by Butler et al. [1992]

Patient transportation is a variant of the dial-a-ride problem (DARP) and concerns finding a set of minimum-cost routes and schedules for a fleet of ambulances (or hospital staff) to transport (or escort) inpatients between nursing wards and diagnostic units. Hospital-specific constraints (e.g. different priorities of requests, needs special equipment and support medical staff during transport and handling of incomplete knowledge in advance) significantly complicate the development of high-quality vehicle routes and schedules. The latter is often controlled by the imposition of the travel time of the patient and minimizing deviations from the desired times for pickup and delivery. By its nature DARP combined extremely difficult to solve, which has contributed to the development of new OR, in particular the new (meta-) heuristic methods allowed. Beaudry et al. [2010] and Kergosien et al. [2011] proposed search-based approaches, while Hanne et al. [24] embedded an evolutionary algorithm in a software application designed to support all phases of the transportation flow including request booking, scheduling, dispatching, monitoring, and reporting. Recently, Knyazkov et al. [2015] illustrated the evaluation of Dynamic Ambulance Routing for the Transportation of Patients with Acute Coronary Syndrome in Saint-petersburg. Zhang et al. [2015] addressed a real-life public patient transportation problem derived from the Hong Kong Hospital Authority (HKHA), which provides ambulance transportation services for disabled and elderly patients from one location to another.

Aiming at improving the efficiency and reliability of ambulance service, several location models for ambulance stations have been proposed in the OR literature. Well-known approaches to this problem are coverage model and median model. Coverage model looks for the location to maximize the (deterministic or probabilistic) covered demand of ambulance calls. Hence this model can be thought of reliability-oriented model. On the other hand, in median model the objective is to minimize the total traveling distance of the ambulances from the station to the scene of call. This model gives more weight to the efficiency of ambulance operation. Morohosi [2008] addressed the comparison of those optimization models through actual patient call data from



Tokyo metropolitan area to show the characteristics of each model and investigate a possibility of improvement in ambulance service.

Some more applications of OR in health care

1. Emergency Vehicles

The optimum allocation of emergency vehicles is very important because it the question of life and death of a person. While planning for this the two main objectives need to be kept in mind: there should be maximum population coverage by a single unit of vehicle; minimization of the total travel distance from locations to the hospitals which helps them to reach faster.

Various researchers have come up with literature related to allocation of the emergency vehicle. In Colombia, Rojas et al. (2007) used linear programming to determine ambulance location and tested the effectiveness of results by using simulations. Simulation is a process involved with developing a model of some real phenomenon and then performing experiments on the model evolved with a view to predict the behavior of the system over time.

A facility location model for ambulances that limits the number of units needed for performing at pre-specified service levels was developed by Ingolfsson et al. (2008). They used uncertainties and randomness into their convex optimization model using actual data from Edmonton, Canada. They found the model to be tractable with general-purpose optimization solvers for cities with population of up to one million.

The following shows a survey which was taken by Alabama company, it shows the patients complaint, the time taken to reach there at the right time, and the reasons (medical transports, immediate ambulances needed), etc.

2. Demand Forecasting

Demand forecasting is basically predicting the future demand of a particular product in advance. It includes both controllable and uncontrollable factors. Proper demand forecasting is of utmost importance as it forms a part of the basis of the input of the model. The techniques for demand forecasting can either be quantitative or qualitative, however quantitative requires data in the form of numbers which is more accurate

Finarelli and Johnson (2004) gave an elaborate nine-step, quantitative demand forecasting model for healthcare services-Effective forecasting of demand for healthcare services requires nine steps: 1. Gather historical data. 2. Analyze historical trends. 3. Recognize key demand drivers. 4. Recognize relevant benchmarks. 5. Demonstrate existing conditions. 6. Create core assumptions for population-based demand. 7. Create core assumptions for provider-level demand. 8. Make a baseline forecast of future demand. 9. Test effectiveness of projections to changes in core assumptions, while Cote and Tucker (2001) examined four common methods for predicting demand for healthcare services: percent adjustment, 12-month moving average, trend line and seasonality. The correctness of different forecasting methods was evaluated by Jones et al. (2008). They utilized data from daily patient arrivals at the emergency departments of three different hospitals and considered the following methods: time series



regression, exponential smoothing, and seasonal autoregressive integrated moving average and artificial neural network models. Beech (20001) derived market-based healthcare service forecasting from a wide scope of accessible information for estimating the future demand. The data set includes primary as well as secondary service areas, service-area populations by various demographic groupings, discharge utilization rates, market size and market share by service lines. They found that market dynamics can allow a variety of explicit assumptions and trends for developing scenarios of potential future demand.

3. Step Quantitative Demand Forecasting Model for Healthcare

Developing countries like India, where there is lack of space and proper infrastructure optimal allocation of healthcare centers is very important. Hence, OR scholars have studied where to keep this kind of centers for maximum accessibility by the people. Murawski and Church (2009) considered the issue of improving health service accessibility by connecting the existing facility locations of the transport network to metalled roads. Their integer-programming model is sufficient for rural areas of underdeveloped countries where, during bad weather conditions, availability is reduced because of the lack of basic access to roads. A marginal different problem is solved in Ndiaye and Alfares (2008). They consider the issue of selecting public service locations for nomadic population groups that seasonally change their locations. The authors have presented a binary integer-programming model to decide the ideal number along with the areas of the primary healthcare units that can fulfill seasonally varying demands.

4. Patient Scheduling

Patients have to make appointments to visit specialists. This gives rise to the problem of long waiting time at clinics and hospitals before consultation. Hence appointment scheduling or patient scheduling is an important field of research in healthcare. Researchers have used various OR techniques to make appropriate appointment schedule so as to minimize waiting time. Making optimal patient-staff schedules and patient-facility schedules can help to save time and reduce cost. A good appointment schedule aims at least waiting time for patients and minimizes overtime for staff constrained by the patient load and staffing. OR models are developed by authors to answer the given three questions:

- 1) How many patients should be scheduled on a given day?
- 2) How should appointment slots be allocated to these patients on a given day?
- 3) What will be the optimal sequencing of heterogeneous patients?

Patrick et al. (2008) gave a model for patient scheduling based on varying priorities as a Markov decision process. Markov decision processes provide a mathematical framework for modelling decision making in situations where outcomes are partly random and partly under the control of a decision maker.

Turhan et al. (2013) used heuristic models called Fix-and-Relax and Fix-and-Optimize for Patient Admission Scheduling. Fix-and-Relax is used to find an initial solution to the problem which is further improved using Fix-and-Optimize.



Green and Savin (2008) gave a single server queue model for last minute cancellation of appointments by patients. Simulation was used by Patrick and PuteOrman (2007) to achieve resource utilization and flexibility in appointment scheduling.

5. Resource Scheduling

Resource scheduling is a set of techniques and methods used to determine the requirement of resources to complete a given work and when it will be required. Nowadays, it has become important for hospitals to reduce their operational costs without affecting its quality in terms of providing health care services. This can be done using resource scheduling. Resources may only include health professionals (e.g. doctors, nurses), rooms (e.g. examination rooms, operating theaters), equipment (e.g. x-ray machines, CT scanners) and supplies (e.g. blood, bandages). But more importance is given to staff scheduling and operating room scheduling.

6. Staff Scheduling

Staff scheduling, or rostering, refers to the process of assigning schedules and making work timetables for staff members in a clinic or hospital to meet the demand for its services. In order to do this first shifts are assigned to all staff members to meet the requirements at different timings, and duties are then assigned as per the respective shifts. Personal preferences of staff should also be considered.

Leksakul et al. (2014) developed a nurse scheduling model using Genetic Algorithm to maintain highest level of service, minimize hospital staffing cost and equitably distribute overtime pay. Grano et al. (2009) developed a model with a two stage approach which considers hospital requirements as well as nurse preferences.

A re-rostering problem occurs when any nurse declares that she is unable to complete a job assigned to her. A solution to this problem was given by Pato and Moz (2008) using Genetic Algorithm and Moz and Pato (2005) using Goal Programming.

In various situations, patients need specific nurses with special skills. Punnakitkashem et al. (2008) developed a stochastic programming approach to tackle nurse to patient assignments. Mullinax and Lawley (2002) gave a mathematical model and heuristic approach to assign nurses to seriously ill infants.

Felici and Gentile (2004) presented a model with an objective of maximizing staff satisfaction using a polyhedral approach.

7. Operating Room Scheduling

Operating Rooms are the largest cost center and revenue center in a hospital. And hence it becomes increasingly important to effectively manage them so as to minimize cost and maximize revenue. Studies show that on an average, operating rooms are utilized to only 40% to 75% of their capacity. This can be improved using Operating Room Scheduling. Various studies have been conducted by OR practitioners which study Operating Room Scheduling.

Magerlein and Martin (1978) reviewed literature on surgical demand scheduling. He distinguished between advance scheduling (process of fixing a surgery date for a patient) and allocation scheduling (operating room and the starting time of the procedure on the specific day of surgery) in his study.

Lamiri et al. (2008) developed a stochastic model which considers two types of demands for surgery for operating room planning: elective (can be pre-planned) and emergency (arrives randomly and surgery must be performed immediately). Wang et al. (2014)



investigated an operating theater allocation problem with uncertain surgery duration and emergency demand.

Besides addressing various other healthcare management aspects, OR researchers have made significant contribution to drug treatment planning, infectious disease prevention and control and organ donation.

8 Disease Diagnosis

A review on the application of the Analytic Hierarchy Process to numerous problems in medical decision making is provided in Liberatore and Nydick (2008). They summarised 50 different articles from seven categories: diagnosis, patient participation, therapy/treatment, organ transplantation, project and technology evaluation and selection, human resource planning and healthcare evaluation and policy.

Abnormal brain activity is investigated in Chaovalitwongse et al. (2003) (2006) (2008) by using a mathematical-modelling framework for minimizing errors in classification.

Cancer diagnoses are the focus of the work by Bortfeld et al. (2008) and Sofer et al. (2003). They gave a robust optimization formulation of the problem that generalizes mathematical-programming formulations using clinical data.

Paltiel et al. (2004) introduced “Asthma Policy Model” as a Markov state-transition simulation to forecast asthma-related symptoms, acute exacerbations, quality-adjusted life expectancy, healthcare costs and cost effectiveness.

Finally, coronary risk prediction was studied by introducing the Logical Analysis of Data and discusses how it can be used for disease prediction.

9. Treatment Planning

Within Medical Therapeutics, an area that has been receiving special attention is radiation therapy. Still, several other areas of planning and intervention have been the subject of study as reflected in the papers by Paltiel et al. (2004), Lee et al. (2008) and Zenios (2004).

Recently, Holder (2004) gave a comprehensive discussion of linear- and non-linear programming models for Intensity Modulated Radiotherapy Treatment (IMRT).

IMRT, as well as three-dimensional conformal radiotherapy (3DCRT), are addressed in Ferris et al. (2004). The problems are described in quadratic, linear, piece-wise linear and non-linear formulations.

Kidney dialysis therapy initiation for evaluating cost and effectiveness is investigated in Lee et al. (2008). They used Approximate Dynamic Programming and Simulation to determine an optimal therapy and a strategy for maximizing patient welfare.

Lee and Zaider (2004) described a clinical decision support system for treatment planning in Brachytherapy and used Mixed Integer Program for optimization.

Davies and Brailsford (2004) described a simulation model for screening complications related to diabetes.

10. SPECIALIZED AND PREVENTIVE HEALTHCARE

Increase in longevity, escalating health-care costs and the emergence of new diseases in recent years have forced medical decision-makers to focus strongly on preventive and specialized measures.



a. Organ Donation And Transplant

Most research work on organ transplantation focuses on policies for allocating donated organs to the waiting patients, liver and especially kidney transplants being the most monitored problems.

Zenios (2002) addressed the mix of direct and indirect exchanges of organs that maximise the expected total discounted quality-adjusted life years of the candidates in the participating pairs. They developed a double-ended queuing model for an exchange system with two types of donor-candidate pairs. They found direct exchanges to be preferable. They analysed allocation, queuing and simulation models as the core OR methodologies for medical decision making.

A software solution for optimising kidney pair donation based on maximum edge-weight matching algorithm is presented in Segev et al. (2005). The algorithm first constructs a graph in which each node is an incompatible donor-recipient pair and each edge is a potential match between the two connecting nodes. The graph can be constructed by entering the blood type, antibody and antigen information for each pair of nodes. Liver transplants are analysed by Alagoz et al. (2004). They studied how to optimally time liver transplant to maximise the patient's total reward.

Shechter et al. (2005) designed a biologically based discrete-event simulation to test changes in allocation policies for liver diseases. Another simulation model which allows a comparison of different policies for allocating donor hearts on pre-transplant outcomes is presented in van den Hout et al. (2003).

b. Prevention of Diseases

Optimization problems related to the prevention of diseases concern mostly vaccine selection. Sewell and Jacobson (2003) developed the vaccine selection algorithm to cover the entire immunisation schedule. They developed an integer-programming model to assess the economic premium that exists in having combination vaccines available.

Hall et al. (2008) addressed a vaccine formulary problem for generic childhood immunisation schedules. They formulated an integer-programming model to find the maximum number of vaccines that can be administered without extra-immunisation. An exact Dynamic Programming algorithm along with a randomised heuristic for the integer-programming model is developed to solve the model.

Earnshaw et al. (2007) addressed a resource allocation problem for HIV prevention and developed a linear-programming model for improving on past allocation strategies. Brandeau et al. (2003) used non-linear optimisation techniques combined with epidemic modelling to determine the optimal allocation of limited resources for epidemic control in multiple, non-interacting populations.

3. Conclusion: A brief review of operations research (OR) applications to healthcare system are addressed in this paper. The purpose of this paper is to identify the existing literature on the wide range of operations research (OR) studies applied to healthcare, and to classify studies based on application type and on the OR technique employed.



In the last two decades, Operations Research communities have become interested in the increasing applications of OR techniques in healthcare sector. In this paper various studies undertaken in the field of OR for betterment of healthcare services have been discussed. Although OR researchers have been able to tackle a number of problems in healthcare services, there is still much scope left for improvement and research in this area.

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VIOLENCE-FREE HOME IS THE HUMAN RIGHT OF WOMEN

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Abstract

Domestic violence against women is a world phenomenon, which murders, tortures and hurts- physically, psychologically, sexually and economically. Domestic violence is a multifaceted and inhuman form of mistreatment, committed most often within the four walls of the home by nearest and dearest family member of a woman. It is one of the most pervasive forms of human rights violation, denying women and girl's equality, security, dignity, self-worth, and their right to enjoy fundamental freedoms. In India, domestic violence against women is the most common form of violence against women. From the mother's womb till old age women face different kinds and different extent of violence perpetrated by her near and dear family members. In many cases residential home become most unsafe place for her. Domestic violence against women leads to far-reaching physical and psychological consequences for the victim, some with deadly outcomes. The government of India has taken several legal and protective measures for prevention of women from violence, especially from domestic violence. But, still incidents of domestic violence in India are in rise. It can be reduced, when the contribution of women in family maintenance and socio-economic development of the country would be recognized by the people (men and women) of India.

Key words: Domestic Violence, Human Rights, Cruelty.

Introduction

Residential 'Home' is considered as a safe and secured place for any human being among near and dear family members. In any difficult situation people feel safe and secured at home with close relatives. But, in many cases home become a unsafe place for women. For many women in the world, home is a place of fear and troubles. Many of their nearest family members become perpetrators of violence against women, where women feel insecure and perilous, even death-defying. Even life of a woman becomes endangered among family members; her human rights are violated by members of her family. Moreover, victimized women have to remain silent, as she has no other option to live a life with dignity.

According to the United Nations definition, "Violence against women means any act of gender-based violence that results in or is likely to result in physical, sexual, or psychological harm or suffering to women, including threats of such acts, coercion or arbitrary deprivation of liberty, whether occurring in public or private life."

Domestic violence against women is a world phenomenon, which murders, tortures and hurts- physically, psychologically, sexually and economically. In India, domestic violence against women is the most common form of violence against women.

Domestic violence is a multifaceted and inhuman form of mistreatment, committed most often within the four walls of the home by nearest and dearest family



member of a woman. It is one of the most pervasive forms of human rights violation, denying women and girl's equality, security, dignity, self-worth, and their right to enjoy fundamental freedoms.

Types of domestic violence against women:

Physical violence:

Any act of violence that causes bodily pain or injury constitutes Physical violence. Intentional use of physical force involving cause of death, disability, injury or harm is considered as physical violence. For example, Scratching, pushing, shoving, throwing, grabbing, biting, choking, shaking, poking, hair pulling, slapping, punching, hitting, burning are acts of physical violence.

Sexual violence:

This includes, forced sexual intercourse, being compelled to watch or participate in pornography or other obscene material; unwelcome sexual conduct such as demand for oral sex; use of physical force to compel a person to engage in a sexual act against his or her will, even if the act is not completed; an attempted or completed sex act involving a girl or woman who is unable to understand the nature or condition of the act to decline participation, or to express unwillingness to engage in the act due to illness, disability etc.; abusive sexual violence that includes intentional touching to private body parts of any person against his or her will; use of words, gestures or weapons to compel a girl/woman to engage in sexual act or sexual contact, even, if the person is either unwilling or unable to disagree due to threat.

Psychological or emotional Violence:

This includes trauma to the victim caused by threats or coercive tactics like, Character assassination, demeaning a women for not having given birth to a male child or having given birth to daughters, threatening to desert or harm the women, Ridicule, insults, taunts concerning appearance, unwanted commentary regarding not bringing dowry, preventing the women from leaving home or without child, preventing the women from meeting other people, forcing the women to marry against her will or interfering with the women's plan to marry a person of her choice, threatening to commit suicide as a method of coercion, Ostracism, forcing the women to leave her job, humiliating the women, controlling what the victim can and cannot do; withholding information to blackmail her; getting annoyed if she disagrees; deliberately doing something to make the woman feel embarrassed & frustrated; disregarding what she wants; isolating her from friends and family; prohibiting access to transportation or telephone etc.

Economic violence:

This includes, refusing to provide money for maintaining the women and her children, not providing food, clothes, medicines or other necessities for the women or for the children; interfering with the woman's ability to be gainfully employed; taking the women's income, salary, wages or assets, prohibiting the women from using her money the way she wishes; expelling the women from the household; interfering with the women's use of any part of the house; forbidding the use of clothes or general household articles; disposing of assets which the women has an interest and entitled to use by virtue of domestic relationship or which are reasonably required by the women or her children against her wishes; deprivation of all or any economic or financial



resources, assets whether movable or immovable, valuables, shares, securities, bonds and other property, to which the woman is required or entitled; 'Stridhan' and jointly or separately owned property by the woman.

Magnitude of domestic violence against women in India:

In Indian society, women are subjected to domestic violence during her entire life-cycle, even before taking birth. At every stage of her life cycle from conception to adulthood, she is vulnerable to human rights abuses. Violence within the four walls of home, ranges from offence such as, female feticide and infanticide, child marriage, insult, hurt, attempt to murder, murder, abetment to suicide, physical and sexual assault, economic exploitation and many more. Violence within the home spans several acts which is dismissed as "personal" or "family issues" and could not be subject matter of legal intervention. This is coupled with the dilemma of women who have very few alternatives to the violent home.

Female foeticide:

According to the Indian cultural heritage, son is desired to ensure contribution of the lineage and family name and economic support of parents in their old age. On the other hand, daughter is viewed as a burden and liability, because investment made for her brings no return. Moreover, a sizable dowry has to be given in her marriage. So, a systematic gender bias for the Indian girl child begins in the mothers' womb. Sex-selective abortions have become widespread, which is evidenced by the declining child sex-ratio.

Female infanticide:

The first right of a new born girl child is the right to remain alive and not to be killed. The Constitution of India has guaranteed the right to life to all who dwell in India in Article 21, which declares "No person shall be deprived of his life or personal liberty except according to procedure established by law". Article 21 encompasses not only the right to her mere survival, but, also right to childhood and right to family and safe home. How far the right is available to the Indian girl child is a valid question. Female infanticide still continues, which is evident from the declining ratio of girl and boy child in India. It is shameful for a developing country like India that a large number of girl children are missing every year. According to the report of UNDP- 'State of World Population 2020', published on 30th July 2020, about 4, 60, 000 girls in India were "missing" at birth each year, between 2013 and 2017. It is evident from this statistical analysis that large number of girl child has lost their right to life in India during last few years.

Sexual abuse of girl child:

Sexual abuse of children and adolescent girls within the family is one of the most invisible forms of domestic violence. There are many cases of sexual abuse of girl child at home by her own relatives. But, there is utter silence around the sexual violence of girl child. Statistics of this violence is hard to find in India as it is a crime that threatens the foundation of family life. Most of the abusers are biological or social fathers, grandfathers, cousins, uncles or other male relatives in a position of trust, who live in same household, which presents him a chance for continual and easier sexual



accessibility to the girl child. Sometimes the incidence of sexual abuse of a girl child is occurred during her visit of relative's house; sometimes in her own residence by her neighbouring male person, who is trustable to her family members in absence of her parents. Most common forms of sexual abuse of girl child in domestic premises are sexual assault, sodomy, caressing, kissing, exhibitionism, rape, showing pornography, sexual penetration with an object etc. Unlike as in adults, in children the use of force is not required always for the abuse. Since children are incapable of understanding the implications of the act, their willingness has no meaning whatsoever. In fact, most instances of abuse are there, where she is not even aware of being abused and treats it as play.

Child marriage:

Child marriage is one of the worst means of domestic violence in India, but it remained unnoticed. UNICEF defines child marriage as marriage before 18 years of age and considers this practice as violation of human right. The Prohibition of Child Marriage Act (PCMA), 2006 defines child marriage as marriage in which either the girl or the boy is underage, i.e., the girl is under 18 years of age or the boy is younger than 21 years. According to the NFHS-4 (2015-16), rate of child marriage rate is 26.8 percent in India, which was 47.4 percent in 2004-05 (NFHS-3report). The victim of child marriage has to suffer continuous sexual exploitation and abuse by her husband, but, it remains out of legal intervention. But, its incidence of sexual abuse occurred with an unmarried minor girl, there strong provision of punishment in POCSO Act, 2012 (Protection of Children from Sexual Offence Act.). She has to face more life-threatening consequences of child marriage like, high risk pregnancy with health complications, risk of HIV/AIDS and other sexually transmitted diseases, inability to manage families, Illiteracy and poverty.

Dowry violence and dowry death:

Marriage in India is regarded as essential and ultimate goal of life for women, irrespective of class, caste, religion, ethnicity and region. And in most of the arranged marriage in Indian society, dowry is common. According to the legal term, "dowry" means any property or valuable security given or agreed to be given either directly or indirectly by one party to a marriage to the other party to the marriage. Dowry system has become crystallized in customary marriage system in India. This evil practice of 'dowry' continued since time immemorial. But, its degree, quantity and demanding style had been changing with changing socio-economic trends. Non-fulfilment of dowry demands is one of the basic causes behind domestic violence against women by her husband and in-laws. There is a tendency to associate most domestic violence with 'dowry' in India. Demand of dowry is an insult to the dignity of women and also of men. It has been deep rooted in our society and despite legislations, cases of dowry harassment and dowry deaths are increasing every year. Many greedy bride-grooms and their family find the evil practice of 'dowry' as a way of leading luxurious life. A large number of women are being physically assaulted, mentally harassed, burnt, murdered and tempt to commit suicide, every year in India on demand of dowry.

Cruelty:

Presence of Subtle or brutal cruelty by husband and in-laws is now become fate of a large number of women in India. Cruelty may be divided into two types- physical cruelty and mental cruelty. An act of physical violence by husband or any family



member to a woman resulting injury to body limb or health or causing reasonable apprehension of the same is considered as cruelty. Wife-beating, kicking, slapping, breaking bones, On the other hand, various act of non-physical violence such as harassment, insulting behaviour, termination of marital intercourse, refusal to provide food, cloth, accommodation, and treatment by the husband can be considered as mental cruelty. Most of the Indian women irrespective of illiterate, uneducated or educated women have been victimised of some degree of cruelty in the domestic premises.

Marital sexual abuse:

Physical cruelty by the abuser husband is often accompanied by, or culminates in, sexual violence, wherein woman is forced to have sexual intercourse with her abuser or take part in unwanted sexual activity or unnatural/pervasive sexual act. Many times women are victimised of marital rape. Sexual abuse and rape by an intimate partner is not considered a crime in most of the countries. Moreover, people of many societies do not consider forced sex by husband as rape. It is felt that once a woman enters into a contract of marriage, the husband has the right to unlimited sexual access to his wife. Most of the victims of marital sexual abuse keep silence in our society in fear of social stigma. Some countries like, Australia, United Kingdom, United States of America, South Africa, France, Germany etc. have legislated against marital rape. There is no specific law against marital sexual abuse in India.

Making women economically dependent on men:

Women comprise a majority of the poor and are often the poorest of the poor, due to cultural norms and values, gendered division of assets, and power dynamics between men and women. Indeed, women and girls bear an unequal burden of unpaid domestic responsibilities and are overrepresented in informal and unstable jobs. So, they remain property-less. In most cases immovable property is not purchased in the name of a woman member of a family. Very few women have fixed deposit account at bank in their own name. In many cases her 'Stridhan' remains under the custody of her mother-in-law or husband. Many working women are restrained to use their earned money for personal purpose and their ATM card is regulated by her husband. Before 2005, Indian Hindu women did not have equal rights on ancestral property. After amendment of Hindu Succession Act in 2005, Hindu women are allowed to have equal rights to ancestral property; whereas, Muslim women of India are deprived of equal rights on ancestral property. Thus, women have to remain dependent on their male counterpart.

Restriction on mobility and communication:

Another common form of domestic violence against women in India is wrongful restraint or confinement of the woman within her matrimonial home. Women's mobility in outside world depends upon the will of her male guardians during her entire life cycle- in pre-marriage stage it depends upon her father's and brothers will; in post-marriage stage women's depends upon her husband's and in-laws will.

Honour killing:

Like many countries in the world, women are killed by her family members in order to sustain the family 'honour' in India. There may be many reasons behind honour killing- alleged adultery, pre-marital relationships (with or without sexual relationships), love affairs with a person of lower caste or different caste, rape etc. In most of the cases incidents of honour killing are remain hidden and thus, unattended by legal instruments.



Violence against elderly women and widow:

In the context of elder women, domestic violence encompasses physical and mental abuse and neglect by children, by siblings and by male partner. Usually the older women live with the perpetrator under a same roof and dependent on the perpetrator. So, they keep silence regarding their sufferings. Elder women may face different types of violence, like, physical abuse, emotional abuse, financial or material exploitation, abandonment, neglect etc. physical abuse may range from slapping or shoving to severe beating or restraining; emotional abuse can range from threatening to insulting and withdrawal of assistance and caring; financial exploitation can range from misuse of an elder women's money to her property grabbing and leave her abandon.

In seventy plus age group, most of the women in India are found widows. Widowhood is a curse in India. The Indian widow tends to be a highly marginalized person. She typically receives very little support from family members. When she lives with one of her several adult sons, remains highly vulnerable to neglect. Her mobility and participation in different familial and social functions are restricted. The marginalisation of widows in India is consistent with the traditional perception of Hindu widows as ominous and she should lead a life of austerity devoted to the memory of their husband.

Another dimension of domestic violence against widow and elderly women is 'witchcraft'. In many tribal communities in India, many older women are treated as 'witch' by their relatives and local people. Out of superstitious mentality, a lonely old woman may be considered as witch by the people of a particular community and she may be beaten, thrown out from her own residence, even she may be murdered by her relatives in India.

Causes of domestic violence:

There are many causes behind domestic violence against women in India and in many cases these causes are interrelated to each other. The basic cause of continuation of domestic violence is unequal power relations between men and women. Factors contributing to these unequal power relations include: socio-economic forces, the family as an institution, where power relations are enforced, control over female sexuality, belief in the inherent dominance of males, and customs and cultural sanctions that have traditionally denied women and children in independent legal and social status.

Lack of economic resources vindicates women's vulnerability to violence and their difficulty in rescuing themselves from a violent relationship. The link between violence and lack of economic resources and dependence is spherical. On the one hand, the threat and fear of violence prevent women from seeking employment, or at best, forces to them to accept low-paid, home-based, unequal, exploitative labour. On the other hand, without economic independence, women have no power to get away from an abusive relationship.

Excessive consumption of alcohol and other drugs has been noted as a factor in provoking aggressive and violent male behaviour towards women and children.

Women's mobility is restricted by the family members most often. The isolation of women in their families and communities is considered as another reason of domestic violence against women. On the other hand, women's participation in social networks has been working as reducing factor of vulnerability of violence and in their ability to



resolve domestic violence. These networks could be informal like, neighbours or formal, like self-help groups or political party.

Lack of legal protection, particularly within the sanctity of the home, is a strong factor in perpetuating violence against women. Until recently, the law enforcement and judicial system did not recognise domestic violence as crime.

Lacking in execution of legislations and loopholes in legislations are causing increase of domestic violence against women.

Religious and historical traditions in ancient and medieval period in India have sanctioned punishing and beating of wives. The physical punishment of wives has been particularly sanctioned under the notion of prerogative and possession of women. In 'Manusmriti', guardianship of women in their every sphere of life is provided to male persons. Control over family wealth inevitably places men as decision-making authority in the family, leading to men dominance and proprietary rights over women and girls. The concept of ownership, in turn legitimates control over women's sexuality, which in many law codes has been deemed essential to ensure patrilineal inheritance. Women's sexuality is also tied to the concept of family honour of Indian society.

Traditional norms of many societies allow the killing of so called 'sinful' daughters, sisters and wives suspected of polluting the honour of the family by involving in forbidden sex or marrying a man of another caste or divorcing without the consent of the male guardian of her family.

Destabilised economic condition of a society, poverty, unstable job security, large number of unemployment, hardship in finding suitable and expected job, income inequality, mental stress, price hike of essential commodities etc. are indirect causes of increases violence against women.

Consequences of domestic violence against women:

Domestic violence against women leads to far-reaching physical and psychological consequences, some with deadly outcomes. Physical violence results in injuries ranging from damage of organ to chronic disabilities such as loss of hearing or vision, disfigurement to death.

Psychological violence leads to stress, stress-related illness, depression, trauma, mental sleekness, sleeping and eating disturbances, increases blood pressure, drug abuse, alcoholism and low self-esteem.

Girl child victims of sexual violence are more vulnerable. Sexual abuse and rape of girl child can lead to unwanted pregnancy, illegal abortion, severe mental trauma, honour killing of the girl child.

Children, who have witnessed domestic violence or have themselves been abused, exhibit health and behaviour problems such as unwanted behaviour, obstinacy, arrogance, denial of parental advice, drug addiction, and alcoholism. They may have difficulty at school and find it hard to develop close and positive friendships. They may run away from home and school, even the may feel suicidal tendency. The child witnessing violence at home can internalize violence as a form of conflict resolution. The girl who witnesses her mother being abused may be more likely to accept violence as the norm of marriage.



Violence against women at home starts from the womb of mother. Severe consequence of gender selective abortion may endanger the human species in the world. It may change demographic change in negative way in India and in the world.

Perhaps the most crucial consequence of domestic violence against women and girls is the denial of fundamental human rights of women and girls. Residential home is the place, where every human being can enjoy almost all kind of human rights, which are essential for his/her personal development and which are secured as Constitutional rights. But, domestic violence against women violates all six fundamental rights guaranteed by the Constitution of India for all its citizens including women - the right to life (Article 21), right to equality (Article no. 14-18), right to freedom (Article 19-22), right against exploitation (Article 23-24), right to freedom of religion (Article 25-28), Cultural and educational rights (Article 29-30).

Legal measures adopted for protecting women form domestic violence against India:

For making home safe and secured for women the Government of India has formulated several Acts and rules. A short account of these legal probations is relevant to mention here.

1. **Prevention of Women from Domestic Violence Act, 2005**, is an Act to provide effective protection of the rights of women guaranteed under the Constitution who are victims of violence of any kind occurring within the family.
2. **Pre-Conception and Pre-Natal Diagnostic Techniques (PCPNDT) Act, 1994**, is enacted to stop female foeticides and arrest the declining sex ratio in India. The **act** banned prenatal sex determination.
3. **The Protection of Children from Sexual Offences (POCSO) Act, 2012** is enacted to provide a robust legal framework for the protection of children from offences of sexual assault, sexual harassment and pornography, while safeguarding the interest of the child at every stage of the judicial process. The framing of the Act seeks to put children first by making it easy to use by including mechanisms for child-friendly reporting, recording of evidence, investigation and speedy trial of offences through designated Special Courts.
4. **The Prohibition of Child Marriage Act 2006** came into force on 1 November 2007 to ensure eradication of *child marriage* from the society.
5. **Dowry Prohibition Act**, enacted on 1st May, 1961, intended to prevent the giving or receiving of a **dowry**. Under the **Dowry Prohibition Act**, dowry includes property, goods, or money given by either party to the marriage, by the parents of either party, or by anyone else in connection with the marriage.
6. **Hindu Succession Act, 1956 was amended in 2005**, which says that daughter has equal **right** in the ancestral property. The **Act** specifies married daughters' *property right*. The amended **Act**, which came into effect on September 9, 2005, is applicable to the various sects and castes of Hindus, Sikhs, Buddhists and Jains.
7. The Hindu **Widows' Remarriage Act, 1856**, also **Act XV, 1856**, enacted on 26 July 1856, legalised the **remarriage** of Hindu widows in all jurisdictions of India under East India Company rule.



8. **Maintenance and Welfare of Parents and Senior Citizens Act 2007** is a legislation to provide more effective provision for maintenance and welfare of parents and **senior citizens**. The Maintenance and Welfare of Parents and **Senior Citizens** (Amendment) Bill, **2019** is under process.

Conclusion

Violence against women, either it take place in domestic space or in public space, is the one of the worst and at the same time simplest way of violation of human rights of women. Despite the fact that the Constitution of India has provided equal rights for all citizens irrespective to caste, class, race, religion, gender and the Government of India has formulated several Acts, rules to safeguard the rights guaranteed by the Constitution, still, violence against women in domestic sphere are continuous in rising. The NCRB report 2018 shows that majority of cases under crimes against women out of total IPC crimes against women were registered under 'Cruelty by Husband or His Relatives' (31.9%) followed by 'Assault on Women with Intent to Outrage her Modesty' (27.6%), 'Kidnapping & Abduction of Women' (22.5%) and 'Rape' (10.3%). The crime rate per lakh women population is 58.8 in 2018 in comparison with 57.9 in 2017. It seems that only Acts and rules cannot stop violence against women, proper and prompt execution of the provisions under different acts is required. The fact of equal contribution of women in family maintenance, as well as socio-economic and political development of nation should be made understanding to new generation to change the prejudice mindset of Indian people regarding the subordinate status of women. The people of India (men and women) should conceptualize the fact in mind that 'violence-free home is the inalienable right of women'.

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EFFECT OF YOGIC PRACTICES AND BRISK WALKING ON PHYSICAL FUNCTION AMONG MIDDLE AGED WOMEN

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Abstract

Introduction: The purpose of the present study was to find the effect of yogic practices and brisk walking on physical function among middle aged women. **Materials and Methods:** For this purpose, forty-five middle aged women working in various faculties (except Department of Physical Education & Music) of S.N. College, Kannur in the age group of 35 – 45 years were selected. They were divided into three equal groups, each group consisted of fifteen subjects, in which group – I underwent yoga practice, group – II underwent brisk walking five days (Monday to Friday) per week for twelve weeks and group – III acted as control group who did not participate in any special training. Prior to and after the training period the subjects were tested for flexibility, vital capacity and blood pressure (systolic and diastolic). The flexibility was measured by administering sit and reach test, vital capacity was assessed by using spirometry and blood pressure was assessed by using sphygmomanometer. **Statistical Tool Used:** The independent sample ‘t’ - test, Levene’s test for equality of error variances and Analysis of covariance (ANCOVA) was applied as statistical tool. Since there were three groups were involved in the present study, Scheffe S test was applied as post-hoc test. **Result:** The resistance training followed by yogic practices group improved ($P < 0.05$) flexibility, vital capacity and decreased the blood pressure (both systolic and diastolic). There was a significant difference was also found between the experimental and control groups, in favor of experimental groups. But there was no significant difference was occurred between the experimental groups on selected criterion variables. **Conclusion:** Twelve week of yogic practices and brisk walking has a favourable improvement in flexibility, vital capacity and a decrease in systolic and diastolic blood pressure.

Key Words: Yogic Practices, Brisk Walkings, Flexibility, Vital Capacity, Blood Pressure and ANCOVA.

INTRODUCTION

Aging become natural and it is a common process related with structural and functional changes.[1,2] Mood changes, social activity, changes in physical fitness and also unpleasant changes in apparent sensation, cognitive behavior and process of thinking happened during aging.[3] Between 2015 to 2050, the increase of the individual over 60 years will almost be doubled from 12% to 22%[4] and it may also increase the incidence of non-fatal disabilities and non-



communicable diseases also increases by upper limit. Physical fitness activities is coupled with mental health improvement, the onset of dementia will be delayed, [5] quality of life and wellbeing will also be improved.[6] Physical activity increases the health benefit in higher level and repeated bouts performance reduced the risk and improved health in various ways.[7] Physical activity performed with regular mode show reduced the pain, mobility, mood disorders, depression, anxiety and improves the mental health and sleep quality.[8,9] The studies of recent years has recommended that interest of elderly peoples are in different types of activity which is simple, easy and help them to develop well-being and internal satisfaction focused on appearances and fitness.[10-14]

In ancient India, the yoga was practiced to develop the bodily, spiritually and mental communion. During the modern era, yoga increased in popularity and the benefits are shifted to mind and body practice. Usually, yoga combines with asana, pranayama and meditation and 89.9% of yogis combined pranayama with yoga and 54.9% combined meditation with asana.[15] Yoga is a typical activity involving multifaceted benefits for older people.[16-18] In modern days, yoga is become popular physical activity[19] and it also means that harmony of the mind, body and spirit.[20] Latest research notifies that there was some beneficial effects of yoga on lot of health outcomes which affects older peoples, including balance and mobility,[21-23] cardio-metabolic health, [24-27] sleep quality, quality of life[28] and cognition.[29-31] Yogic exercises which is related with best and better subjective well being[32-34], the mental health outcomes has increased or improved with depression and anxiety also be reduced.[35,36]

Walking is a type of aerobic training that is suitable for many people [37] and may be included into daily routines in an easiest way. It is also a formal type of training without any requirements or special equipments also undergo in an person's living area and available time. Strength and muscle power have exaggerated by loss of sarcopenia (muscle mass) during the aging course. At the time of second and third decennary of aging, the muscle's crest strength occurs. Up to the age of 50, mild decrease in strength of muscle occurs, and also stressed after the age of 65 years and then declined between 12% to 15% for each decade.[38,39] Moreover, a qualitative decrease in the strength of muscle with atrophy in the fast twitch fibers (type II fibers), decrease in tendon elasticity, and low activation of agonist and higher antagonist muscles.[40]

MATERIALS & METHODS

This study under investigation involves the experimentation of yogic practice and brisk walking on flexibility, vital capacity and blood pressure (systolic and diastolic).

SUBJECT

Only middle aged women those who were working in various faculties (except physical education and music) of S.N. College, Kannur, Kerala and aged between 35 and 45 years were selected. The average age in the experimental and control groups were 39.5 years. The selected forty-five



subjects were randomly divided into three groups of fifteen each, out of which group - I (n = 15) underwent yogic practice, group - II (n = 15) underwent brisk walking and group - III (n = 15) remained as control. The training programme was carried out for five days per week during morning session only (6 am to 8 am) for twelve weeks. The participant of the study were interrogated about their involvement of physical exercise during previous years and confirmed that there was no participation in any type of physical activity for past one year. The subjects those who are under cardiac infarction and pulmonary embolism were excluded from the present study after using a self-answered questionnaire. All participants provided their written informed consent to participate in this study prior to enrollment. The experimental groups underwent training programme under the guidance of well-trained aerobic trainers and yoga instructors. Attendance of the participants was taken at each training sessions and the training groups attendance was 99%. The training schedules of the respective groups were given below:

Table – 1: Yogic Practice Schedule

Weeks	Name of the Asanas (Maintaining Duration in minutes : Recovery)
1 – 4	Suryanamaskar (10 Min : 5 Min), Vajrasana (1 : 1), Pawanmuktasana (1 : 1), Gomukasana (1 : 1) - All 2 repetitions , Shavasana (2 min), Pranayama –Bhramari (1 min), Meditation – Omkar. (2 min)
5 – 8	Suryanamaskar (10 Min : 5 Min), Vajrasana (1 : 1), Pawanmuktasana (1 : 1), Gomukasana (1 : 1), Ardhamatyendrasana (30 sec : 30 sec), Paschimotsasana (30 sec : 30 sec), Bhujangasana (1 min : 1 min) - All 2 repetitions , Shavasana (2 min), Pranayama –Basthikara (1 min), Meditation – Omkar. (2 min),
9 – 12	Suryanamaskar (10 Min : 5 Min), Vajrasana (1 : 1), Pawanmuktasana (1 : 1), Gomukasana (1 : 1), Ardhamatyendrasana (30 sec : 30 sec), Paschimotsasana (30 sec : 30 sec), Bhujangasana (1 min : 1 min) - All 2 repetitions , Sarvangasana (30 sec : 30 sec), Halasana (1 min : 1 min), Matsyasana (30 sec : 30 sec) - All 3 repetitions,, Shavasana (2 min), Pranayama –Nadisodhana (1 min), Meditation – Omkar. (2 min).

Table – 2: Walking Programme schedule for aerobic training group

Week	Intensity	Duration (rest)	Frequency
1 – 4	90 kcal/h	20 min (5 min)	5 times / week
5 – 8	110 kcal/h	25 min (5 min)	5 times / week
9 – 12	130 kcal/h	30 min (5 min)	5 times / week

PROCEDURE

The researcher selected following criterion variables: 1. Flexibility, 2. Vital Capacity and 3. Systolic and diastolic blood pressure. Flexibility was measured by conducting sit and reach test[41] with Baseline 12 – 1085 Sit ‘n’ Reach Trunk Flexibility equipment, Systolic and diastolic blood pressure was assessed by using the mercury blood pressure Aqua Metallic BPMR121



sphygmomanometer[42] and vital capacity was assessed by using Niscomed Contec spirometer.[43] Blood pressure was taken after subject's were seated for ten minutes with an appropriately sized cuff. Twice the measures were taken with a minimum of two minutes between each measurement trials. The third measure was taken if blood pressure values were differ and greater than 4 mmHg. For the purpose of collection of data, the subjects were asked to report at early morning, one day prior and one day after experimental period.

DATA ANALYSIS

The paired sample 't' test, for measuring the equality of error variances Levene's test was used and Analysis of covariance (ANCOVA) was applied to find out the significant difference if any, among the experimental group and control group on selected criterion variables separately. In all the cases, .05 level of confidence was fixed to test the significance, which was considered as appropriate. Since there were three groups were involved in the present study, Scheffe S test was applied as post-hoc test. The data were compiled and analyzed using the *Statistical Package for the Social Science (SPSS)* for windows computer software (Version 16).

RESULTS

The data collected on flexibility, vital capacity and blood pressure among experimental and control groups were analyses and the results were presented in Table – 3.

Table – 3

Paired Sample T = Test of yogic practice group, brisk walking group and control group on selected dependent variables

Variable Name	Mean	Yogic practice group	Brisk walking group	Control group
Flexibility (Inches)	Pre-test mean	5.89	5.76	5.82
	Post-test mean	7.25	6.88	5.76
't' – ratio		22.49*	12.81*	0.15
Vital Capacity (Litre)	Pre-test mean	2.77	2.65	2.71
	Post-test mean	3.56	3.49	2.79
't' – ratio		24.86*	29.51*	0.15
Systolic Blood Pressure (mmHg)	Pre-test mean	134.90	133.80	134.50
	Post-test mean	127.60	128.50	135.10
't' – ratio		39.51*	22.89*	0.99
Diastolic Blood Pressure (mmHg)	Pre-test mean	93.90	94.10	93.80
	Post-test mean	89.50	89.90	92.90
't' – ratio		85.53*	79.90*	1.08



Table – 3 shows that the paired sample ‘t’ – test on flexibility, vital capacity and blood pressure, the result shows that training groups was significantly altered the criterion variables. A preliminary analysis was conducted to determine whether the prerequisite assumptions of ANCOVA were met before preceding the Univariate analysis. Thus, the assumption of equality of variance (Levene’s test homogeneity), the linear regression relationship between the covariates and the dependent variables and the homogeneity of regression slopes were examined and the result was presented in Table - 4.

Table – 4

Levene’s test for equality of error variances of selected variables among groups

Levene’s Test on flexibility			
‘F’	df1	df2	Sig.
0.867	2	42	0.966
Levene’s Test on Vital Capacity			
‘F’	df1	df2	Sig.
0.345	2	42	0.587
Levene’s Test on Systolic Blood Pressure			
‘F’	df1	df2	Sig.
0.451	2	42	0.724
Levene’s Test on Diastolic Vital Capacity			
‘F’	df1	df2	Sig.
0.371	2	42	0.559

The term homogeneity of variances is used to specify that groups have the similar variances. Thus, in Leven’s test of equality of the error variance table, the obtained F-values of the selected dependent variables were less than the confidence interval value of 0.05, which specify that the variance of each group was not significantly different from one another. Therefore, the homogeneity of variance differentiate the two groups nevertheless of the ability level for each of the dependent variables indicated that homogeneity of variance has been met for two dependent variables at significant 0.05 level of confidence. Hence it was concluded that the assumption of homogeneity of variance has been met for computing univariate ANCOVA.

ANALYSIS OF DATA

The data collected prior to and after the experimental periods on flexibility, vital capacity and blood pressure (systolic and diastolic) on yogic practice group, brisk walking group and control group were analysed and presented in the following table - 5.

**Table – 5**

Analysis of covariance and ‘f’ ratio for flexibility, vital capacity and blood pressure (systolic and diastolic) among yogic practice, brisk walking and control groups

Variable Name		Yogic practice group	Brisk walking group	Control group	‘F - ratio
Flexibility (in Inches)	Pre-test Mean $\pm$ S.D	5.89 $\pm$ 0.056	5.76 $\pm$ 0.016	5.82 $\pm$ 0.043	0.861
	Post-test Mean $\pm$ S.D.	7.25 $\pm$ 0.027	6.88 $\pm$ 0.039	5.76 $\pm$ 0.055	35.76*
	Adj. Post-test Mean	7.33	6.92	5.80	63.25*
Vital Capacity (Litres)	Pre-test Mean $\pm$ S.D	2.77 $\pm$ 0.003	2.65 $\pm$ 0.005	2.71 $\pm$ 0.009	0.593
	Post-test Mean $\pm$ S.D.	3.56 $\pm$ 0.006	3.49 $\pm$ 0.009	2.79 $\pm$ 0.002	56.63*
	Adj. Post-test Mean	3.48	3.37	2.75	89.41*
Systolic Blood Pressure (in mmHg)	Pre-test Mean $\pm$ S.D	134.90 $\pm$ 4.90	133.80 $\pm$ 5.02	134.50 $\pm$ 6.50	1.56
	Post-test Mean $\pm$ S.D.	127.60 $\pm$ 2.50	128.50 $\pm$ 3.10	135.10 $\pm$ 5.90	49.51*
	Adj. Post-test Mean	126.84	128.10	134.54	83.93*
Diastolic Blood Pressure (in mmHg)	Pre-test Mean $\pm$ S.D	93.90 $\pm$ 2.22	94.10 $\pm$ 2.94	93.80 $\pm$ 3.11	0.86
	Post-test Mean $\pm$ S.D.	89.50 $\pm$ 2.16	89.90 $\pm$ 3.01	92.90 $\pm$ 2.59	45.22*
	Adj. Post-test Mean	88.37	89.96	93.35	122.51*

* Significant at .05 level of confidence.

(The table value required for significance at .05 level of confidence with df 2 and 43 and 2 and 42 were 3.21 and 3.22 respectively).

After analysis of data, it was found that there was a positive change in selected criterion variables. Moreover, there was a significant difference occurs between the experimental and control groups on flexibility, vital capacity and blood pressure. Further to determine which of the paired means has a significant difference, Scheffé S test was applied as post-hoc test. The result of the follow-up test is presented in Table - 6.

**Table - 6****Scheffé's test for the difference between the adjusted post-test mean of flexibility, vital capacity and blood pressure (systolic and diastolic)**

<i>Adjusted Post-test Mean of Flexibility</i>				
Yogic practice group	Brisk walking group	Control group	Mean difference	Confidence interval at .05 level
7.33		5.80	1.53*	0.563
7.33	6.92		0.41	0.563
	6.91	5.80	1.11*	0.563
Adjusted Post-test Mean of Vital Capacity				
3.48		2.75	0.73*	0.171
3.48	3.37		0.11	0.171
	3.37	2.75	0.62*	0.171
Adjusted Post-test Mean of Systolic Blood Pressure				
126.84		134.54	7.70*	2.510
126.84	128.10		1.26	2.510
	128.10	134.54	6.44*	2.510
Adjusted Post-test Mean of Diastolic Blood Pressure				
88.37		93.55	5.18*	1.966
88.37	89.96		1.59	1.966
	89.96	93.55	3.59*	1.966

* Significant at 0.05 level of confidence.

DISCUSSION

Yogic exercises are performed with postures along with maximum flexibility like in mobility training. In mobility exercises there is no instruction to breathe regulations and in yogic postures, breathing should be controlled. Not like any type of exercises, yoga has performing several tracks like, posture (asana), breathing control (Pranayama) and concentration (meditation). Yoga practices with slow/passive movements, was more effect by improving flexibility when compared with the calisthenics exercises with fast/dynamic movements, and also it prevent a reduction in flexibility.[44] Out of 27 records from 22 RCTs were included with 17 RCTs assessed physical function and 20 assessed HRQoL, in which lower body flexibility was higher in yoga practice group (ES=0.5) when compared with the control.[45-47] Brisk walking has increased the flexibility[48,49] as walking have a stretching phase. The vital capacity has improved for yoga practice group,[50] as inclusion of pranayama along with the asana during the yogic practices. When pranayama combined with the asana practice, it improves the pulmonary capacity and while inhale the maximum air by the lungs it influence the diaphragm. Brisk walking also improves the vital



capacity [51], as because it stretches the lungs while inhale and exhale process. There are several reviews available regarding the dynamic benefits of yoga for decreasing blood pressure and other cardio-respiratory disease risk factors have been published.[52-57]

CONCLUSIONS

The present study found that the durable value of physical activity for elderly people to increase the level in physical fitness, which give the result of functionality. The result of the present study also showed that both the yogic exercise and brisk walking activity have positive effect on physical and physiological fitness. From the result of the study it was concluded that 12-week of yogic practice and brisk walking improved the flexibility and vital capacity and a significant decrease in blood pressure among middle aged women. These results draw attention to the possible importance of yogic practice and brisk walking in the middle aged people to prevent age-related morbidity and improve the quality of life of this population.

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CORPORATE GOVERNANCE PRACTICES IN INDIA

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Abstract

Corporate governance concept emerged in India after the second half of 90s century due to liberalization and deregulation of industries and business and was introduced by the Industry association confederation of Indian industry (CII), as a voluntary measure to be adopted by Indian companies. After that it obtained a mandatory status in early 2000s through the introduction of clause 49 of listing agreement, as all companies (of a certain size) listed with stock exchanges were required to comply with these norms. With the changing time there was also need for greater accountability of companies for their stakeholders. Need for corporate governance arise due to separation of management from ownership. For a firm success it is necessary to concentrate on both aspects social as well as economic. It needs to protect the interest of stakeholders and to be fair with producers, shareholders, communities etc. It needs to serve its all responsibilities in a best possible manner. Transparency in any business is pre requisite condition for the growth, profitability and stability of any business. The need for good corporate governance arise due to growing competition amongst business in all economic sectors at national as well as international level.

Key words: Corporate Governance, Companies, Stakeholders, Management and Shareholders.

INTRODUCTION:

Corporate governance is a process, relation and mechanism set up for the corporations and firms based on certain guidelines and principles by which a company is controlled and directed. The principles provided in the system ensure that the company is governed in a way that it is able to set and achieve its goals and objectives in the context of the social, regulatory and market environment, and is able to maximize profits and also benefit those whose interest is involved in it, in the long run. The division and distribution of rights and responsibilities among different participants in the corporation (such as the board of directors, managers, shareholders, creditors, auditors, regulators, and other stakeholders) and inclusion of the rules and procedures for making decisions in corporate affairs are identified with the help of Corporate Governance mechanism and guidelines.

Corporate governance refers to the way by which a corporation is governed. It is the technique which helps companies to maintain the balance between its internal affairs and stakeholders, i.e shareholders, management, customers, suppliers, financiers, government and society etc. provide material and non material information to its outside parties. Governance means control and corporate governance means to control and managed the corporations. Corporate governance concept emerged in India after the second half of 90s century due to liberalization and deregulation of industries and business and was introduced by the Industry association confederation of Indian



industry (CII), as a voluntary measure to be adopted by Indian companies. After that it obtained a mandatory status in early 2000s through the introduction of clause 49 of listing agreement, as all companies (of a certain size) listed with stock exchanges were required to comply with these norms. With the changing time there was also need for greater accountability of companies for their stakeholders.

Need of corporate governance:

Need for corporate governance arise due to separation of management from ownership. For a firm success it is necessary to concentrate on both aspects social as well as economic. It needs to protect the interest of stakeholders and to be fair with producers, shareholders, communities etc. It needs to serve its all responsibilities in a best possible manner. Transparency in any business is pre requisite condition for the growth, profitability and stability of any business. The need for good corporate governance arise due to growing competition amongst business in all economic sectors at national as well as international level.

PRE REQUISITE FOR GOOD CORPORATE GOVERNANCE:

Good corporate governance is primarily based upon the personal beliefs, values and ethics which configure the organizational values, beliefs and actions of its board. The board as a main functionary is responsible to ensure value creation for its stakeholders. It required clearly designed duties and powers of board presence of proper system for guiding, monitoring, reporting and controlling presence of visionary goals and mission to grow the Organization. Pillars of good corporate governance:-

- Accountability
- Fairness
- Transparency
- Stakeholder management

Accountability: To account is to give a description or depiction of something that happens or happened. Accountability would therefore be taken to literally mean the process of giving and account of an event. The board should communicate to the company's shareholders and other stakeholders at regular intervals a fair balanced and understandable assessment of how the company is achieving its business purpose and meeting its other responsibilities. Accountability is defined as the assignment of responsibility to specified persons or groups within the corporate enterprise for undertaking definite tasks to produce certain results or outcome and holding such persons or groups responsible for doing the assigned task properly.

Fairness:-Fairness means treating all stakeholders including minorities reasonably equitably and provide effective redress for violations, establishing effective communication mechanism is important to ensure just and timely protection of resources and people asset as well as correcting of wrongs.

Transparency:-Transparency means having nothing to hide that allows its process and transactions observable to outsiders. It also makes necessary disclosure, informs anyone affected about its decisions . Transparency is a critical component of corporate governance because it ensures that all of entity's actions can be checked at any given time by an outside observer. Inefficiency and lack of transparency in corporate governance that often lead to scandals and frauds are major challenges facing the corporate world. These have bumpered the smooth functioning of companies and stock



markets and have negative effect on the long term investment which is crucial for sustained growth of economy.

Stakeholder Engagement:-Those changed with governance should identify the key stakeholders and how they interact with the business and how they are engaged with to ensure the best outcome for the organization.

The Mechanism of Corporate Governance:

- Express or implied contracts between the stakeholders and the company for the distribution of rights, duties, rewards and liabilities, etc among different participants in the corporation.
- Procedure for proper control and supervision of information flow in the company, i.e., a proper mechanism of checks-and-balances, and
- Procedures for resolving and reconciling the conflicting interests and decisions of different participants in the corporation.

This mechanism ensures accountability of the Board of Directors to all stakeholders of the corporation i.e. managers, shareholders, suppliers, creditors, auditors, regulators, employees, customers and society in general; for giving the company a fair, clear and efficient administration. So it is not just mere company administration but a corporate management system. It is a code of conduct that must be followed for running and proper functioning of a corporate entity.

Ever since India's biggest-ever corporate fraud and governance failure unearthed at Satyam Computer Services Limited, the concerns about good Corporate Governance have increased phenomenally. Corporate governance also provides the structure through which the objectives of the company are set, and the means of attaining those objectives and monitoring performance are determined. Good corporate governance should provide proper incentives for the board and management to pursue objectives that are in the interests of the company and shareholders, and should facilitate effective monitoring, thereby encouraging firms to use resources more efficiently."

Regulatory framework:

The Indian statutory framework has, by and large, been in consonance with the international best practices of corporate governance. Broadly speaking, the corporate governance mechanism for companies in India is enumerated in the following enactments/ regulations/ guidelines/ listing agreement:

- The Companies Act, 2013 inter alia contains provisions relating to board constitution, board meetings, board processes, independent directors, general meetings, audit committees, related party transactions, disclosure requirements in financial statements, etc.
- Securities and Exchange Board of India (SEBI) Guidelines: SEBI is a regulatory authority having jurisdiction over listed companies and which issues regulations, rules and guidelines to companies to ensure protection of investors.
- Standard Listing Agreement of Stock Exchanges: For companies whose shares are listed on the stock exchanges.
- Accounting Standards issued by the Institute of Chartered Accountants of India (ICAI): ICAI is an autonomous body, which issues accounting standards providing guidelines for disclosures of financial information. Section 129 of the New



Companies Act inter alia provides that the financial statements shall give a true and fair view of the state of affairs of the company or companies, comply with the accounting standards notified under s 133 of the New Companies Act. It is further provided that items contained in such financial statements shall be in accordance with the accounting standards.

- Secretarial Standards issued by the Institute of Company Secretaries of India (ICSI): ICSI is an autonomous body, which issues secretarial standards in terms of the provisions of the New Companies Act. So far, the ICSI has issued Secretarial Standard on "Meetings of the Board of Directors" (SS-1) and Secretarial Standards on "General Meetings" (SS-2). These Secretarial Standards have come into force w.e.f. July 1, 2015. Section 118(10) of the New Companies Act provide that every company (other than one person company) shall observe Secretarial Standards specified as such by the ICSI with respect to general and board meetings.

Review of Literature:

Review of related literature makes the investigator fully aware with the previous work that has been done. It also provides an opportunity of gaining insight into the method, measures, subject and approaches employed by the other researchers.

Singhal (2012) The researcher has investigated the importance of Corporate governance for the new developments in a worldwide viewpoint. They have also compared major issues of PSU in India, their performances and responsibility with public sector in India. Managerial autonomy, board structure, roles undertaken by nonexecutive directors and compliance with SEBI policies for planning and executions. These are the factors they have gone through in their research. Researcher has also suggested that government should frame good policy for each PSU to safeguard its effective working and suggest severe CG practices for the unlisted PSU also.

Rupali, M (2015) The Public Sector Undertakings counted very poorly on Corporate Governance and compulsory by the government. The state-owned Companies has violated rules related to boards Independence, nominations, Corporate Social Responsibility Committees, appointment of Auditor and Women Director on the board. According to Stakeholders Empowerment Services (SES) studied the top 27 Public Sector Undertakings the research says that 25 do not meet the criteria for Independence of the board, while nearly 25% do not have a women Director, almost 50% failed to create a compliant CSR Committee, 80% do not have compliant committee and Nomination and remuneration Committee.

Ravi (2016) It is a case of collective failure of the system in India. Ruling party and opposition parties played a blame game. Appointments of CEO through political involvement. Bank has not made the official complaint. He has provided the solution of this problem in India is to provide teeth to the watch dog organizations like SEBI, grant more powers to investigating agencies like CBI, ensuring more accountability from public banks, strengthen the other supervisor institutions and decongest courts and bringing culprit to swift justice. The corporation must be made to follow the corporate governance practices both in letter and spirit is suggested by him.

K. M. (2017) The purpose of the paper was to analyze the legal provisions relating to the protection extended to the private employees who blows the whistle. The research has been done from primary and secondary data where researcher has read the whistle



blowers Protection act, 2011, official secrets act 1923, Right to information act 2005 etc. He has found that this Acts provides a mechanism to receive complaints and inquire into allegations of corruptions or misuse of power by the public servant only. The need of exhaustive and complete law is also necessary so that the evils like corruption can curbed completely and effectively.

Methodology:

The method used in this paper is descriptive-evaluative method. The study is mainly review based. It is purely supported by secondary source of data, i.e. books, journals, papers and articles and internet.

Objectives:

The main objectives of this paper is based on following headings:

- To examine the importance of corporate Governance in India.
- To evaluate of effect of corporate Governance on any sectors.

CORPORATE GOVERNANCE UNDER THE COMPANIES ACT, 2013:

Many high profile corporate governance failure scams like the stock market scam, the UTI scam, Ketan Parikh scam, Satyam scam, which was severely criticized by the shareholders, called for a need to make corporate governance in India transparent as it greatly affects the development of the country. The Indian Companies Act of 2013 introduced some progressive and transparent processes which benefit stakeholders, directors as well as the management of companies. Investment advisory services and proxy firms provide concise information to the shareholders about these newly introduced processes and regulations, which aim to improve the corporate governance in India. Corporate advisory services are offered by advisory firms to efficiently manage the activities of companies to ensure stability and growth of the business, maintain the reputation and reliability for customers and clients. The top management that consists of the board of directors is responsible for governance. They must have effective control over affairs of the company in the interest of the company and minority shareholders. Corporate governance ensures strict and efficient application of management practices along with legal compliance in the continually changing business scenario in India. Corporate governance was guided by Clause 49 of the Listing Agreement before introduction of the Companies Act of 2013. As per the new provision, SEBI has also approved certain amendments in the Listing Agreement so as to improve the transparency in transactions of listed companies and giving a bigger say to minority stakeholders in influencing the decisions of management. These amendments have become effective from 1st October 2014.

New Provisions for Directors and Shareholders:

- One or more women directors are recommended for certain classes of companies
- Every company in India must have a resident directory
- The maximum permissible directors cannot exceed 15 in a public limited company. If more directors have to be appointed, it can be done only with approval of the shareholders after passing a Special Resolution
- The Independent Directors are a newly introduced concept under the Act. A code of conduct is prescribed and so are other functions and duties
- The Independent directors must attend at least one meeting a year



- Every company must appoint an individual or firm as an auditor. The responsibility of the Audit committee has increased.
- Filing and disclosures with the Registrar of Companies has increased
- Top management recognizes the rights of the shareholders and ensures strong co-operation between the company and the stakeholders
- Every company has to make accurate disclosure of financial situations, performance, material matter, ownership and governance.

Additional Provisions:

- Related Party Transactions – A Related Party Transaction (RPT) is the transfer of resources or facilities between a company and another specific party. The company devises policies which must be disclosed on the website and in the annual report. All these transactions must be approved by the shareholders by passing a Special Resolution as the Companies Act of 2013. Promoters of the company cannot vote on a resolution for a related party transaction.
- Changes in Clause 35B – The e-voting facility has to be provided to the shareholder for any resolution is a legal binding for the company.
- Corporate Social Responsibility – The company has the responsibility to promote social development in order to return something that is beneficial for the society.
- Whistle Blower Policy – This is a mandatory provision by SEBI which is a vigil mechanism to report the wrong or unethical conduct of any director of the company.

Conclusion:

Corporate governance practices are playing an important role in the growth of companies. So the conclusion of study is that this moral practice should have to follow by all organizations for smooth running of business, for formulate good corporate image, to increase the transparency in corporate affairs and at the end to protect the interest of its stakeholders. Corporate Governance is one of the important criteria for foreign institutional investors to decide on which company to invest in. The corporate practices in India emphasize the functions of audit and finances that have legal, moral and ethical implications for the business and its impact on the shareholders. The Indian Companies Act of 2013 introduced innovative measures to appropriately balance legislative and regulatory reforms for the growth of the enterprise and to increase foreign investment, keeping in mind international practices. The rules and regulations are measures that increase the involvement of the shareholders in decision making and introduce transparency in corporate governance, which ultimately safeguards the interest of the society and shareholders. Corporate governance safeguards not only the management but the interests of the stakeholders as well and fosters the economic progress of India in the roaring economies of the world.

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PHILOSOPHICAL IMPLICATIONS OF ENVIRONMENTALISM

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Environmental ethics is a part of environmental philosophy. It extends the traditional boundaries of ethics from human beings to non-human world. Human beings make ethical decisions which will lead to preservation of our environment. All phenomena in the world is a manifestation of the same ultimate reality. This reality is the essence of the universe, underlying and unifying the multitude of things.

When the mind is disturbed, the multiplicity of things is produced, but when the mind is quieted, the multiplicity of things disappears. The basic oneness of universe is the central characteristic of mystical experience. This realization can be correlated with modern science. The picture of an interconnected cosmic web which emerges from modern atomic physics has been extensively in the East to convey the mystical experience of nature. Brahman is the unifying thread in the cosmic web, the ultimate ground of all being, according to the Upanishads.

Ecological awareness in the deep sense recognizes the fundamental interdependence of all phenomena and individuals and societies in the cyclical process of nature. Holistic world view sees the world as an integrated whole rather than a dissociated collection of parts. It can also be called an ecological world view. The deep ecological awareness is spiritual awareness. The awareness of unity and mutual interrelation of all things and events, the experience of all phenomena as manifestation of a basic oneness.

Indian environmentalism has been about social justice. It was concerned with differential access to natural assets and ecosystem services during 1970s and 1980s. The Bhopal Gas Disaster of 1984 raised new issues related to industrial risk and safety. Conservation ethics is an area which focuses on allocation of natural resources and their protection. We should preserve the biological diversity and natural world with its animate and inanimate objects.

Environmental racism is a form of environmental injustice in which the impacts are identified as falling primarily on people of color. The term was coined in 1987 study drawing together US census data and government data on the location of toxic waste sites; the study documented "clear patterns which shows that communities with greater minority percentages of the population are more likely to be the sites of commercial hazardous waste facilities."

Eco centrism is a term used to denote nature-centered system of values. It is a holistic approach. The justification for eco centrism consists in an ontological belief and subsequent ethical claim. The ontological belief denies that there are any existential



divisions between human and non-human world. It gives intrinsic value to non-human world. It leads to egalitarianism. We should preserve biodiversity and animal rights. Eco-justice holds together commitments for ecological sustainability and human justice. Human justice must involve care for the environment.

Gandhiji once said that nature provides everything for one's need but not for his greed. Albert Schweitzer used the phrase 'reverence for life' by which he meant that 'I am life which wills to live and I exist in the midst of life which wills to live'. What is implied is, "it is good to maintain and cherish life, and it is evil to destroy and to check life". Life is sacred.

Every human being is a part of nature and whatever action he does will have its own consequences. The environmental problems are caused by the over-exploitation of resources and excessive emission of poisonous gases. They are the outcome of greed for maximization of return of benefits.

Man has been disturbing the orderly balance of nature. He should realize the damage he has done on the planet. If a man's intellect is responsible for all the progress of mankind, his arrogance and lack of wisdom are responsible for environmental degradation. Man should have examined the consequences of his activities in terms of their possible negative impact on the environment.

The elements of the life supporting system-air, water, earth flora and fauna as well as other living and non-living beings are interrelated and interdependent. The entire process is self-generating and auto-sustainable. As long as man, as part of this system worked in harmony with nature and used the resources for his normal sustenance, it caused minimal damage to the ecosystem. With the rise of physical science dissection nature for the purpose of examining and reassembling it according to human specification began. Human activities assumed such enormous dimensions that the life supporting system could no longer sustain these. The industrial revolution accelerated this process.

Environmental problems are really social problems. They begin with people as the cause, and end with people as victims. It is people who create bad environment and a bad environment brings out worst in people. Environmental problems created by human activities, have caused the natural disasters, which are menacing the very survival of ours. The modern sciences and technology are also indirectly responsible for the present pathetic ecological conditions. The twenty first century is remarkably characterized by the advancement of information and technology. The century also marks the increasing severity of environmental problems or eco-crisis.

Philosophers have thought about nature for millennia. Earth provides a reliable home to all species so long as the system remains stable. An ecosystem operates sustainable if its inputs and outputs are balanced. The biosphere is affected by the pollutants and cause long term consequences on the earth. Human beings ought to find nature morally



considerable in itself, i.e. intrinsic value in itself. We must have a spiritual awareness as a guide for our relationship to the world.

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PRODUCTION OF CITRIC ACID (CA) BY FERMENTED BROTH METHOD

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ABSTRACT

Citric acid demand increased in the different industries (fermented food items, beverages and pharmaceutical industries). Ancient source of citric acid was citrus fruits which contain 6 to 9% of citric acid. It was obtained by the processing of citrus fruits and precipitation of calcium salt. Traditional method citrus fruits could not sufficient for fulfill the growing demand of citric acid production. Hence alternative source of citric acid is a microbial origin. Many microorganisms are involved in the production of citric acid.

In the present study *Aspergillus niger* is considered more suitable than the other microorganisms for production of citric acid by fermented broth method. Many factors are affecting invitro production of citric acid. It was confirmed from tabular reading that sucrose was a suitable at 13 % to 15 % carbon source (Currie, 1917). Many factors were affecting fungal origin production of citric acid like strain of microorganism, temperature, carbon source, PH etc. were considered. Pure strain of *Aspergillus niger* was obtained from soil samples from different localities and from lemon fruits, 2% methanol added into culture medium gives higher yield, 13% sucrose was better carbon source than the glucose, 4.5 P^H acidic was suitable for healthy production of citric acid in vitro condition. Healthy growth was found at 28-30 °C temperature Aftab Nadeem et al (2010).

Key Words: Soil, lemon fruit, Citric acid, Fermentation broth, *Aspergillus niger* etc.

Introduction:

Citric acid is widely used as an acidifying agent and antioxidant in a fermented food items, beverages and pharmaceutical industries (Kapoor et. al, 1982). Microbial fungal origin Citric acid was obtained by submerged fermentation of *Aspergillus niger*. The yield of citric acid depends upon composition of culture medium and on the microbial strain (Aftab Nadeem, et al, 2010). Citric acid production using *A. niger* is influenced by the process variables such as initial sucrose concentration, pH, nutrient concentration, additive, incubation period, temperature etc. However, demand for Citric acid production is increasing faster than its production and hence requires more economical process. The fitness of solution would be measured by determining the total weight of the proposed solution. Healthy growth of fungus means more quantity of citric acid (K. Anand Kishor, et al 2008).



In the present study screened different factors for production of citric acid like methanol, higher yielding strain of *A. niger*, carbon source, pH etc. were considered. Isolation and maintained pure cultures of *Aspergillus niger* from soil sample collected from different localities, suitable 2% methanol added into culture medium gives higher yield, 13% sucrose was gives higher yield than the glucose, 4.5 P^H was found more suitable for production of citric acid in vitro and in 28-30° temperature healthy growth was found (Chaturvedi Madhusudan et al 2010).

MATERIALS AND METHODS:

Aspergillus niger is a fungus recommended for the production of various metabolites. Citric acid is one of the important organic acids synthesized and released on synthetic medium by this fungus. Natural source of *Aspergillus niger* is a soil, hence soil from different localities from Nashik District was collected and tested for higher yielding strain of *Aspergillus niger* for the production of citric acid. It also isolated from lemon fruits.

1. Screening of *Aspergillus niger* for citric acid production: Selection and isolation of micro-organism (*A. niger*) which produces high amount of citric acid. Primary screening determines which microorganism is able to produce a citric acid followed by secondary screening to determine capacity of that organism producing quantitatively (Abdullah – Al –Mahin et al 2004).

2. Isolation of Microorganism: The natural source of *Aspergillus niger* is the soil. Collection of soil samples from different locations with respect to P^H of the soil. In this way ten soil samples were collected and diluted 1/100, 1/1000 and 1/10000 of each sample. The soil samples were diluted, analyzed and they were purified by sub culturing on Czepecks Dox agar slants. Culture Plates were incubated at 30°C and isolated cultures were observed and they were purified by sub culturing on Czepecks Dox agar slants. Isolation of *A. niger* from lemon fruits and pure culture isolated and maintained. Similar to soil screening lemon strain tested for citric acid production.

Similarly, fresh and healthy lemon fruits were selected. Cleaned lemon fruits were soaked in the water and placed in the closed container for a week (5- 7 days). After incubation pure cultures of *Aspergillus niger* isolated from lemon fruits and maintained on suitable culture medium.

3. Screening for organic acid production: Spore from slant cultures were inoculated on sterile Czepeck's Dox agar medium plates incorporated with Bromo-cresol green dye. Inoculated plates were incubated at 28°C for one to two days and checked color change blue to yellow indicates organic acid production.

To study the effect of media component on citric acid fermentation, all the components except one to be studied are kept constant with respect to the control medium and one component concentration is changed in particular range. Fermented broths were analyzed for the production of citric acid by selected strains of *Aspergillus niger*.



Table No.1: Screening for citric acid yield and selection of strains

Sr. No.	Area	PH	Culture	Yield mg/ml
1.	Lemon fruits		LF1	4.7
			LF2	3.7
			LF3	4.3
			LF4	2.8
			LF5	3.9
2.	Forest soil	6.2	FS1	2.5
		6.1	FS2	3.2
		5.9	FS3	4.1
		5.4	FS4	2.9
		6.1	FS5	3.5
3.	College Campus garden Soil	4.8	CC1	2.6
		5.2	CC2	2.7
		4.9	CC3	1.6
		5.1	CC4	1.8
		4.8	CC5	2.9

Table No.2: Effect of different carbon source % on the production of CA by *Aspergillus niger*

Carbon source	Yield mg/ml Sucrose			Yield mg/ml Glucose			Yield mg/ml Galactose			Yield mg/ml Fructose		
	LF 1	FS 3	CC 5	LF 1	FS 3	CC 5	LF 1	FS 3	CC 5	LF 1	FS 3	CC 5
10	1.6	2.1	1.9	1.4	1.1	1.3	1.1	0.8	0.8	1.2	1.6	1.7
11	1.9	1.8	1.9	1.4	1.6	1.3	0.5	0.8	0.9	1.1	1.5	1.3
12	2.5	2.6	2.8	1.8	1.6	1.9	0.9	0.7	1.0	1.2	1.5	1.4
13	4.7	3.9	3.6	2.9	2.4	1.8	0.6	0.9	1.6	1.6	1.8	1.2
14	3.1	2.9	2.6	2.4	2.1	2.3	1.1	1.5	1.7	1.9	2.0	1.6
15	2.9	2.4	2.1	1.9	1.8	1.8	0.9	0.8	0.7	1.7	1.9	1.4
16	1.8	1.4	1.3	1.0	1.2	1.3	0.5	0.7	0.6	0.9	0.9	0.8

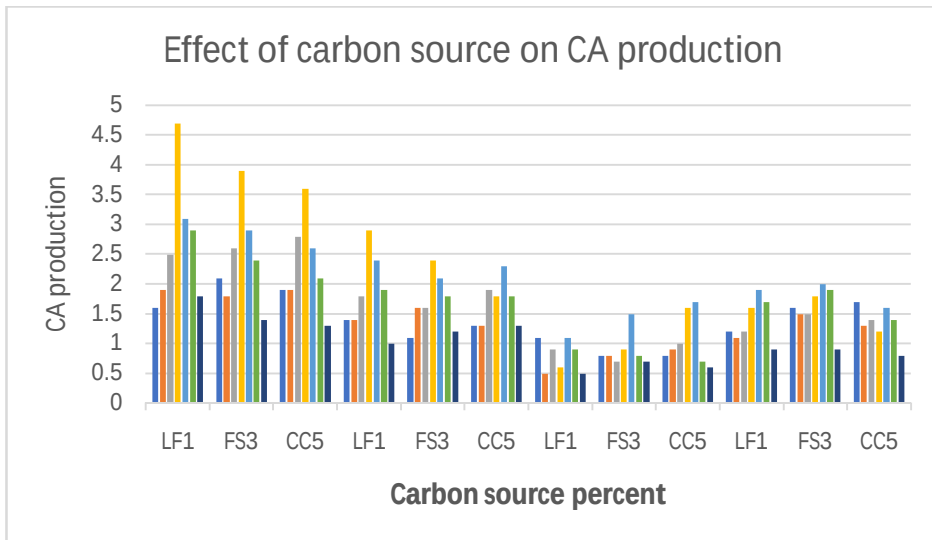


Table No. 3: Effect of pH on the production of CA by *Aspergillus niger*

Sr.No.	pH	LF1	FS3	CC5
1.	2.5	2.6	2.8	2.9
2.	3.0	2.8	2.8	3.0
3.	3.5	3.0	3.1	3.3
4.	4.0	2.9	3.5	3.9
5.	4.5	3.9	3.7	3.8
6.	5.0	1.8	2.1	1.9
7.	5.5	1.3	1.2	1.5

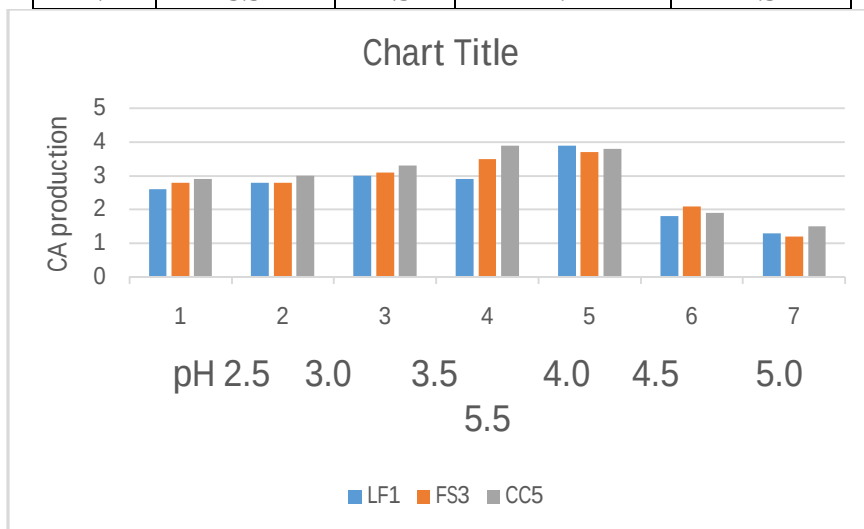


**Table No.4: Ascending chromatography of organic acid and test solution**

Sr. No.	Sugar	Distance travelled by solvent	Distance travelled by solute	Rf	% Rf
1.	Citric acid	10.0	4.0	0.4	40
2.	Oxalic acid	10.0	5.0	0.5	50
3.	Succinic acid	10.0	6.0	0.6	60
4.	Test	10.0	4.0	0.4	40

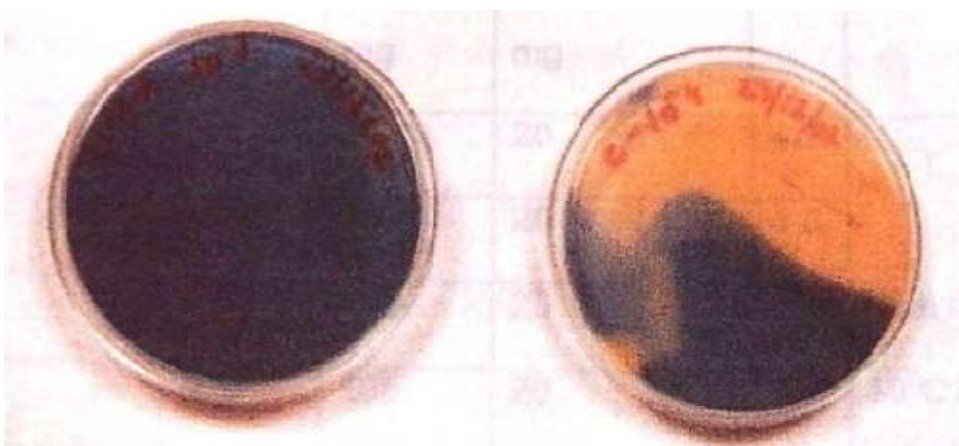
RESULT AND DISCUSSION:

Table No.1 Soil from various areas were collected and different cultures isolated from it. These were checked for citric acid production. Similarly, different cultures of *A. niger* isolated from lemon and college campus garden soils. The soil pH was checked of the collected soils. Samples were tested for citric acid production and results were noted (SING, S.P, 1998). The highest yield was reported from LF1, FS3 and CC5. It was found that the highest yield was found when the pH of soil was 4.5, above this pH the yield was less. These three higher yielding strains were used for further experiments (Ashish Kumar and V.K. Jain, 2008)

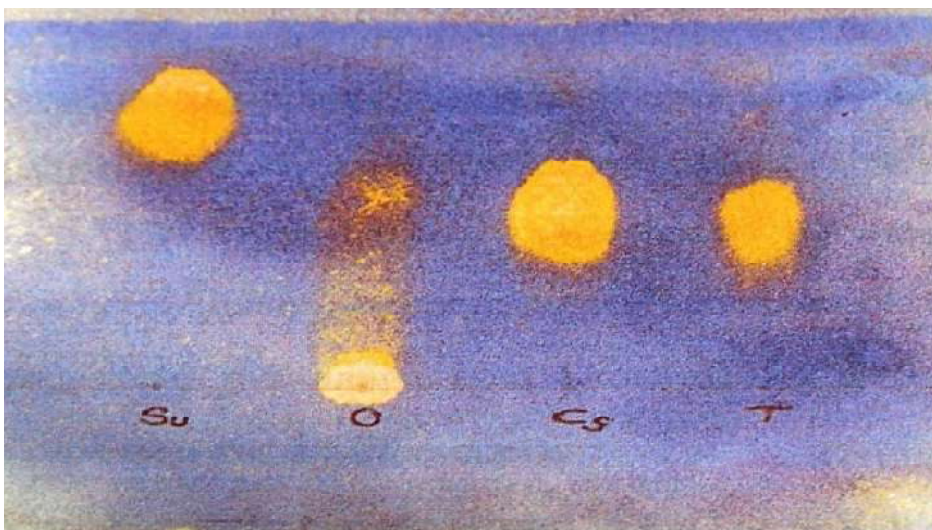
Table2, when all the three cultures were tested for variation in sugar concentration (Sucrose and glucose). It was found that glucose is not a suitable carbon source for citric acid production. Culture medium with sucrose showed higher yields. It was reported that at sugar concentration 13% all the three cultures gave the higher yield. It was also found that sugar concentration (15% to 18%) the yield reported was less as compared to 13%. Kovats (1960) reported that higher sugar concentration (15 to 18%) greater amount of residual sugars remains in the medium and process become uneconomical.

Table3, pH was play important role in the production of citric acid invitro. pH acidic (2.5 to 5.5) were tested for citric acid production. It was found that the pH of 4.5 was found to be suitable for all the three cultures for the yield of citric acid (Gupta J.K., Heding L.G. & Jorgensen O.B. (1976). This showed the contrasts with the finding of Prescott and Dunn (1987) which claims that the initial pH for sucrose.

Table4, Ascending chromatography was done by using the solvent system n-Butanol, formic acid and water in the proportion of 10:2:5 respectively. It was prepared by separating funnel and out of the two layers upper organic layer was used. The fermented broth concentrated by evaporating it in a Petri dish. Chromatogram removed, dried and sprayed with 0.4% Bromo-Cresol Green prepared in ethanol (pH is equal to 6.7) and Rf values were calculated and recorded. Calculated Rf value of samples were compared with the different organic acids and from this it was confirmed that fermentation broth contains citric acid



Photograph: Primary Screening of Organic Acid Production on Culture Medium by using Bromocresol Green Dye



Su-Succinic acid, O-Oxalic acid, Cs-Standard citric acid, T-Fermented broth

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ANALYSIS OF SYMMETRIC AND ASYMMETRIC ENCRYPTION FOR SECURE DATA COMMUNICATION BY USING CRYPTOGRAPHIC TECHNIQUES

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INTRODUCTION

Cryptography is the study of information hiding and retrieval. Its main goal is to keep the data safe from unauthorized access. It includes the guidelines, algorithms and methodologies to safely and frequently limit or delay unauthorized access to essential information and helps certify all components in a communication. Cryptography can be applied anywhere in the TCP/IP stack, for all that it is not common at physical layer. Cryptography is also used in complicated protocols that help to achieve various security services, that is called as security protocols. For this several encryption techniques are existing which are used to avoid the information theft. Diverse encryption techniques are used to guard the private information from unconstitutional use. This paper holds some of those recent existing encryption techniques and their security problems. The field cryptography is becoming very important in today's times as information security. Contemporarily more and more sensitive data is being stored on computers and transmitted over the Internet. We need to ensure security and safety of information.

Key words: Cryptography, Symmetric, Asymmetric, Encryption, Decryption, Key algorithm

FUNDAMENTAL TERMS UTILIZED AS A PART OF CRYPTOGRAPHY

A. Plain Text

The elementary message that person wishes to another is defined as Plain Text. In cryptography the elementary message that has to be sent to the other end is given a special name as Plain Text. Suppose Alex wishes to send the message, “Hi Abu, how are you?” to Abu. Here “Hi Abu, how are you?” is the plain text.

B. Cipher Text

The message that cannot be unstated by any person or worthless communication is what we entitle as Cipher Text. In Cryptography the elementary message is transformed into incomprehensive message before the transmission of actual message.

C. Encryption

A procedure of converting simple Text into Cipher Text is called Encryption. Cryptographers use different kind of encryption methods to send confidential messages

through out an insecure channel. The procedure of encryption requires dual things - an encryption algorithm and a key. An encryption algorithm means the method that has been used in encrypt the data. Encryption happens at the sender's side.

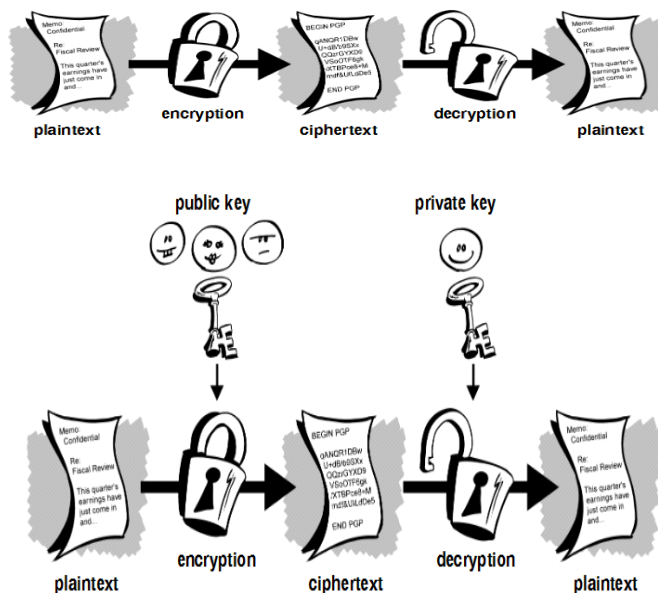
D. Decryption

The reverse process of encryption is called Decryption. It is the procedure of converting Cipher Text into simple Text. Cryptographers use the decryption algorithms at the receiver side to obtain the elementary message from message i.e. Cipher Text.

The process of decryption has need of two things - a Decryption algorithm and a key. A Decryption algorithm means the method that has been used in Decryption. Generally, the encryption and decryption algorithm are identical but reverse.

E. Key

A key is a portion of information determines the practical output of a cryptographic algorithm. For encryption algorithms, a key specifies the conversion of plaintext into cipher text, and vice versa for decryption algorithms. Keys have varying levels of strength and higher numbers of bits to break because there is higher possible transformation of data bits. (Since bits are binary, the number of possible transformation for a key of x bits is 2^x .) The special approach a key is used rely on whether it's used with asymmetric or symmetric cryptography. For example, if the Alice uses a input of 3 to encrypt the simple Text "President" then Cipher Text formed will be "Suhvlghqw".





F. Encoder

An encoder is the person that wants to send the message and uses encryption to make the message secure.

G. Decoder

A decoder is the person who decrypts the message. This may be the planned receiver of the communication or may be an intruder, demanding to get access to the secret message.

PURPOSE OF CRYPTOGRAPHY

Data Authenticity

A user can prove their identification to another who does not have personal knowledge of their identification. Expert using digital certificates in a asymmetric cryptosystem. Kerberos is a common crypto graphic authentication system using symmetric cryptosystems

Data Integrity

Ensures that the message received is the same as the message that was sent. Uses hashing to make a unique communication digest from the communication that is sent along with the point. Beneficiary uses a similar system to make a moment process from the message to contrast with the first one. A variation is used to create digital signatures to protect against mischievous alteration

Non-Repudiation

Ensures that neither the dispatcher nor the recipient of communication should be able to deny the broadcast.

Access Control

Only the official parties are able to right of entry to the given information. Network security involves the approval of access to information in a network, which is prohibited by the network administrator. The beginning encrypted data is specifying to as plain text. It is encrypted into cipher text and it will be decrypted into disposable plain text. Cryptography algorithms are ordered in view of the quantity of key that are utilized for encryption and unscrambling.

THREE CRYPTOGRAPHIC SCHEMES

Secret Key Cryptography or Symmetric Cryptography

Uses a solo key for together encryption and decryption.

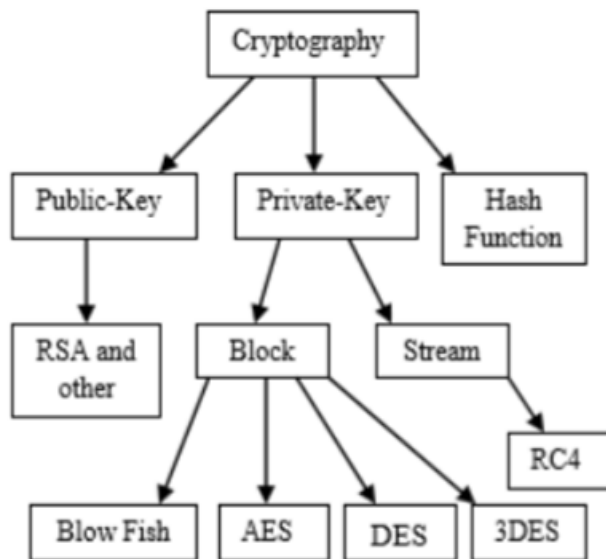


Public Key Cryptography or Asymmetric Cryptography

Uses one key for encryption and another for decryption [8].

Hash Function

Uses a mathematical conversion to irrevocably “encrypt” information [7].



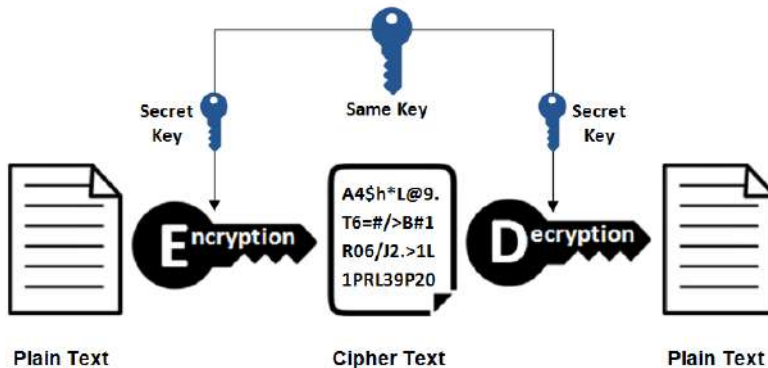
CLASSIFICATION OF CRYPTOGRAPHY

There are predominant categories of cryptography depending on the type of safety keys used to encrypt/decrypt the facts. These two categories are: Asymmetric and Symmetric encryption techniques. [11]

Symmetric Key Encryption

In this Symmetric key encryption, the single secret key is used for both encryption and decryption process. Given a plaintext and the key, encryption produces unintelligible data, which is about the same length as the plaintext. Decryption is the reverse process of encryption, and this process uses the same key as encryption. It is also called as single key cryptography. There are various symmetric key algorithms such as DES, TRIPLE DES, AES, RC4, RC6, BLOWFISH [6].

Symmetric Encryption



DES (Data Encryption Standard)

DES is a symmetric square figure created by IBM. The **algorithmic program** uses a 56-bit key to encipher/interpret a 64-bit piece of information. The key is constantly exhibited as a 64-bit hinder, each eighth piece of which is overlooked. In any case, it is regular to set each eighth piece with the goal that each gathering of 8 bits has an odd number of bits set to 1.

Triple DES(3DES)

3DES is an improvement of DES; it is a 64-bit piece estimate with 192 bits' key size. In this standard the encryption strategy is like the one in the first DES yet connected 3 times to expand the encryption level and the normal safe time. 3DES is slower than other piece figure strategies.

AES

AES is a block cipher. It has variable key size of 128, 192, or 256 bits; default 256. It encrypts information piece of 128 bits in 10, 12 and 14 round depending on the key length. AES encryption is quick and adaptable; it can be executed on different stages particularly in small devices. Also, AES has been suspiciously experienced for numerous security applications.

BlowFish

Blowfish calculation is the essential kind of the symmetric key encryption that has a 64-bit piece measure and a variable key length from 32 bits to 448 bits by and large. Since the key length is greater it's miles complicated to interrupt the code inside the blowfish set of rules. Moreover, it is prone to all of the attacks besides the susceptible key elegance assault.

RC4

RC4 is identified because the maximum commonly utilized circulation cipher in the world of cryptography. RC4 has a utilization in both encryption and decoding while the information stream experiences XOR together with a progression of produced



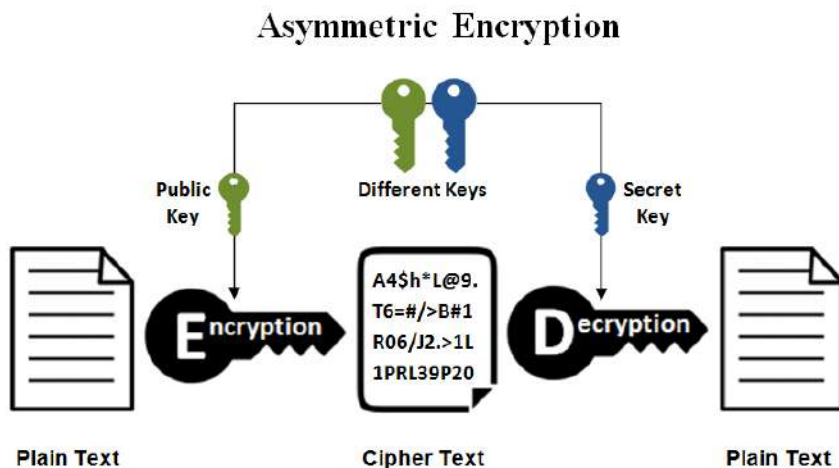
keys. It takes in keys of random lengths and this is called a producer of pseudo arbitrary numbers. The output is then XOR together with the stream of information for you to generate a newly-encrypted data.

Asymmetric Key Encryption

Asymmetric cryptography, otherwise called open key cryptography, makes use of public and private keys to encrypt and decrypt data. The public key's used for encrypting, **whereas** the **Private key**'s used for decrypting. Two of the most generally used asymmetric key algorithms are: RSA and DSA. In case you will use asymmetric key encryption in a document exchange condition, the sender might want to preserve the public key, even as the receiver could need to hold the corresponding private key.

The problem with secret keys is exchanging them over the Internet or a huge network even as preventing them from falling into the wrong hands. Some person who knows the secret key can decode the communication. Single response is asymmetric encryption, in which there are dual linked keys--a key pair.

A public key is made unreservedly accessible to any individual who should need to send you a message. A second, private key is kept secret, so that only you recognize it. 'any message (text, binary files, or documents) which are encrypted through the usage of the public key can be decrypted through applying the same algorithm, however by way of the use the private key. Any message that is encrypted by utilizing the private key must be decrypted by utilizing the public key. Because of this you do no longer have to fear approximately passing public keys over the internet (the keys are supposed to be public). A trouble with uneven encryption, but, is that it's miles slower than symmetric encryption. It calls for a ways extra processing energy to each encrypt and decrypt the content material of the message.





RSA

RSA Asymmetric algorithm Rivest-Shamir-Adleman is the main frequently used for asymmetric algorithm (public key algorithm). It can be used to launch an encrypted communication without a disconnect exchange of secret keys. It can also be used to sign a communication. The security of RSA is basically considered equivalent to factoring, although this has not been proved. RSA calculation occurs with integers modulo $n = p * q$, for two huge top secret primes p, q . To encrypt a communication m , it is exponentiated with a tiny open exponent e . For decryption, the recipient of the ciphertext $c = m^e \pmod{n}$ computes the multiplicative reverse $d = e^{-1} \pmod{(p-1) * (q-1)}$ and obtains $cd = m^e * d = m \pmod{n}$. The confidential key consists of n, p, q, e, d ; the open key contains only n and e .

The trouble for the attacker is that compute the reverse d of e is assumed to be no easier than factorizing n . The key dimension should be better than 1024 bits for a logical level of security. Keys of dimension, say, 2048 bits should permit safety for decades. There are essentially numerous incarnations of this algorithm; RC5 is single of most frequent in use, and RC6 was a finalist algorithm for AES. [17]

Diffie-Hellman

Diffie-Hellman is the first asymmetric encryption algorithm, developed in 1976 utilizing discrete logarithms in a limited field. Enables two clients to exchange a secret key over an insecure medium with no early secrets. Diffie-Hellman (DH) is a generally used key exchange algorithm. In various crypto graphical conventions, two gatherings wish to begin imparting. Be that as it may, we should accept they don't at first have any regular mystery and in this way can't utilize mystery key cryptosystems.

The key trade by Diffie-Hellman protocol remedies this situation by permitting the development of a typical secret key over an unreliable communication channel. It depends on an issue identified with discrete logarithms, to be specific the Diffie-Hellman issue. This issue is viewed as hard, and it is in some instances as hard as the discrete logarithm issue. The Diffie-Hellman convention is by and large thought to be secure when a suitable scientific gathering is utilized. Specifically, the generator component utilized as a part of the exponentiations ought to have a substantial period (i.e. arrange). For the most part, Diffie-Hellman isn't actualized on equipment. Diffie-Hellman Algorithm the Diffie- Hellman key trade strategy permits two gatherings that have no earlier learning of each other to mutually build up a common mystery key over a shaky interchanges channel. This key would then be able to be utilized to scramble ensuing correspondences utilizing a symmetric key figure. The Diffie-Hellman convention is for the most part thought to be secure when a suitable scientific gathering is utilized.



Digital Signature Algorithm (DSA):

Digital Signature Algorithm (DSA) is a United States Federal Government standard or FIPS for computerized marks. It was **discourse** by the National Institute of Standards and Technology (NIST) in August 1991 for **usefulness** in their Digital Signature Algorithm DSA determined in FIPS 186 [1], embraced in 1993. A minor revision turned into issued in 1996 as FIPS 186-1 [2], and the same old was multiplied further in 2000 as FIPS 186-2 [3].

Computerized Signature Algorithm (DSA) is like the one utilized by ElGamal signature algorithm. It is genuinely effective however not as productive as RSA for signature confirmation. The standard characterizes DSS to utilize the SHA-1 hash work only to process message digests. The fundamental issue with DSA is the settled subgroup estimate (the request of the generator component), which constrains the security to around just 80 bits. Equipment assaults can be threatening to a few usages of DSS. In any case, it is generally utilized and acknowledged as a good algorithm.

DIFFERENCE BETWEEN SYMMETRIC AND ASYMMETRIC ENCRYPTION

- Symmetric encryption uses a only key that requirements to be shared among the public who need to accept the communication while asymmetrical encryption uses a couple of public key and a private key to encrypt and decrypt communication when communicating.
- Symmetric encryption is an older method while asymmetric encryption is comparatively new.
- Asymmetric encryption was introduced to balance the intrinsic difficulties of the requirement to add to the key in symmetrical encryption representation; removal must to be share the key by using a couple of public-private keys.
- Asymmetric encryption takes comparatively extra time than the symmetric encryption.

Selection of Right Cryptographic Scheme

The selection of right cryptographic technique depends on following constraints:

Time

How much time will be needed for encrypting and decrypting the data and to fulfill the prerequisites before starting an

Memory

How much memory will be needed in case of small devices like PDAs, smart cards, RFID tags.



Security

Selected encryption scheme should be the confidentiality, integrity (authentication, non-repudiation) and availability.

Nature of Data

It is the imparting data is how much classified, if the data is little in measure and very little imperative; at that point any encryption conspire is reasonable. In the event that data is exceedingly mystery or essential at that point joint half and half mix of symmetric and unbalanced plan will be appropriate

Type of Data

In case of video data, the privacy is more important and considerable constraint. If the data is small and in video format the constrains (Time, memory, security) the use of asymmetric scheme but this selection is not sufficient because the third party particularly in case of Identity based Public Key Cryptography (ID-PKC) can view the video clip as they have all information (key(s), encrypted data). So in this case the data privacy is not anything. That's why the type of data constraint is very important one which should not be neglected in case of right selection of cryptographic scheme. If data type is secret multimedia (personal video clip) then the symmetric scheme is good quality but hybrid encryption method (symmetric + asymmetric) can give the all safety objectives [9].

CONCLUSION:

In this remote world these days, the security for the information has turned out to be exceptionally vital since the correspondence by transmitting of advanced items over the open system happen every now and again. In this paper different symmetric key encryption calculations and lopsided calculations were seen from numerous edges. Regular new encryption strategy is advancing consequently quick and secure traditional encryption methods will dependably work out with high rate of security. With regards to encryption, the most recent plans may fundamentally be the best fit. You ought to dependably utilize the encryption calculation that is appropriate for the job needing to be done. Cryptography is a developing innovation which is imperative for arrange security. Some outstanding cryptographic calculations have been dissected in this paper to exhibit the fundamental contrasts between the encryption and decoding procedures. Notwithstanding the scientific hypothesis behind a calculation, the best calculation is those that are outstanding and very much reported on the grounds that they are all around tried and well-studied. Truth be told time is the main genuine trial of good cryptography, any cryptographic plan that stays being used a seemingly endless amount of time is in all likelihood great one. The quality of cryptography lies in the decision of the key; longer key oppose assault superior to anything shorter keys. Nobody can ensure 100% security. However, we can move in the direction of 100% hazard acknowledgment. Misrepresentation exists in current business frameworks: money can be forged, checks changed, charge card numbers stolen. A decent cryptographic



framework strikes a harmony between what is conceivable and what is satisfactory. In this manner impressive research exertion is as yet required for secured correspondence. To conquer the issues in Symmetric Ciphers, Public Key Cryptography was produced, yet it has its own escape clauses. Most recent research is going on the themes like DNA Cryptography and Quantum Cryptography. In this way, we are proposing plan of half and half cryptographic for secure email in light of Android OS.

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പ്രവാസവും അസ്തിത്വദുഃഖവും അപഹരിക്കപ്പെട്ട ദൈവങ്ങളിൽ

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പാതളം

സ്വന്തം നാടുവിട്ട അസ്തിത്വദുഃഖം പേരി അന്യനാടുകളിൽ വസിക്കുന്നവരുടെ ജീവിതവും, നോവു കളും, സ്വപ്നങ്ങളും വികാരവിചാരങ്ങളും തീക്ഷ്ണമായ അനുഭവങ്ങളും സംഘർഷങ്ങളും എഴുത്തു കാർ പല സന്ദർഭങ്ങളിലും സാഹിത്യ സൃഷ്ടിക്ക് വിഷയമാക്കിയിട്ടുണ്ട്. “വിടിയെടുത്തൊരു നീണ്ട സ്വപ്നം” എന്നാണ് വിക്ടർ ഹ്യൂഗോ പ്രവാസത്തെ വിശേഷിപ്പിച്ചത്. ജന്മനാട്ടിൽനിന്ന് പാലായനം ചെയ്യേണ്ടി വരുമ്പോൾ എവിടെയെങ്കിലും സ്ഥിരപ്പെടാനുള്ള തൃഷ്ണ, ഗൃഹാതുരത, അന്യവൽക്കരണം ഇതെല്ലാം പ്രവാസികളുടെ ജീവിതത്തെ മാറ്റിമറിക്കുന്നു. ഒരു വ്യക്തിക്കോ സമൂഹത്തിനോ തൊഴിൽ തേടിയോ അഭയാർത്ഥിയായോ അടിമത്തത്താലോ വർഗ്ഗീയ കലാപങ്ങളാലോ നാടുകടത്തലിലൂടെയോ സ്വദേശം വിട്ടു പോകുമ്പോഴും പ്രവാസം തന്നെയാണ് സംഭവിക്കുന്നത്. സ്വന്തം സമൂഹത്തിൽനിന്നും വ്യതിരിക്തമായി സാമൂഹികമായും സാമ്പത്തികമായും സാംസ്കാരികമായും കൂടുതൽ ജീവിതമനോഹരിച്ചുള്ള യാത്രകളാണ് ഇന്ന് കൂടുതൽ പ്രവാസങ്ങളും. എവിടെ പ്രവാസിയായിപ്പോയാലും ജന്മനാട്നെക്കുറിച്ചുള്ള ഓർമ്മകൾ ഗൃഹാതുരതയും ഉണർത്തുന്ന ഒന്നായി അവരുടെ പിന്നിലുണ്ടാകും. പ്രവാസം സൃഷ്ടിക്കുന്ന വ്യത്യസ്തമായ അനുഭവങ്ങളെ പ്രമേയമാക്കി എഴുത്തുകാർ നടത്തുന്ന രചനകളെ പ്രവാസ സാഹിത്യം എന്ന് വിളിക്കാം. അപഹരിക്കപ്പെട്ട ദൈവങ്ങൾ എന്ന നോവലിൽ ഒളിഞ്ഞിരിക്കുന്ന പ്രവാസ ജീവിതചിന്തകളെ കണ്ടെത്തുകയാണ്.

നോവലിനെ വിവിധ വിജ്ഞാന മേഖലകളുടെ സംവാദവേദിയാക്കിയ കഥാകാരനും ആധുനിക പരിസരങ്ങളെ ആഴത്തിൽ അളക്കുന്ന ആഖ്യാനശില്പങ്ങളുടെ സ്രഷ്ടാവുമായ ആനന്ദിന്റെ “അപഹരിക്കപ്പെട്ട ദൈവങ്ങൾ” എന്ന നോവൽ നാഗരിക അന്തരീക്ഷത്തിന്റെയും നൈമിഷികമായ പ്രത്യക്ഷപ്പെടലുകളുടെയും പ്രവാസം മുതലായവയുടെ ഒരു ധ്വനിതരംഗമാണ്. മൂന്നു കഥാപാത്രങ്ങളിലൂടെ വികസിപ്പിക്കുന്ന നോവൽ മറ്റ് അനേകം കഥാപാത്രങ്ങളുടെ സമാഗമത്തിനും വഴിയൊരുക്കുന്നു. ഒരു മനുഷ്യനായ സ്ത്രീക്ക് വന്നും പോയും ഇരിക്കുന്ന സന്തത സഹചാരികളെപ്പോലെ അനേകം കഥാപാത്രങ്ങൾ രംഗത്ത് എത്തുന്നു. ഗണേശൻ, നസിമ, അമർ, എന്നീ മൂന്നു കഥാപാത്രങ്ങൾക്കപ്പുറം മറ്റു പല കഥാപാത്രങ്ങളും ഈ നോവലിന്റെ പ്രയാണത്തിലെത്തുന്നു. കവിതകളും ഉപകഥകളും ചിത്രങ്ങളും ജീവിതാവലിഷ്കാരങ്ങളും നിറഞ്ഞ ഒരു ആഖ്യാന ശൈലി തന്നെയാണ് ഈ നോവലിനെ വ്യത്യസ്തമാക്കുന്നത്. ചോദ്യങ്ങൾക്കു പിന്നാലെയുള്ള ഉത്തരങ്ങളുടെ അന്വേഷണവും ഈ നോവലിൽ കാണാം. എന്നാൽ നിയതമായ ഒരു ഉത്തരവും കണ്ടെത്തുന്നില്ല. അറുപത്തിനാല് അധ്യായങ്ങൾ ഉള്ള ഈ നോവൽ മാറുന്ന മാനവസമൂഹത്തിനു നേരെയുള്ള ഒരു കണ്ണാടിപോലെ വായനക്കാരിൽ എത്തുന്നു.

കവാസ്ജി, ഗണേശൻ എന്നീ കഥാപാത്രങ്ങളിലൂടെയാണ് നോവൽ ആരംഭിക്കുന്നത്. ചെസ്സ് കളിക്കിടയിൽ അവർ പലതിനേയും കുറിച്ച് സംസാരിക്കുന്നു. കളികളിൽനിന്നും അവർ ജീവിതത്തേയും ബന്ധിപ്പിക്കുന്നു. പൂർണ്ണമായും മുന്നിലുള്ള ലക്ഷ്യത്തിനു പിന്നാലെ പായുന്ന മാനവസമൂഹത്തിന്റെ സൂചനയിലൂടെയാണ് നോവൽ ആരംഭിക്കുന്നത്. തനിക്കു മുന്നിലുള്ള ചെസ്സ് ബോർഡിലെ കുതിരക്കരുക്കൾക്ക് കണ്ണുകളും കാതുകളും വളരെ വ്യക്തമായിതന്നെ രേഖപ്പെടുത്തിയിട്ടുള്ളതായി ഗണേശൻ മനസ്സിലാക്കുന്നു. അവയ്ക്ക് കണ്ണമറകളോ, കടിഞ്ഞാൺ മുതലായവ ഇല്ലാതാനും. ഇത് സമൂഹത്തിന് നേരേയുള്ള ഒരു വിജ്ഞാപനമാണ്. നാം കണ്ണുകളാലും കാതുകളാലും നമുക്ക് ചുറ്റുമുള്ളതിനെ മനസ്സിലാക്കണം. അതിലെ നന്മ തിരയുകയും കണ്ടും കേട്ടും തിരിച്ചറിയണം. ചെസ്സ് ബോർഡിലെ കുതിരകളും ഇതേ തത്ത്വമാണ് നൽകുന്നത്. കളിക്കിടയിൽ പാളിച്ചകൾ സംഭവിക്കാൻ അതാഗ്രഹിക്കുന്നില്ല. ലക്ഷ്യത്തിലേക്ക് എത്തുവാൻ കണ്ണുകൾക്കും കാതുകൾക്കും ജാഗ്രതയുണ്ടാവണം എന്ന ബൗദ്ധികപരമായ സൂചനയും നൽകുന്നു. കവാസ്ജിയോട് യാത്രപറഞ്ഞ് ഗണേശൻ മടങ്ങിപ്പോരുമ്പോൾ വളരെ വൈകി



യിരുന്നു. ഈ സന്ദർഭത്തിലെ യാത്രയെപ്പറ്റുന്നതാണ് ഉണ്ടായതായ സംഭാഷണശകലത്തിനിടയിലാണ് നസീമ, അമൻ എന്നീ കഥാപാത്രങ്ങൾ വായനക്കാരന് മുന്നിൽ എത്തുന്നത്. തന്റെ മകനായ അമൻ മരണത്തെ നേരിട്ടു എന്നത് കാലത്തിന്റെ പിന്നിലാക്കൽപോലെയാണ് ഗണേശൻ കരുതുന്നത്. മരണമെന്ന പ്രതിഭാസത്തെ തീർത്തും തലമുറകളുടെ മത്സരമായും ആ മത്സരത്തിൽ അവന്റെ കാലം ഗണേശന്റെ കാലത്തെ മറികടന്ന് മുന്നേറുന്നു. കവാസ്‌ജി എന്ന ഒരു മനുഷ്യൻ തീർത്തും ഗണേശന്റെ മനസിലെ മരവിച്ച ഓർമ്മകൾക്ക് പുതുജീവൻ നൽകി പുത്തൻ തലങ്ങളിലേക്ക് യാത്ര ചെയ്യുകയായിരുന്നു. വ്യവസ്ഥാപിതമായ ഒന്നിനേയും മറികടന്ന ഒരു വനായിരുന്നു കവാസ്‌ജി. എപ്പോഴും മനുഷ്യനും അവനുൾപ്പെടുന്ന പ്രകൃതിയും കൈവരിക്കുന്ന പുതിയ ഭാവങ്ങളെ, ശിഥിലീകൃതമായ അവസ്ഥകളെ ഒക്കെ കവാസ്‌ജി തന്റെ വാക്കുകളിലൂടെയും പ്രവർത്തിയിലൂടെയും എതിർക്കുന്നു. പേരുകേട്ട ഒരു ആർക്കിടെക്ടായിരുന്നു കവാസ്‌ജി. കവാസ്‌ജിക്ക് ബന്ധങ്ങളോ, ബന്ധനങ്ങളോ ഉണ്ടായിരുന്നില്ല. ഭൗതികമായും മാനസികമായും തീർത്തും സ്വതന്ത്ര അനുഭവിക്കുന്ന ഒരു വ്യക്തിയായിരുന്നു കവാസ്‌ജി. എന്നാൽ തനിക്ക് എതിർപ്പ് എന്നു തോന്നുന്ന ഏതു മേഖലയിലും കടന്നുചെന്ന് നിഷ്കരുണം മനസ്സിലുള്ളതിനെ ഒരു പ്രളയം പോലെ സമൂഹമധ്യത്തിലേക്ക് തുറന്നുവിടാനും കവാസ്‌ജിക്കു കഴിയും. നോവലിന്റെ അന്ത്യം വരെയും തീർത്തും പൂർണ്ണമായും മനസിലാക്കാനാവാത്ത ഒരു നിഗൂഢമായ വ്യക്തിയായി കവാസ്‌ജി മാറുന്നു. ഒരു ആർക്കിടെക്റ്റിന്റെ വൈദഗ്ദ്ധ്യം തീർത്തും അയാളുടെ ഭാവനയിൽ ഉയർന്നുപൊങ്ങുന്ന ഓരോ കെട്ടിടങ്ങളിലും പ്രതിഫലിക്കുന്നു. അവയുടെ തകർച്ചപോലും ഈ വൈദഗ്ദ്ധ്യത്തെയും നല്ല ആർക്കിടെക്റ്റിനേയും സൂചിപ്പിക്കും. നാലു ചുവരുകളും നേരേ താഴ്ന്നു വീണ് കിടക്കുമ്പോൾ തീർത്തും എല്ലാം വളരെ കൃത്യമായ ഒരു കെട്ടിട നിർമ്മിതിയായി കവാസ്‌ജി അതിനെ നോക്കിക്കാണുന്നു. കവാസ്‌ജിയുടെ അഭിപ്രായത്തിൽ അത്തരം കെട്ടിടങ്ങൾ ഒരു ലിമിറ്റ് സ്റ്റേറ്റ് ഡിസൈൻ എന്നാണ് പറയുന്നത്. ജീവിതത്തിലും, കളിയിലും ഒരു സ്റ്റേറ്റിൽമേറ്റ് ഇഷ്ടപ്പെടുന്ന വ്യക്തിയാണ് കവാസ്‌ജി. കവാസ്‌ജിയെപ്പോലെ തന്നെയാണ് നോവലിലെ മറ്റു കഥാപാത്രങ്ങളും. തികച്ചും വ്യത്യസ്തമാണ് ഓരോ കഥാപാത്രങ്ങളുടെയും സ്വഭാവം.

ഗണേശൻ, നസീമ, അമൻ എന്നിവരെ കേന്ദ്ര കഥാപാത്രങ്ങളാക്കിയാണ് നോവൽ മുന്നേറുന്നത്. അവനെ ഒരു മ്യൂസിക് ബാൻഡിന്റെ അംഗമായി മാത്രമല്ല മാറുന്ന സമൂഹത്തിന്റെ മായുന്ന നന്മകളുടെയും ആവിഷ്കാരങ്ങൾ ഒരു തുലികത്തുമ്പിൽ വിരിയിക്കുന്ന ഒരു കവിയായും നോവലിസ്റ്റ് അമനെക്കുറിച്ച് പറയുന്നു. നോവൽ തീർത്തും വ്യത്യസ്ത വഴിയിലൂടെ വായനക്കാരനെ യാത്ര ചെയ്യിക്കുന്നു. കഥയിലും ജീവിതത്തിലൂടെയും മാത്രമല്ല കവിതയും കുറിച്ചുകളും ഉൾപ്പെടുന്ന കാവ്യലോകത്തേക്കുതന്നെ അമൻ നമ്മെ കൂട്ടിക്കൊണ്ടുപോകുന്നു. എന്നാൽ ഇവയൊക്കെയും മരണമെന്ന നിത്യപ്രവാസത്തിനായി അമൻ ജീവിതത്തിൽനിന്നും അപ്രത്യക്ഷമാകുന്നതുമുതലാണ് അമൻ എന്ന കവിയെ നിരൂപകനെ ഏവരും തിരിച്ചറിയുന്നത്. നഗരത്തെ മാത്രമല്ല മാറുന്ന യാത്രകൾ നിറഞ്ഞ ജീവിതത്തെ നിത്യദർശിക്കുക എന്ന പ്രപഞ്ചത്തെ, സ്നേഹത്തെ, കടപ്പാടുകളെ, കടമകളെ, മറയുന്ന മനുഷ്യത്വത്തെ എന്നിങ്ങനെ വൈകാരികമായ തലങ്ങളിലൂടെയെല്ലാം അമന്റെ കവിതകൾ നമ്മെ കൊണ്ടുപോകുന്നു. മരണം എന്ന നശിതത്വത്തിൽനിന്നും ഓർമ്മകൾ എന്ന അനശ്വരതയിലേക്കാണ് അവൻ സഞ്ചരിക്കുന്നത്. രണ്ടുതവണയാണ് നഗരം അമനെ ഗണേശനിൽനിന്നും നസീമയിൽനിന്നും അടർത്തിയെടുത്തത്. പതിനാലാം വയസ്സിൽ കാണാതായ അമന്റെ പ്രവാസം ആറു വർഷത്തിനുശേഷമാണ് പൂർത്തിയായത്. ആറുവർഷങ്ങൾ അമന്റെ മാതാപിതാക്കൾക്ക് തീർത്തും ദുരിതകാലമായിരുന്നു. ഒടുവിൽ മരണം എന്ന ഒരു ശാശ്വതമായത് എന്നുള്ള ഒരു ഉത്തരത്തോടുകൂടി അമന്റെ ഓർമ്മകളിൽനിന്നും മനസിനെ വ്യതിചലിക്കാൻ തുടങ്ങുമ്പോഴായിരുന്നു അവന്റെ തിരിച്ചുവരവ്. ആറുവർഷത്തിനുശേഷം അവൻ തിരിച്ചെത്തുന്നു. ആറുവർഷക്കാലം അവരിരുവരും ജീവിതത്തെ മുറുകെപ്പിടിക്കുവാൻ ശ്രമിച്ചു. നിസ്സഹായതയോടെ, വാശിയോടെ, പ്രതികാരമനോഭാവത്തോടെ അവർ തങ്ങളുടെ ജോലികളിൽ മുഴുകി. മരണം എന്ന ലേബൽ പതിച്ചുനൽകി എങ്കിലും ആ ഓർമ്മ അവരിൽ സ്വസ്ഥത ഇല്ലാതാക്കി. പിന്നീട് ആറുവർഷത്തിനുശേഷം അമൻ തിരിച്ചെത്തുന്നു. അത് ഗണേശനിലും നസീമയിലും അതിവലിയ സന്തോഷം ജനിപ്പിക്കുന്നു. പിന്നീട് അതേ നഗരം തന്നെ ആ സന്തോഷം ഇല്ലാതെയൊക്കുന്നു. അവന്റെ ജീവനെ ഒരു അപകടത്തിലൂടെ നഗരം കവർന്നെടുക്കുന്നു.



മരണമെത്തുന്നതിന് മുൻപ് ഇതേ നഗരങ്ങളിൽ അമനും കൂട്ടരും ബാൻഡ് വായിക്കാനായി എത്തിയിരുന്നു. അങ്ങനെ അമൻ എന്ന കഥാപാത്രം ഒരിക്കലും തിരികെ എത്താനാകാത്തവിധം മരണം എന്ന യാത്രയെ ഇരുകൈകളും നീട്ടി സ്വീകരിച്ചു. ഇങ്ങനെയെക്കെ സംഭവിക്കുമ്പോഴും, നാഗരിക അസന്ദഗ്ധതകൾ നിത്യേന വർദ്ധിച്ചുകൊണ്ടിരിക്കുന്നു. ജാതീയ സംഘട്ടനങ്ങൾ, കുടിയേറ്റങ്ങൾ, ബോംബ് സ്ഫോടനങ്ങൾ ഇങ്ങനെ ഒരുപാട്. അസ്ഥിരമായ ജനസാന്ദ്രതയും കുടിയേറ്റങ്ങൾ സൃഷ്ടിക്കുന്നു. ഒരു മനുഷ്യജീവനു നിലനിൽക്കാനാവശ്യമായ വെള്ളം, തണൽ, ആഹാരം, തൊഴിൽ ഇവയില്ലാത്ത ഒരു ജനത, ഈ പ്രശ്നം നിരന്തരമായ അക്രമത്തിനും, ഒരു കുടിയേറ്റത്തിനും വരെ വേദിയൊരുക്കുന്നു.

അസംഭവങ്ങൾ പലതും സംഭവിക്കുന്നു. എന്നാൽ അവയെയൊക്കെയും മനുഷ്യത്വം നശിച്ച ഒരു സമൂഹത്തിനു മുന്നിൽ തീർത്തും ആനന്ദകരവും, സമയം പോക്കുവാനുമുള്ള കാഴ്ചകളാകുന്നു. ഒരു തിബത്തൻ അഭയാർത്ഥിയുടെ ക്രൂരമായ ആത്മഹത്യ അത് നിഷ്കരുണം ക്യാമറാക്കണ്ണുകളിൽ പകർത്തുന്നതും, ഇത്തരത്തിൽ മനുഷ്യത്വം മരവിച്ച മാനവികതയ്ക്കു തെളിവുകളാണ് സംരക്ഷണം പ്രധാനം ചെയ്യുന്ന അഗധിമന്ദിരങ്ങളും. അനാഥാലയങ്ങളും മറ്റും സംരക്ഷണം തിരസ്കരിക്കുമ്പോൾ ചൂഷണം ചെയ്യപ്പെടുമ്പോൾ ഇരുളിന്റെ മറവിൽ അമ്മയെ, മകളെ, സഹോദരിയേ, ഭാര്യയെ, പിച്ഛിച്ചിത്തുമ്പോൾ സമൂഹം മൗനം പാലിക്കുന്നു. അനാഥാലയത്തിലെ വിജയ് എന്നു പേരായ പന്ത്രണ്ടുവയസ്സുള്ള ഒരു അന്തേവാസി മരിക്കുന്നു. അതും ക്രൂരമായ പീഡനങ്ങൾ ഏറ്റ്, നിരന്തരമായ പീഡകളിൽനിന്നും മുക്തി നേടാൻ അവൻ ആശാനികേതന്റെ മതിലു ചാടി രക്ഷപെടാൻ ഒരുങ്ങി എന്ന കുറ്റത്തിന് മൂലിയായാണ് വിജയിയെ കൊല്ലുന്നത്. രണ്ടേക്കർ ഭൂമിയിൽ എവിടെയോ അവനെ മറവു ചെയ്തിരുന്നു. ധനികനായ ഒരു സേര് ആയിരുന്നു ആശാനികേതന്റെ സ്ഥാപകൻ. പിന്നീട് തീർത്തും അരിഷ്ടതയുടെ കൈകളിൽ സ്ഥാപനം എത്തപ്പെടുകയും ചെയ്യുന്നു. ആശാനികേതനിലെത്തുന്ന ബാലർക്ക് യാതൊന്നും പ്രതീക്ഷിക്കാനുണ്ടായിരുന്നില്ല. ആശാനികേതനിൽ മാത്രമല്ല, സമൂഹത്തിൽ പട്ടാള അട്ടിമറി, മത തീവ്രവാദം, മയക്കുമരുന്നു വ്യാപാരം എന്നിങ്ങനെ ഒരു സാമൂഹികമായ മലിനീകരണം തന്നെ ഉണ്ടാകുന്നു. ജനങ്ങൾ പ്രതികരിക്കാത്തവരായി മാറുന്നു. എന്തു പ്രശ്നങ്ങൾ ഉണ്ടായാലും ജനങ്ങൾ തങ്ങളുടെ പ്രവർത്തികളിൽ തന്നെ വ്യാപൃതരായി ജീവിക്കുന്നു. സത്യങ്ങൾ മറയ്ക്കപ്പെടുന്നു. അസത്യങ്ങൾ ഘോഷിക്കപ്പെടുന്നു. മരണപ്പെട്ടതായ അഥവാ കൊലചെയ്യപ്പെട്ടതായ വിജയ് എന്ന ആശാനികേതനിലെ ബാലന്റെ സഞ്ചിയിൽനിന്നും ലഭിച്ചു എന്ന് പറയപ്പെടുന്ന ഗണേശന്റെ പേരും വിലാസവും ഒരു ദുരുഹതയായി നോവലവസാനം വരെയും തുടരുന്നു. വിജയിയുടേത് എന്ന് പറഞ്ഞ് കാണിച്ചതായ ഫോട്ടോയിൽപോലും കാപട്യം നിറഞ്ഞ് നിൽക്കുന്നതായിരുന്നു. വിജയിയുടേത് എന്ന് പറഞ്ഞ് മറ്റൊരുടേയോ ഫോട്ടോ ആയിരുന്നു. ഇവിടെ മനുഷ്യന്റെ ശരീരങ്ങൾക്ക് പ്രാധാന്യം നൽകുന്നില്ല. അവരുടെ ശിരസ്സുകൾക്ക് മാത്രമേ ഐഡന്റിറ്റി ഉള്ളൂ എന്നാണ് സമൂഹം വിചിന്തനം ചെയ്യുന്നത്. വിജയിയുടെ മരണവും ഗണേശന്റെ പേരും വിവരവും രേഖപ്പെടുത്തിയതായ കുറിപ്പും ഗണേശന്റെ അന്വേഷണതാര വർദ്ധിപ്പിക്കുന്നു. ഇത് മറ്റ് പല കണ്ടെത്തലിനും വഴിയൊരുക്കുന്നു. അമൻ എന്ന തന്റെ മകന്റെ കാവ്യസൃഷ്ടികൾപോലും അത്തരത്തിൽ കണ്ടെത്തിയവയായിരുന്നു. ഇത്തരത്തിൽ ഒട്ടനേകം കണ്ടെത്തലുകൾ അസത്യത്തിന്റെ മറന്നിപ്പി പുറത്തുവരുന്നു. വിജയ് എന്ന ബാലൻ ആശാനികേതനിലെ മുഴുവൻ കുട്ടികളുടെയും പ്രതിനിധിയായുന്നു. എന്നു മാത്രമല്ല, ആശാനികേതന്റെ നാലു ചുവരുകൾക്ക് ഉള്ളിൽ നടക്കുന്നതായ അസംഭവങ്ങൾ ഒക്കെത്തന്നെ ഈ ഒരു മരണത്തിലൂടെ പുറത്തെത്തുന്നു. കവാട്ജി ആശാനികേതനിലെ ഓരോ രജിസ്റ്ററും പരിശോധിച്ച് ഓരോ പേപ്പറുകളും ആരും അറിയാതെ കീറിയെടുത്ത് ഗണേശനെ ഏൽപ്പിക്കുന്നു. ഈ പ്രവർത്തി ആവർത്തിക്കുന്നു. ഇതിലൂടെ ആശാനികേതനിലെ പല കൊള്ളത്തരങ്ങളും കണ്ടുപിടിക്കപ്പെടുന്നു. ഇവ വെളിപ്പെടുന്നു എന്നിരുന്നാലും ജനമധ്യത്തിൽ ഇവയൊന്നും തന്നെ എത്തുന്നില്ല. ആശാനികേതന്റെ ബാരക്കുകൾ ഓരോന്നും തകർന്നു വീഴുമ്പോഴും അടിത്തറ ഇളകിയാൽ പിന്നീട് എല്ലാം താനെ സംഭവിക്കുകയുള്ളൂ എന്ന കവാട്ജിയുടെ മറുപടിതന്നെയും, സമൂഹത്തിലെ അരാജകത്വത്തിന്റെ നേർചിത്രമാണ്. സാമൂഹികമായും പ്രസക്തിയേറിയുള്ള ആശാനികേതനിൽ മാത്രമല്ല, നഗരങ്ങളിലെ തെരുവോരങ്ങളും ജനജീവിതവും എല്ലാം ഇത്തരത്തിലുള്ള അരാജകത്വത്തിന്റെ ബാക്കിപത്രങ്ങളാണ്. ജാതി, മതം,



വർഗ്ഗം, വർണ്ണം, ലിംഗം എന്നിങ്ങനെ ഒരു ഭേദവും ഒരുവനും കൽപ്പിക്കുന്നില്ല. ചുഷണത്തിനു മുന്നിലും ചുഷകർക്കു മുന്നിലും മനുഷ്യജന്മങ്ങൾ ഒന്നുതന്നെയാണ്. വിജയിയുടേത് എന്നു പറഞ്ഞു നൽകിയിരുന്ന ഫോട്ടോ ശങ്കർ എന്ന കുട്ടിയുടേതായിരുന്നു. മനുഷ്യന്റെ ശിരസ്സുകളെത്രേ ഐഡന്റിറ്റി നൽകുന്നത്. മനുഷ്യന്റെ ഉടലുകളെ വെറും ജീവചരിത്രങ്ങൾ മാത്രമാകുന്നു.

കേണൽ ഡിസുസയുമായാണ് ഗണേശൻ പിന്നീട് സംവദിക്കുന്നത്. പട്ടാളക്കാരനായ ഡിസുസ, ഒറ്റക്കായിരുന്നു താമസം. ഭീകരവാദികൾക്കും പോലീസിനും ഇരയായി മരിച്ചുപോയവരുടെ അനാഥരായ കുട്ടികൾക്കുവേണ്ടി നടത്തുന്ന ഒരു ആലയം നടത്തിവരികയാണ് ഡിസുസ. ചില അന്ധവിശ്വാസങ്ങളുടെ പേരിൽ മകളെ ബലികഴിക്കേണ്ടിവന്നവരാണ് ഡിസുസ. അയാളുടെ ഭാര്യ അങ്ങ് അക്കലെ ഒരു സ്കൂളിലേക്ക് പോയിരുന്നു. ഒറ്റയ്ക്കാണ് ഡിസുസ ജീവിതം നയിക്കുന്നത്. ഡിസുസയ്ക്ക് മറ്റാരുടെയും നിയന്ത്രണത്തിലാവുന്നതിനോട് തീരെ താല്പര്യമുണ്ടായിരുന്നില്ല. ഡിസുസയുടെ വീട്ടിലെ ചുമരിൽ കണ്ടതായ പീറ്ററിന്റെ മുഖം. പട്ടാളജീവിതവും യുദ്ധവും, മരണവും എന്നിങ്ങനെ ഒട്ടേറെ പഴയ ചിത്രങ്ങളിലേക്ക് ഗണേശനെ കുട്ടിക്കൊണ്ടുപോകുന്നു. ഇത് അമ്മനിലേക്കും അവന്റെ കവിതയിലേക്കുമുള്ള ഒരു വഴിയാകുന്നു. അമ്മന്റെ കൂട്ടത്തിലെ ബാൻഡ് സംഘത്തെ ഗണേശനോ, നസീമയ്ക്കോ അറിയുമായിരുന്നില്ല. അവന്റെ ജീവിത ശൈലി ക്രമങ്ങളിൽ പൂർണ്ണ സ്വാതന്ത്ര്യം നൽകിയിരുന്നു. ഏതിനും സ്വന്തമായ കാഴ്ചപ്പാടുണ്ടായിരുന്ന യുവാവാണ് അമ്മൻ. ജനസാന്ദ്രതയും, കൂടിയിരിക്കലും പ്രവാസം എന്നിങ്ങനെ സാമൂഹിക പ്രാധാന്യമുള്ള ഓരോന്നിനെക്കുറിച്ചും അമ്മൻ അഭിപ്രായമുണ്ട്. അവയാകട്ടെ ചിന്തിപ്പിക്കുന്നതും അർത്ഥവത്തായിട്ടുള്ളതും. ഇതേ രീതി തന്നെയാണ് അമ്മന്റെ കവിതകൾക്കും അവ നഗരത്തെയും നഗരജീവിതത്തിനേയും, വെയിലിനെയും, ജനലിനെയും, ചുമരുകളെയും എന്നിങ്ങനെ എല്ലാത്തിനേയും തന്റെ കവിതകളിലേക്ക് കൊണ്ടുവരുന്നത്. ഓരോ കവിതകൾ മാത്രമേ ഗണേശൻ അമ്മന്റെ മുറിയിൽനിന്നും വായിക്കുമായിരുന്നുള്ളൂ. അവ ഓരോന്നും ക്രമം തെറ്റാതെ തൽസ്ഥാനത്ത് അടുക്കിവയ്ക്കാനും ഗണേശൻ ശ്രദ്ധിച്ചിരുന്നു. എന്നാൽ നസീമയാകട്ടെ ഒന്നിനോടും പ്രതികരിച്ചില്ല. തോജോമയാനന്ദിയുടെ ആശ്രമവും ആത്മീയമായ ചിന്തകളുമായി ജീവിതം കഴിച്ചുകൂട്ടുകയാണ് നസീമ, സാമിയിലേക്കുള്ള പോക്കുപോലും അപൂർവ്വമായാണ് ഉണ്ടാകുന്നത്. സ്ത്രീകളെയും, സ്ത്രീപ്രശ്നങ്ങളെയും ചുറ്റിപ്പറ്റിയാണ് സാമി മുന്നേറുന്നത്. നസീമയോടൊപ്പം, വസുന്ധര, രജനി, എസിസബത്ത്, വിനീത എന്നിവരും ഉണ്ടായിരുന്നു. എന്നാൽ അമ്മന്റെ മരണശേഷം ഉള്ള ദിനരാത്രങ്ങൾ ഓരോന്നും പലതിൽനിന്നും നസീമയെ അകറ്റി. അവരുടെ ജോലികളിൽ പോലും കൃത്യമായ ശ്രദ്ധ ചെലുത്തുവാൻ നസീമയ്ക്ക് കഴിഞ്ഞില്ല. പിന്നീട് വിശ്വാസങ്ങളുടെയും ആത്മീയതയുടെയും വക്താവായ സ്വാമിയിലും ആശ്രമത്തിലും വിശ്വാസങ്ങളിലും നസീമ ശ്രദ്ധിക്കുവാൻ ശ്രമിച്ചു. തൊഴിലിന്റെയും മനസിന്റെയും വിരക്തി ഗാർഡനിങ്ങിലൂടെ നസീമ പരിഹരിച്ചു. നസീമയിലെപ്പോലെ പല മാറ്റങ്ങളും ഗാർഡനിങ്ങിലേക്ക് ഗണേശനേയും നയിച്ചു. അങ്ങനെ അവർ പ്രകൃതിയിലെ ഒരു ഭാഗമായി.

പ്രകൃതിയിലെ വരദാനമായ പക്ഷിമൃഗാദികളെ കൂട്ടിലിട്ട് ബന്ധനസ്ഥരാക്കുന്നതും അവയുടെ ഇണകൾ ദിവസവും അവർക്കായി പറന്നെത്തുന്നത് സ്നേഹം പങ്കുവയ്ക്കുന്നതും കൗതുകമായി നോക്കിക്കാണുകയും അതിലെ കാഴ്ച പരസ്യമാക്കി മാറ്റുകയും ചെയ്യുന്ന ഉടമസ്ഥൻ ഒരിക്കൽപോലും അതിനെ തുറന്നുവിടാൻ മുതിരുന്നില്ല. എന്തിന്റെയും പേരിൽ പ്രശസ്തി ആർജ്ജിക്കാനാഗ്രഹിക്കുന്ന മനുഷ്യരുടെ പ്രതിനിധിയാണ് ഈ ഉടമസ്ഥൻ. കച്ചവടക്കണ്ണുകളോടെ എത്തിനേയും വീക്ഷിക്കുന്ന ഇവർക്ക് മറ്റുള്ളവരുടെ ദുഃഖം പോലും സ്വന്തമായി നേടിയിട്ടുണ്ടാകാത്ത ഉപാധികൂടിയാണ്. കേവലം കീറിപ്പോയ പേജുകൾക്കായി ആശാനികേതനിലെ നടത്തിപ്പുകാരെ ശിക്ഷിക്കുമ്പോൾ അതേ സ്ഥാപനത്തിലെ അന്തേവാസിനായ ഒരു ബാലന്റെ മരണം നിഷ്കരുണം മുടിവയ്ക്കുകയും ശങ്കർ എന്ന കുട്ടിയുടെ തിരോധാനവിവരം അറിയാതെപോവുകയും മാനസികമായും ശാരീരികമായും കരുണകളെ പീഡിതരാക്കുകയും ചെയ്യുന്ന ഒരു വിചിത്ര സംസ്കാരഭാഗവും നശിച്ച മാനുഷികമൂല്യങ്ങളും നോവലിനെ കൂടുതൽ സിറകാർവ്വമാക്കുന്നു. നിത്യേന നാം കാണുകയും സംസാരിക്കുകയും ചെയ്യുന്നവർ ഒരുമാത്രക്കൊണ്ട് അപ്രത്യക്ഷമാകുമ്പോൾ അവരെ തിരിച്ചറിയാൻ ആകാത്തവിധത്തിൽ മനസിന് മറവി പിടിപെടുമ്പോൾ നാം



മനസ്സിലാക്കണം ഓരോ വ്യക്തിയും ജീവജാലങ്ങളും പ്രകൃതി നിർമ്മിതിതന്നെ. മരണപ്പെട്ട ബാർ ജീവനക്കാരനായ സാക്സോഫോണിസ്റ്റിന്റെ മരണം അയാളുടെ പേരിനേയോ, വിലാസത്തെയോ മനസ്സിലാക്കാൻ കഴിയാത്തവിധം നിഗൂഢമാകുന്നു. 'ദിവോയ്സ്' എന്ന ഒരേ ഒരു ശബ്ദം മാത്രമാണ് ആ പാട്ടുകാരന്റെ ഐഡന്റിറ്റി. സംഗീതമില്ലാതാകുന്നതോടെ ആ വ്യക്തിയും അപരിചിതനാകുന്നു. ഇവിടെ പേരിനോ, വ്യക്തിക്കോ പ്രാധാന്യമില്ല. മറിച്ച് അവരുടെ തൊഴിൽ, ഐഡന്റിറ്റി നൽകുന്നു. എവിടെയും ഒന്നിനും ഒരു സ്വതന്ത്രമായ നിലനിൽപ്പില്ല. വ്യക്തിത്വങ്ങളില്ല. അതുകൊണ്ടുതന്നെ എല്ലാത്തിന്റെയും തുമ്പ് വേഗം നഷ്ടപ്പെടുന്നു. ഇവിടെ മരണത്തിനും തീരോധാനത്തിനും ക്രൂരതയ്ക്കും ഒന്നിനും തന്നെ തെളിവുകൾ ഇല്ല. ആരും സത്യത്തെ അന്വേഷിക്കുകയോ കണ്ടെത്തുകയോ ചെയ്യുന്നില്ല. മനുഷ്യ മനസാക്ഷികൾ മരവിക്കുന്നു. ജീവനും സത്യങ്ങളും അപഹരിക്കപ്പെടുന്ന മനുഷ്യൻ മാത്രമല്ല ദൈവങ്ങളും വ്യക്തികളോ രൂപങ്ങളോ വിഗ്രഹങ്ങളോ ഒന്നുമില്ലാത്ത വെറും വർണ്ണക്കല്ലുകളായ നാടോടി ദൈവങ്ങളും ഇവിടെ കളവുമുതലാകുന്നു. നസീമയുടെ തോട്ടത്തിൽ ബോഗൻവിലയുടെ ശിഖരങ്ങൾക്കുതാഴെ ചുരുക്കപ്പെട്ടിരിക്കുന്ന നിറയെ പല വർണ്ണങ്ങളിലുള്ള ഉരുളൻ കല്ലുകൾ കാണുന്ന ഗണേശൻ അതിനെ കൗതുകപൂർവ്വം നോക്കുന്നു. എന്നാൽ അവ എടുക്കുവാനുള്ള ശ്രമം, നസീമ വിഫലമാകുന്നു. കാരണം അവ അപഹരിക്കപ്പെട്ട നാടോടി ദൈവങ്ങളാണ്. ഏതോ നാടോടി ബാലനിൽനിന്നും പലവഴി സഞ്ചരിച്ചാണ് ആ കല്ലുകൾ നസീമയുടെ പക്കലെത്തിയത്. ഒരു ബഞ്ചാര സംഘത്തിന്റേതായിരുന്നു ആ കല്ലുകൾ. വസുന്ധരയാണ് ആ കല്ലുകൾ അവിടേക്ക് കൊണ്ടുവന്നത്. അവ നാടോടി ദൈവങ്ങളാണ് എന്നും ചില വർഗ്ഗങ്ങൾക്ക് നാടോടിദൈവങ്ങളെ മാറേണ്ടത് അനിവാര്യമാണെന്നും ഉള്ള സത്യം ആ ബാലൻ വസുന്ധരയോട് സൂചിപ്പിക്കുന്നു. എന്നാൽ ഇത്തരം കാര്യങ്ങളിലൊന്നും തന്നെ വിശ്വസിക്കാതെ വസുന്ധര അവ നാടോടികളെ കാക്കുന്ന ദൈവമായി മാത്രമേ ആ കല്ലുകളെ കണ്ടിരുന്നുള്ളൂ. സാമ്രാജ്യത്തിലെ ഒരുദിവസം ഈ കൽദൈവങ്ങളെക്കുറിച്ച് വിശദമാക്കുകയുണ്ടായി. ഈ കല്ലുകൾ കാർത്തിക മാസത്തിലോ മറ്റോ പുഴയിലെ വെള്ളം ഇറങ്ങുമ്പോൾ പഴയ കല്ലുകൾ ഉപേക്ഷിച്ച് പുതിയവ ശേഖരിക്കും. അതിനായി അവർ ചോലകളുടെ തീരങ്ങളിൽ താവളമടിച്ചിരുന്നു. ഇങ്ങനെ മാറ്റിനിർത്താൻ കല്ലുകൾ പിശാചുകളായി പരിണമിക്കുമത്രേ. ഇത് നാടോടികളുടെ വിശ്വാസമാകുന്നു. എന്നാൽ വെറും ഒരു കൗതുകത്തിന് പുറത്ത് നസീമ ആ കല്ലുകൾ വീട്ടിലേക്ക് കൊണ്ടുപോകുന്നു. അവ സൃഷ്ടിച്ചേക്കാവുന്ന പരിണിതഫലങ്ങളെക്കുറിച്ച് നസീമ ചിന്തിച്ചിരുന്നു. എന്നാൽ പുതുക്കപ്പെടാത്ത ദൈവങ്ങളാണ് തന്റെ വീട്ടിലുള്ളത് എന്ന് അറിയാനിയ്ക്കാതെ നസീമയ്ക്ക് തന്റെ വീട്ടിലെ അസാധാവിതകൾക്കു കാരണം ഈ പിശാചുകളാണെന്നത് മനസ്സിലാക്കൽ വസുന്ധരയോടെ പൊട്ടിത്തെറി ഉണ്ടാക്കി. അങ്ങനെ പിന്നീട് നസീമ സാമ്രാജ്യത്വം കുന്നു. എന്നാൽ പിന്നീട് നസീമ ആ കല്ലുകളെ വലിച്ചെറിഞ്ഞുകൊടുത്തതായും കാണാം. പിന്നീട് വസുന്ധര രോഗത്തേ നേരിടുന്നതും മരണമടയുന്നതും കാണാം. ആ മരണവും, വേർപാടും നസീമയിലും വിഷമതകൾ സൃഷ്ടിക്കുന്നു. ദൈവത്തെ സാരക്ഷിച്ച് വസുന്ധരയുടെ ജീവനും ഇപ്പോൾ മരണം അപഹരിച്ചിരിക്കുന്നു. അങ്ങനെ ഓരോന്നും. അമ്മന്റെ മരണം, ഋഷിയും സീതയും തമ്മിലുള്ള സ്നേഹത്തിന്റെ നഷ്ടമാകൽ, ജന്മസ്ഥലത്തിന്റെ അപഹരണം, മനുഷ്യത്വത്തിന്റെ അപഹരണം എന്നിങ്ങനെ പ്രപഞ്ചശക്തിയാകുന്ന, ജീവനും സ്നേഹവും ബന്ധങ്ങളും ദൈവവും ഒക്കെ അപഹരിക്കപ്പെടുന്നു. ഒരു തെളിവുകളും സൂചനകളും ബാക്കി നൽകാതെ ഇവയെല്ലാം പ്രപഞ്ചത്തിൽനിന്നും നിത്യമായും മാഞ്ഞുപോകുന്നു.

ഋഷിയും സീതയുമായുണ്ടായിരുന്ന ബന്ധം ഒരു ഒറ്റവരി പാത പോലെ ആയിരുന്നു. ഋഷിക്കുള്ള സ്നേഹം, സീതയ്ക്ക് തോന്നിയിരുന്നില്ല. മാത്രമല്ല ആ സ്നേഹം എങ്ങും കൂട്ടിയിണക്കപ്പെടുന്നതുമില്ല. ഒരു ബാരി അക്രമികൾ നടത്തിയ പ്രശ്നത്തിൽ തോക്കിന്റെ മുന്നിൽ ജീവൻ തിരുമ്പോഴും ആ സ്നേഹത്തിന് സമാപ്തി ഉണ്ടാകുന്നില്ല. സീതയുടെ മരണത്തിന്റെയും അവളുടെ നഷ്ടത്തിന്റെയും വേദന ഋഷിയെ തളർത്തു. ആ തളർച്ചയിലും പലതും ഋഷി മനസ്സിലാക്കുന്നു. സീത എന്ന പേരല്ലാതെ, അവളുടെ വിലാസമോ, മാതാപിതാക്കളുടെ വിലാസമോ, പേരോ അവളുടെ തൊഴിലും ഒന്നും ഋഷിക്കറിയാമായിരുന്നില്ല. ഇത് സ്നേഹിക്കുന്നവരിൽനിന്നും എത്ര അകലെയാണ് ഋഷിയുടെ സ്ഥാനം എന്ന് അയാൾ മനസ്സിലാക്കുന്നു. മരണമാണ് പലപ്പോഴും അടുപ്പത്തിന്റെയും ബന്ധത്തിന്റെയും ആഴം അളക്കുന്നത്. രജനി



എന്ന സാമിതിയിലെ ജീവനക്കാരിയുടെ ജീവിതത്തിലും ഇതുതന്നെയാണ് സംഭവിച്ചത്. രജനി തന്റെ ജീവിതപങ്കാളിയെ തിരഞ്ഞെടുക്കുന്നു. എന്നാൽ വിവാഹശേഷം അയാൾ ഒരു ക്രിമിനലാണെന്നു തിരിച്ചറിയുന്നു. മോഷണത്തിലൂടെ നേടിയെടുത്ത വസ്തുക്കളിലാണ് ഞങ്ങൾ ഇതുവരെ ഭൗതിക സുഖം അനുഭവിച്ചത് എന്ന് തിരിച്ചറിവ് തന്റെ ദർശനത്തിനെ ഒരുപാട് പ്രഹരിക്കുകയും ശകാരിക്കുകയും ചെയ്തു. എന്നാൽ പിന്നീട് കണ്ടത് തന്റെ ദർശനത്തിന്റെ ശവശരീരമാണ്. അത് മാനസികമായും രജനിയെ തകർക്കുന്നു. ഇവിടെ ഇരുവരും സ്നേഹിക്കുകയും പരസ്പരം ഒന്നിക്കുകയും ചെയ്തു. എന്നാൽ ഇവിടെയും മരണം എന്ന ഒരു യാത്രയിലൂടെ അവരെയും അകറ്റി. സിത, ഋഷി, ഷുക്കുർ, ഇംതിയാസ്, രജനി, ദർശനവ്, അമൻ, വിജയ് എന്നിങ്ങനെ എല്ലാവരും പലതരത്തിൽ അപഹരിക്കപ്പെട്ടവരാകുന്നു. ഇവിടെ നഷ്ടങ്ങളും നഷ്ടപ്പെടലുകളും ഉണ്ടാവുന്നു. എല്ലാവരും നിത്യമായ ഒരിക്കലും തിരികെ എത്താത്ത ഒരു ലോകത്തേക്ക് കൂടിയേറുന്നു.

ഇൻസ്പെക്ടർ തരുൺകുമാറിന്റെ പ്രത്യക്ഷപ്പെടലുകളും അന്വേഷണരീതിയും പലപ്പോഴും ഉത്തരം ലഭിക്കാത്ത ചോദ്യങ്ങളായി നോവലുകളിനീളം തുടരുന്നു. ഇതിൽനിന്നും ഒക്കെ മാറി ജ്ഞാനത്തിന്റെയും സമാധാനത്തിന്റെയും വൈകാരികതയിലേക്ക് ചേക്കേറുവാൻ നസീമ തീരുമാനിച്ചു. ഒരു നീണ്ട യാത്രയ്ക്കുശേഷം ഭൗതികവും ശാരീരികവുമായ എല്ലാ ബന്ധങ്ങളും ഉപേക്ഷിച്ച് സാമിതിയുടെ ആശ്രമത്തിന്റെ ഭാഗമാകുവാൻ നസീമ തീരുമാനിക്കുന്നു. മരണത്തെ മുൻകൂട്ടി പ്രവചിച്ചതുപോലെ അമന്റെ കലാസൃഷ്ടികളും മരണത്തോട് അടുത്തുകൊണ്ടിരുന്നു. ഇവിടെ എല്ലാം മരണം തന്നെയാണ് നോവലിന്റെ തുടക്കത്തിൽ കണ്ടതായ കവാസ്ജിയുടെ മരണം, വയലുകളുടെ നടവിൽ, മരണപ്പെട്ട ബന്ധിയായ ഒരുവന്റെ, സിതയുടെ അമന്റെ തെരുവിലെ ബാലികയുടെ, വിജയിയുടെ, ഇംതിയാസിന്റെ, ഷംഷേറിന്റെ വസുന്ധരയുടെ, സുചിത്രബഹന്റെ ദർശനവായ അനുപിന്റെ എന്നിങ്ങനെ എവിടെയും മരണം ഒരു തരംഗം തീർക്കുന്നു. ഇവിടെ മരണമെന്നത് ഒരു കൂടിയേറ്റം പോലെ ആകുന്നു. വസിക്കുന്ന പൂസ്താകിൽനിന്നും എന്നും എന്നും തിരിച്ചെത്താൻ കഴിയാത്ത അത്ര ദൂരത്തിലേക്ക് മരണത്തിന്റെ യാത്രയെ ഇവിടെ സ്വീകരിക്കുകയാണിവർ. ഒരുതരത്തിൽ ഇവരോരുത്തരും മരണത്തിലൂടെ മടങ്ങിവരാൻ ഒരിക്കലും സാധിക്കാത്തത്ര ദൂരത്തിലേക്ക് ഒരു യാത്ര നടത്തുകയാണ്. ഒരു പ്രവാസം പോലെ ജീവിതത്തിൽ ഒട്ടേറെ നേടേണ്ടവർ. ഇനിയും, നേടാനുള്ളവർ, ഭാവിയുടെ വാഗ്ദാനങ്ങൾ, പ്രതിഷേധം ഇവയൊക്കെയും ഈ പ്രപഞ്ചത്തിൽനിന്നും അകന്നുപോകുന്നു. അത്യന്തം ശിഥിലീകരിക്കപ്പെട്ടതും നിയന്ത്രണങ്ങൾ നഷ്ടപ്പെട്ടതും നാടോടിത്തത്തോട് സമീപിക്കുന്നതുമായ സമകാലിക നാഗരികതയായിത്തീരുന്നു നോവൽ രംഗം. വൈരുദ്ധ്യങ്ങളും, വഴിമുട്ടുന്ന അന്വേഷണങ്ങളുടെ നടപ്പുകളും, നിയതമായ ഒരു ഉത്തരത്തിലേക്കും നിശ്ചിത നിയമ വ്യവസ്ഥയും, മറയ്ക്കപ്പെടുന്ന സത്യങ്ങളും, മറന്നിരിക്കി പുറത്തുവരുന്ന യാഥാർത്ഥ്യവും ഈ നോവലിന്റെ മാറ്റ് കൂട്ടുന്നു. ശിഥിലീകൃതമായ സമൂഹം മാത്രമല്ല, തകരുന്ന ഗ്രാമപശ്ചാത്തലം, വളരുന്ന നാഗരികത, അരക്ഷിതാവസ്ഥയും, നശിക്കുന്ന മനുഷ്യത്വവും ഒക്കെ നോവലിന്റെ പ്രതിപാദ്യവിഷയങ്ങളാണ്. ഇവിടെ നഗരത്തിൽനിന്ന് കൂടിയേറുന്നവർക്ക് പറയാൻ യാതൊന്നും ഏറെയാണ്. ജലം, വായു, ഭക്ഷണം, പാർപ്പിടം എന്നിങ്ങനെ എല്ലാ അടിസ്ഥാന സൗകര്യങ്ങളും തിരസ്കരിച്ച ഒരു നാടോടിത്ത സമൂഹത്തിനും യാതൊന്നും ഏറെയാണ്. ഡാമ്പുകളിലെ ദുഷ്കരമായ ജീവിതം അവരിൽ മനുഷ്യത്വത്തിന്റെ നാശത്തിലേക്കും, ക്രിമിനൽ കുറ്റങ്ങളിലേയ്ക്കും തുടർന്ന് പല പ്രശ്നങ്ങളിലേക്കും കൂട്ടിക്കൊണ്ടുപോകുന്നു. എന്നിരുന്നാലും അവർ കെട്ടുറപ്പുള്ള ഒരു കുടുംബബന്ധത്തിനു ചെറിയ തോതിൽ വില കൽപ്പിച്ചിരുന്നു. ഗണേശന്റെയും നസീമയുടെയും കുടുംബബന്ധത്തിന് പോലും അണുകൂടുംബത്തിന്റെയും തിരക്കുപിടിച്ച ആധുനിക നഗരവത്കൃത സമൂഹത്തിന്റെയും വേഗതയുണ്ട്. ഭക്ഷണത്തിന് ചിലപ്പോൾ മാത്രം സമ്മേളിച്ച അവർ പലപ്പോഴും കുറിപ്പുകളിലൂടെ മാത്രമാണ് സംവദിച്ചിരുന്നത്. എവിടെപ്പോകുന്നു എന്നോ, എന്തു ചെയ്യുന്നു എന്നോ എപ്പോഴാണ് വരുന്നതെന്നോ ഒന്നും തന്നെ പൂർണ്ണമായും അവർക്ക് പരസ്പരമറിയുമായിരുന്നില്ല. ക്രമം തെറ്റിയുള്ള കയറിവരവുകളും സ്വന്തം കാര്യങ്ങൾ മാത്രം ചിന്തിച്ച് പ്രവർത്തിക്കുന്ന ജനതയും നാഗരികതയുടെയും പുത്തൻ യുഗത്തിന്റെയും ബാക്കിപത്രങ്ങളാണ്. ശിഥിലീകൃതമായിത്തീർന്ന ഒരു കുടുംബപശ്ചാത്തലം, പ്രകൃതിയിൽനിന്നുള്ള മടക്കം, വിശ്വാ



സങ്ങളുടെ അപഹരണം, തീവ്രവാദം, വെടിവെയ്പ്പ്, കൊലപാതകം എന്നിങ്ങനെ തികച്ചും വ്യത്യസ്തമായ ഒരു ജനതയുടെ കഥാവിഷ്കാരമാണ് ആനന്ദിന്റെ 'അപഹരിക്കപ്പെട്ട ദൈവങ്ങൾ' എന്ന നോവൽ. കഥയിൽനിന്നും കഥകളിലേക്കും, കവിതകളിലേയ്ക്കും, കുറുപ്പുകളിലേയ്ക്കും, ജീവിത യഥാർത്ഥ്യങ്ങളിലേയ്ക്കും ആനന്ദിന് നമ്മെ കൂട്ടിക്കൊണ്ടുപോകുന്നു. ജനലിലൂടെ എത്തുന്ന നിഴലിന്റെ വലിപ്പവ്യത്യാസം പോലും ഉദയാസ്തമനത്തിന്റെയും ജനനം, മരണം ഇവയുടെയും കഥ പറയുന്നു. തീർത്തും ഈ കഥ അപഹരിക്കപ്പെട്ട ദൈവങ്ങളുടേതല്ല. കാലഹരണപ്പെട്ടവയുടേതാണ്. അസാധാരണതകളുടെയും അത്ഭുതങ്ങളുടെയും വർണങ്ങൾ കൈയ്യഴിച്ചു ചേർത്ത് സൃഷ്ടിച്ച കാലഹരണം എന്ന സങ്കല്പത്തിന് ഈ നോവൽ പുതിയൊരു മാനം സൃഷ്ടിക്കയാണിവിടെ. പീഡിതരുടെയും, അനാഥരുടെയും ജീവിതകഥകളിലൂടെ മുന്നേറുന്ന നോവൽ ഗഹനമായ ഒരു വിക്ഷണം നൽകുന്നു. പീഡനത്തിന്റെ ഓർമ്മയ്ക്ക് യുഗത്തിന്റെ ആഴമുണ്ട്. പീഡിതരിലും, അനാഥരിലും കൂടെയാണ് മനുഷ്യജാതിയുടെ യഥാർത്ഥ ചരിത്രം എഴുതപ്പെട്ടിരിക്കുന്നത്. നോവൽ അവസാനിക്കുന്നതും ഇത്തരം അനേകം പേരുടെ ഓർമ്മകളിലൂടെയാണ്. സ്വാമിയുടെ ആശ്രമത്തിലേക്ക് നസീമയും, അനന്തമായ ലോകത്തിലേക്ക് അമനും പ്രയാണം ചെയ്യുന്നു. ഇങ്ങനെ പറഞ്ഞ് അമന്റെ ഒരു തൂലികയിലെ അവസാനത്തെ അക്ഷരമുത്തുകളുടെ ഉച്ചരിക്കലിലൂടെ നോവൽ പരിസമാപ്തിയിലെത്തുന്നു.

മനുഷ്യന്റെ അറിവിന് അതിരുകളുണ്ട്. എന്നാൽ ആ അതിരുകൾ, എവിടെയാണ് എന്ന് അവനറിയില്ലെന്നതാണ് ഭാഗ്യം. അഥവാ ആ അതിരുകൾ മനസ്സിലാകുമ്പോഴേയ്ക്കും അവൻ ഒരു പക്ഷെ അവയെ കടന്നുകാണും. ഇങ്ങനെ അമന്റെ സൃഷ്ടിയുടെ വെളിപ്പെടുത്തലിലെ ഒരു തത്ത്വമായി കണ്ടുകൊണ്ടാണ് അറുപത്തിനാലാം അധ്യായം അവസാനിക്കുന്നത്. മരണം, ജീവിതം, നഷ്ടമാകുന്ന ബന്ധങ്ങൾ, പ്രകൃതി, അപഹരണങ്ങൾ, തെരുവജീവിതങ്ങൾ എന്നിങ്ങനെ ഒരു നഗരവൽക്കൃത സമൂഹത്തിന്റെ മുഴുവൻ പ്രത്യേകതകളും, സ്വഭാവവൈശിഷ്ട്യങ്ങളും ആനന്ദിന് തന്റെ നോവലിൽ എത്തിച്ചു. കവിതകളും, കഥകളും വ്യത്യസ്ത സംഭവവികാസങ്ങളും പാട്ടുകളും, ചിത്രങ്ങളും നിറഞ്ഞ ഈ നോവലിന്റെ ആഖ്യാനം സഹൃദയന്റെ മനസിനെ പലവഴികളിലേയ്ക്കും നയിക്കുന്നു. വ്യത്യസ്ത വഴിയിലൂടെ മനോഭാവങ്ങളിലൂടെ വായനക്കാരന്റെ മനസ്സ് ഈ ചിത്രങ്ങളെ മനസ്സിൽ ആലേഖനം ചെയ്യുന്നു. ഉത്തരങ്ങൾക്കായുള്ള യാത്രയിൽ പലവഴിയിലും സഞ്ചരിച്ച് പുതിയ കണ്ടുപിടുത്തങ്ങൾ നടത്തുന്നു. എന്നാൽ ആ കണ്ടുപിടുത്തത്തിനപ്പുറം നിയതമായ ഒരു ഉത്തരവും നോവലിൽ കണ്ടെത്തുന്നില്ല. അവ ഇപ്പോഴും ചുരുളഴിയാത്ത നിഗൂഢ രഹസ്യങ്ങൾ പോലെ ജീവിതത്തിലും സഹൃദയമനസ്സുകളിലും നിലനിൽക്കുന്നു.

ആഗോളവൽക്കരണവും വ്യവസായവൽക്കരണവും വരുത്തിയ നഷ്ടങ്ങൾ നമുക്ക് ഏറെ വേദനാജനകമാണെന്നാണ്. പ്രവാസത്തിന് ഇരയാകേണ്ടിവരുന്നവരിൽ അധികവും ദേശവും സംസ്കാരവും കിടപ്പാടവും നഷ്ടപ്പെടുന്നവരാണ്. ഇവിടെ കുടുംബം വംശത്തിന്റെ തന്നെ നാശം, സാംസ്കാരികതനിമകൾ, സ്വത്വം, നാട്, ബന്ധങ്ങൾ ഇവയെല്ലാം നഷ്ടപ്പെടുന്നു. പ്രവാസജീവിതത്തിൽ ഇത് സർവ്വസാധാരണം തന്നെ. ഇങ്ങനെ ഭൂമിയും സ്വത്വം നഷ്ടപ്പെട്ട് മനുഷ്യർ എല്ലാത്തരത്തിലും പുറന്തള്ളപ്പെട്ട് സാംസ്കാരികമായും ദേശപരമായും സ്ഥാനഭ്രംശം സംഭവിച്ച് പലനാടുകളിൽ എത്തപ്പെടുന്നു. അങ്ങനെ വരുമ്പോൾ ലോകപ്രവാസികളിൽ ഏറെപേരും പാരിസ്ഥിതിക അഭയാർത്ഥികളാണെന്നു പറയാം. വികസനത്തിന്റെ പേരിൽ സ്ഥലഭ്രംശം സംഭവിക്കുന്ന അനവധി പ്രവാസികൾ ഉള്ളതിനാൽ പ്രവാസത്തിന് പാരിസ്ഥിതികമായ തലംകൂടി കടന്നുവരുന്നു. 'അപഹരിക്കപ്പെട്ട ദൈവങ്ങൾ' എന്ന ആനന്ദിന്റെ നോവലിലൂടെ കടന്നുപോകുന്ന വായനക്കാരന്തിലും പ്രവാസ ജീവിത തുടിക്കുകൾ വ്യത്യസ്ത രൂപത്തിലും ഭാവത്തിലും കാണാൻ കഴിയും.

റഫറൻസ്

- അപഹരിക്കപ്പെട്ട ദൈവങ്ങൾ - ആനന്ദി.
- വിജ്ഞാനകൈരളി- ഭാഷാ ഇൻസ്റ്റിറ്റ്യൂട്ട്.
- ആട്ടജീവിതം - ബെന്യാമൻ
- കേരള കൗമുദി ആഴ്ചപ്പതിപ്പ്.



ലേഖനം

മനുഷ്യതമെന്ന മഹാകവി

ഡോ: ആർ. അശ്വതി

ഡോ: ആർ. അശ്വതി
അസി. പ്രൊഫസർ,
മലയാളവിഭാഗം
എൻ.എസ്.എസ്. കോളേജ്
പന്തളം

ആമുഖം

1952 ൽ തന്റെ 26-ാം വയസ്സിലാണ് അക്കിത്തം ഇരുപതാം നൂറ്റാണ്ടിന്റെ ഇതിഹാസമെഴുതുന്നത്. 1958 ൽ അത് പുസ്തകരൂപത്തിൽ പുറത്തു വന്നു. ഇന്നോളം ഈ കാവ്യത്തിന്റെ ബഹുതല സ്പർശിയായ ധാരാളം പാഠങ്ങളും പഠനങ്ങളും ഉണ്ടായിട്ടുണ്ട്. പ്രബുദ്ധ കേരളത്തിന്റെ സാമൂഹികാന്തരീക്ഷം ഇതിനിടയിൽ പല മട്ടുമാറി. തത്വശാസ്ത്രങ്ങളുടെ, ഭരണപ്രതിപക്ഷ പ്രസ്ഥാനങ്ങളുടെ എണ്ണവും എണ്ണിയാൽ തിരാത്ത അണികളും ഏറി. രാഷ്ട്രീയം രാഷ്ട്രഭരണ സംബന്ധിച്ചത് എന്ന അർത്ഥത്തിൽ നിന്ന് 'അവ നവനിസത്തി'ലേക്ക് കുറുമാറി. സാംസ്കാരിക രംഗം കൂലിയെഴുത്തുകൊണ്ട് സജീവമായി. കേരളം അടിമുടി പരിവർത്തിപ്പിക്കപ്പെട്ട 21-ാം നൂറ്റാണ്ടിന്റെ ചരിത്രമിതാണ്.

ഇതി-ഇഹ-ആസീത്....

'ഇരുപതാം നൂറ്റാണ്ടിന്റെ ഇതിഹാസം' ഒറ്റപ്പെട്ടുപോയിരിക്കുന്നു. 'ഇതി ഇഹ ആസീത് ഇതിഹാസം'— 'ഇവിടെ ഇപ്രകാരം സംഭവിച്ചിരിക്കുന്നു' എന്ന അർത്ഥത്തിൽ ഈ 'ഇതിഹാസം' പ്രസക്തമാണ്. ഭൂത കാലാനുഭവങ്ങളുടെ ഭാവനാത്മകമായ വർണ്ണനയെ, ധർമ്മാർത്ഥകാമമോക്ഷങ്ങളുടെ കർമ്മകാണ്ഡങ്ങളെ പ്രയോഗത്തബദ്ധമാക്കാൻ ഈ കൃതിയെ തലയിലേറ്റുന്നവർ പോലും തയ്യാറാകുന്നില്ല. സായുധ വിപ്ലവ സാരഥിയായി സ്വയമവരോധിതനായവന്റെ ബോധോദയങ്ങളും ഏറ്റുചൊല്ലിപ്പറയുന്ന അത്യാചാരങ്ങളുടെ മനസ്താപകഥകളും സ്വാതന്ത്ര്യം എന്ന മുക്തിമാർഗ്ഗത്തിന്റെ കാവ്യകലാതന്ത്രവും സവർണ്ണ ഭാരമായി ഇപ്പോഴും കവി ചുമക്കുന്നു. അധികാരം, മോചനശാസ്ത്രം ഈ വിരുദ്ധവന്ധങ്ങളുടെ സങ്കീർണ്ണ സാമരസ്യം ഏത് ഇസങ്ങളുടെ തൈതിക ബോധത്തെയാണ് ഇന്നുവരെ അസ്വസ്ഥമാക്കിയിട്ടുള്ളത്? പ്രവാചകന്റെ ദർശനം

“പിച്വ നൽകാൻ, അച്ഛനമ്മ-
മാരെപ്പരിചരിക്കുവാൻ,
മനുസൃദ്ധം തരും ദൈവ-
ശക്തിയെപ്പറ്റിയോർക്കുവാൻ
സഹധർമ്മിണിതനന്തർ-
ദുഃഖം പങ്കിട്ടെടുക്കുവാൻ,
സ്വന്തരതപ്പെടുത്തിക്കള-
ച്ചിരിപ്പിച്ചു രസിക്കുവാൻ” നുള്ള ‘സാമൂഹിക മൂല്യനിതി’ (‘ദൈവശക്തി’ എന്ന പ്രയോഗം തന്നെ) കവി ത്വയിൽ മാത്രമൊടുങ്ങുന്നിടത്താണ് നിതിദേവത അന്ധകാരനിറം കൊണ്ട് കണ്ണുകൾ മൂടിക്കളയുന്നത്. ഇങ്ങനെ ചരിത്രസംഭവങ്ങളുടെ തനിയാവർത്തനങ്ങളിൽ കവി പ്രവാചക ശബ്ദമായി ഒറ്റപ്പെട്ടു പോകുന്നിടത്താണ് ഭാവി പൗരന്റെ അകാല ജീവിതവ്യഥകൾ അറുതിയില്ലാതെ തുടരുന്നത്.

എന്നിട്ടും വീണ്ടുമേതോ ചരിത്ര സന്ധികളെ നിർവ്വചിക്കാനായി വിസ്ഫോടനങ്ങളുടെ ശർശൂഹാ പോലെ മഹാപ്രവചനങ്ങളുടെ മന്ത്രശാലപോലെ ആത്മസാക്ഷാത്കാരങ്ങളുടെ മഹാകാശമൊരുക്കി മലയാളത്തിൽ ഒരു കാവ്യം കാത്തിരിക്കുന്നു. വിശ്വ മാനവ സങ്കരപ്പത്തോളം വളർന്ന് ഒരോ ജീവാത്മാവിലെയും താനെന്ന സത്തയെ അളന്ന് തളർന്നു പോകുന്ന മനുഷ്യതയാണ് ഈ മഹാകവി. ഈ സാത്തികരണം തന്നെയാണ് കവിയുടെ ജയവും പരാജയവും.

മർദ്ദിതർക്കുള്ള നീതിശാസ്ത്രം

സ്വർഗ്ഗം, നരകം, പാതാളം, ഭൂമി ഈ സൂചകങ്ങളുടെ ധന്യാർത്ഥമാണ് സഹൃദയന്റെ ഉൾക്കാഴ്ചകളായി പൊടിക്കേണ്ടത്. ആ അനുഭവ സാക്ഷ്യങ്ങൾ എല്ലാക്കാലത്തും ഓരോ മനുഷ്യനിലും സമാനമാകുന്ന സാധ്യതകളാണ് 'ഇതിഹാസം'ത്തിലുള്ളത്.

“വിഷമുള്ളതിനെക്കൊന്നും

മില്ലാത്തതു വിഴുങ്ങിയും” എന്ന ഇടശ്ശേരിയുടെ വരികൾ ഹൃദയപൂർവ്വമാശംസിക്കാനൊന്നുമില്ലാത്ത മനുഷ്യതാഹ്വനമായ പൂർവ്വകാലത്തിന്റെ മറ്റൊരു രേഖയാണ്.

സമതന്ത്രസുന്ദരലോകം കെട്ടിപ്പടുക്കാനുള്ള പ്രത്യയശാസ്ത്രങ്ങൾ മർദ്ദിതരുടെ രീതിശാസ്ത്രമാക്കി വീളുമ്പോൾ,

“ആദ്യം വിശ്വപ്രേമമാം നൽ-



പ്പാലുതന്നെ കൊടുത്തുഞാൻ
വഴിയെപ്പാലിൽ ഞാൻ ചേർത്തി
തൽപ്പം വിദേഷമാം വിഷം”

ഇവിടെ രണ്ടുവട്ടം ആവർത്തിക്കുന്ന ‘ഞാൻ’ വിഷം കലർത്തിയ മാനവികതയുടെ മരവിച്ച പ്രായോഗിക വാദത്താൽ എനിക്കുനേരെ ചൂണ്ടിയ എന്റെ വിരലവഗണിച്ച് ‘നരവർഗ്ഗനവാതിലികൾക്ക് വിപ്ലവത്തിന്റെ സത്ക്കാരമൊരുക്കുകയാണ്.’

“വേലക്കാരും കൃഷിക്കാരും
തരുന്ന കടുകാപ്പിയും

വറ്റില്ലാക്കഞ്ഞിയും” കൊണ്ടാണ് കുട്ടിനേതാക്കൾ തടിച്ചുകൊഴുക്കുന്നത്. പൊളിഞ്ഞ പത്തായങ്ങളും വിള കയ്യേറ്റലും പൊരിഞ്ഞ പ്രസംഗങ്ങളും നീണ്ട ചരിത്രത്തിൽ മുക്തിയുദ്ധമൊരുക്കുവാൻ അന്യന്റെ കീഴയിൽ കയ്യിട്ടുവരുന്ന ‘പിരിവുകളും’ പതിവാകുന്നു.

കാടാകുന്ന ഒറ്റമരം

ഇങ്ങനെ മനുഷ്യത്വത്തിന്റെ പൊരുൾ ഊറ്റിയെടുത്ത് യഥാർത്ഥ സ്വപ്നം കാണാൻ, ആത്മാർത്ഥമായി കരയുവാൻ, ഹൃദയപൂർവ്വം ചിരിക്കുവാൻ, പ്രാണൻ നൽകി പ്രണയിക്കുവാൻ, ജീവിത ദർശനങ്ങൾക്കായി കല നിർമ്മിക്കുവാൻ, സമൂഹത്തോടുള്ള മൂല്യനിരീതികൾക്കു വഴങ്ങുവാൻ വശമില്ലാത്ത പുതുമലയുടെ സ്രഷ്ടാക്കളും വക്താക്കളുമായി നാമൊരുത്തരും വേഷം മാറി. കൂത്തനെ നിർത്തിയ മൈക്കിനു മുന്നിൽ കെട്ടിയുയർത്തിയ വേദാന്തങ്ങളുടെ ചിട്ടുകൊട്ടാരങ്ങൾ ‘ഇടിഞ്ഞുപൊളിഞ്ഞ ലോക’ മാകുന്നത് സ്ഥിരം കാഴ്ചയായി. ‘ഒരു പുണ്യതീർത്ഥത്തിന്റെ മനോരാജ്യങ്ങൾ സഹജാനുകമ്പയാൽ നിത്യനിർമ്മല പൗർണ്ണിമി സ്വപ്നം കണ്ടും ആന്ധ്യങ്ങളിലെ സൂര്യപ്രതിക്ഷയായും വീണ്ടും മുളയ്ക്കുന്ന പൊടിപ്പുകളാൽ പിന്നെയും കാട്ടുകൾ തീർക്കുന്നു.

ഈ കാടുകയറൽ ഒരു ദർശന പരിധിയല്ല, കവിയുടെ ദർശന പരിമിതിയുമല്ല.

സമാനതകളുടെ മനോവിജ്ഞാനീയം

സ്വർഗ്ഗഖണ്ഡത്തിലെ ബാലതാം,

“അതിപ്രാസങ്ങളനത്തെ-

ദ്രിവാന്തിശകളാകവേ;

ഉറങ്ങും മുൻപുണരണം

കളി തീരാതെ നിർത്തണം” എന്ന ദേവഭാവനയുടെ സുഖം മുറിയ നാളുകളാണ്. ഇത് കേവലമൊരു വ്യക്തിയുടെ ജീവിത സമാനതയല്ല. അവിടെ നിന്ന് ‘അഹംഭാവ പരപ്പിന്റെ യൗവനനാളുകളിലേക്കുള്ള ‘നരക’ വേദനകൾ സ്വയം തിരിച്ചറിയലിന്റേതാണ്.

വെളിച്ചം ദുഃഖമാണെന്നും തമസ്സാണ് സുഖപ്രദമെന്നുമുള്ള ഈ വീണ്ടുവിചാരത്തിൽ നരകതീക്ഷ്ണതയിലൂടെ ഇതിഹാസത്തിലെ നരവർഗ്ഗ പ്രതിനിധി എൻ.വിയുടെ ‘മദിരാശിയിലെ സായാഹ്നവും’ കടന്നു പോകുന്നുണ്ട്.

“തുറന്നു പറയാമെന്നേ

പ്പാലുട്ടിയ ചിരക്ഷമേ

ഞാനെന്നുടപ്പിറന്നോരോ-

ടനുഷ്ഠിച്ചവിയങ്ങളേ” യെന്ന ‘പാതാള’ത്തിന്റെ മുഴക്കം മനുഷ്യത്വക്കെതി തുരക്കലാണ്.

‘ഭൂമി’ യോടടുക്കുമ്പോൾ കേൾക്കുന്ന ശബ്ദങ്ങൾക്ക് ഇവിടെ മാനഹാനിയുടെ പ്രതിച്ഛായയില്ല.

“ആശിപ്തേനിബ്ഭൂമിനന്നാ-

ക്കിടുവാനെങ്കിലാഭ്യമായ്

എന്നിലുള്ള കളങ്കത്തെ-

ക്കഴുകിക്കളയാവു ഞാൻ” എന്ന ആദർശാർത്ഥക ഭൂതകാര്യം വീതയ്ക്കുന്നതു മാത്രം കൊയ്യാൻ പരുവപ്പെട്ട മണ്ണിലാണ് കവി വിതയ്ക്കുന്നത്.

“തോക്കിനും വാളിനും വേണ്ടി-

ചെലവിട്ടോതിരുമ്പുകൾ

ഉരുകിവാർത്തെടുക്കാവു

ബലമുള്ള കലപ്പുകൾ

ബോംബിനായ് ദുർവ്യയം ചെയ്യും-

മാണവോൽബണശക്തിയാൽ

അന്ധഗ്രാമവെലയിൽ

സ്നേഹ ദീപം കൊളുത്തുക” എന്ന ആഹ്വാനവും എഴുതിയ കാലത്തിനിപ്പുറം ഒരു കവിയെ നിർണയിച്ച ദൃഷ്ടിത്വത്താണ് വെളിപ്പെടുത്തുന്നത്.



അന്യായീനപ്പെട്ടുപോയ മണ്ണിന്റെയും മനുഷ്യന്റെയും ജൈവികപദാർഥങ്ങൾക്ക്, വെട്ടിനിരത്തിയാലും വിണ്ടും മുളയ്ക്കാനുള്ള ഉൽക്കടാഗ്രഹങ്ങൾക്ക് അഴിക്കുന്നതോടും മൂറുകുന്ന ഒരു മനോവിജ്ഞാനീയ തലം കൂടിയുണ്ട്. പുരോഗമനത്തിന്റെ ആ പ്രകൃതി ബിംബങ്ങൾ പ്രപഞ്ചം പോലെ വിശാലവും കാലം പോലെ അനാദിയുമാകുന്നിടത്താണ് 'ഇതിഹാസ'ത്തിലെ സത്യം കൂടിയിരിക്കുന്നത്.

കാവ്യകലയുടെ വാങ്മയ ചിത്രം

ജീവിതത്തിന്റെ പച്ചയും ചുവപ്പും നീലയും വെളളയും ചാലിച്ച് ചേർത്തൊരുക്കിയ ചിത്രമെഴുത്താണ് കാവ്യത്തിലെ നാലുഖണ്ഡങ്ങൾ. കവി ചരിത്രത്തിന്റെ ചിത്രമെഴുതുന്നു. അനുഭവങ്ങളുടെ മഷിപ്പടർപ്പുകളിൽ കൂടുതലും സർവ്വലിസ്റ്റിക്ക് നിറമാണുള്ളത്. ഇതിഹാസ കൽപ്പിത (അനുഷ്ടുപ്പ്) വൃത്തത്തിൽ പ്രകരണ വക്രതയുടെ ശൈലീകൃത വിന്യസനത്തിലൂടെ രൂപഭാവങ്ങളെ പ്രതിഷ്ഠിച്ച ഒരു വാങ്മയ ചിത്രം. വിരുദ്ധ ദൃശ്യങ്ങളെ സവിശേഷമായി ഘടിപ്പിക്കുന്ന ചില വിഷയം ഇമേജറികളുടെ ഘോഷയാത്ര. ആധുനിക കാലത്തിന്റെ എടുത്തണിയലുകൾ ഒന്നും കുറഞ്ഞിട്ടില്ല. ആർഷ ഗരിമയുടെ അത്യന്തിക വ്യക്തി സങ്കല്പങ്ങൾക്ക്, വേദത്തിലെ സംവാദസൂക്തത്തിന് ഒരിടവും സംഭവിച്ചിട്ടില്ല. അവിടെ സ്ഥിതി സമത്വവാദത്തിന്റെ പൊള്ളത്തരങ്ങളിൽ നിന്ന് ദളിത് വത്ക്കരിക്കപ്പെട്ടത് വ്യക്തിയോ സമൂഹമോ അല്ല. താൻ തന്നെയാണ് എന്ന പാഠമാണ് 'ഉത്തമപുരുഷനായ' കവിയുടെ 'സാവർണ്യ'ത്തിന്റെ ഭാരം. 'എനിക്ക്' പേരില്ലാതെയാകുമ്പോഴാണ് 'ഞാൻ' നീയും നമ്മളും ഈശ്വരനുമൊക്കെയാകുന്നത് എന്ന തിരിച്ചറിവിലാണ് ഇതിഹാസത്തിലെ സാമ്യവാദത്തിന്റെ പ്രസക്തി.

ഭാവി പൗരന്റെ വൈതരണികൾ

കമ്മ്യൂണിസ്റ്റ് ഭരണ തകർച്ച, ആഗോളമുതലാളിത്തം, വിവരസാങ്കേതിക വിദ്യയുടെ വ്യാപനം, പാരിസ്ഥിക പ്രതിസന്ധി, മതമൗലികവാദം, പ്രാദേശിക വാദം, വംശീയവാദം, വർഗ്ഗീയവാദം, ഭീകരവാദം, യുദ്ധങ്ങൾ, ആയുധനിർമ്മാണങ്ങൾ, ജൈവായുധ-ആണവ പരീക്ഷണങ്ങൾ, പകർച്ചവ്യാധികാലത്തെ നവ സമ്പദ് വ്യവസ്ഥകൾ, സാംസ്കാരിക രാഷ്ട്രീയ പ്രത്യാഘാതങ്ങൾ എന്നിങ്ങനെയുള്ള പ്രതിസന്ധികളിലൂടെ തുടർന്നുവരേണ്ട ജീവിത സമീകരണ പ്രക്രിയയാണ് 21-ാം നൂറ്റാണ്ടിലെ ഭാവിപൗരൻ അഭിമുഖീകരിക്കേണ്ടിവരുന്നത്. എഴുതിവെയ്ക്കപ്പെട്ട നൈതിക നിയമങ്ങൾക്കപ്പുറം മനുഷ്യനൊന്നാകേണ്ടി വരുന്ന ഒരു ആവാസ വ്യവസ്ഥയുടെ ദാർശനിക സംതൂലനം സമീപസ്തമായിരിക്കുന്ന കാലം.

“പുല്ലാണവൻ കാന്താരം

പർവ്വതം പാഴ്മണൽത്തരി

സമുദ്രമിറവെള്ളം, വി-

ണ്ടലമോ കൂടവട്ടവും” എന്ന അധ്യക്ഷതയുടെ തലപ്പാവ് മനുഷ്യൻ അഴിച്ചുകളഞ്ഞെ മതിയാകും...

ഇതിഹാസത്തിന്റെ പ്രസക്തി

നവതിയാഘോഷിച്ച പ്രവാചകന്റെ വാക്കുകൾ ദശാബ്ദങ്ങൾക്കിപ്പുറവും സത്യമാകുന്ന ചരിത്രമുഹൂർത്തം. തോക്കിനും വാളിനും വേണ്ടി ചിലവാക്കിയ ഇരുന്നൂറുക്കി കലപ്പുകൾ തീർക്കേണ്ട കാലം. മനുഷ്യത്വക്കെതിരെന്നു മാതൃകയാകേണ്ട മഹാമാരികളുടെ കാലം ഇരുപതാം നൂറ്റാണ്ടിന്റെ ഇതിഹാസം ഇരുപത്തൊന്നിലും പ്രസ്താവമാകുന്നതിങ്ങനെയൊക്കെയാണ്.



जाकिया जुबैरी की कहानियाँ नारी वजूद पर प्रश्न-चिह्न !

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आज वैश्विक युग में भूमंडलीकरण, औद्योगिकीकरण और सामाजिक विकास के कारण नारी भी अपने अस्तित्व की खोज में पुरुषों से कदम मिलाकर चल रही है। घर - परिवार को संभालती, कार्यक्षेत्र में भी अपने वजूद को निखारती और सवारती आगे बढ़ रही है परन्तु प्रपंचीकरण की होड़ में ,सांस्कृतिक जीवनशैली पर पाश्चात्य संस्कृति की छाया स्पष्ट दिखाई दे रही है। आज विज्ञान इतनी उन्नति में है की लोग चाँद को तो छू लिए परन्तु अपने साथ जी रहे मानव मन को न छू सके। मनुष्य के यांत्रिक जीवन के कारण उसके सामाजिक जीवन में बदलाव आ रहा है। संयुक्त परिवार व्यवस्था मात्र एक संकल्पना बन कर रह गई है। एकल परिवार व्यवस्था में अकेलापन, अजनबीपन, कुंठा ,संत्रास बड़ रहा है, जिसका सीधा प्रभाव सामाजिक जीवन व्यवस्था पर पड़ रहा है।

समाजसुधारकों एवं साहित्यकारों ने नारी स्वतंत्रता पर अपनी कलम चलाई। अबलानारी के सबला रूप को साहित्य द्वारा अभिव्यक्त कर नारी विकास में योग दिया है। "महिलाओं के अध्ययन का प्रमुख विषय यह है की महिलाओं को समाज में सामान्य स्थिति में लाया जाय तथा महिलाओं के साथ किये जाने वाले उत्पीड़ित व्यवहार को भी सामने लाया जाय। इन रचनाओं द्वारा यह बताने का प्रयास किया जाता है की महिलाएँ किसी भी प्रकार से पुरुषों से पीछे नहीं हैं।"

पुरुष अहंकार से नारी हर क्षेत्र में संघर्षरत रही है। नारी के उद्धार में साहित्य का योगदान भी रहा है। नारी के व्यक्तित्व विकास में हिंदी कथा-साहित्य का बड़ा योग रहा है। कहानियों में नारी जीवन की सूक्ष्म - से -सूक्ष्म समस्याओं का यथार्थ प्रस्तुतीकरण है। राजेंद्र यादव ने साहित्य की उपयोगिता को बताते हुए कहा है - "जिंदगी के अनंत सुरू में एक स्वर "अपना" मिलाने को ही तो कला कहते हैं।.... "78

समकालीन साहित्य में मध्यवर्गीय जीवन संघर्ष की छाया स्पष्ट रूप से प्रतिबिम्बित हुई है। आर्थिक और मानसिक कमजोरी नारी को किस हद तक आत्मपीड़क बनाई हुई है। इसी बदलाव की चरमराहट को लेखिका जाकिया जुबैरी ने प्रस्तुत किया है।

35 साल से लन्दन स्थित जाकिया जुबैरी ,लन्दन की बरा ऑफ बर्नट के कोलिडेल वार्ड की निर्वाचित लेबर पार्टी काउंसलर और एशियन कम्युनिटी आर्ट्स की अध्यक्ष है। बनारस हिन्दू विश्वविद्यालय से शिक्षा पूर्णकर साहित्यिक गतिविधियों में क्रियाशील है। भारतीय संस्कृति जाकिया जी के रंग-रंग में है, जिसकी झलक आपकी कहानियों में परिलक्षित है। जाकिया जुबैरी की कहानियाँ यथार्थ के धरातल से जुड़ी कहानियाँ हैं। कहानियों के पात्र हमारे आस-पास उपस्थित हमसे जुड़े से लगते हैं। लेखिका ने नारी जीवन के अनेक अनसुलझे उलझनों की गुत्थियों को सुलझाने का भरसक प्रयास कर, मानव जीवन के सभी पहलुओं को सजीवता और संजीदगी के साथ अपने कहानियों में पेश किया है। जाकिया जुबैरी की "साँकल" कहानी संग्रह नारी जीवन की विभिन्न मानसिक अंतर्द्वंद्व का खाका है। "बाबुल मोरा" कहानी में 18 वर्षीय लिसा के मन के उन तहों को खोला गया है जो अपने अनचाहे, अस्वीकृत जीवन की घुटन से बाहर आना चाहती है। "बाबुल मोरा" एक ऐसी पारिवारिक कहानी है जिसमें बेटी का संघर्ष, उसकी व्यथा, घृणा और मजबूरी को लेखिका ने बखूबी उकेरा है। पाश्चात्य संस्कृति की स्वच्छंद जीवन पद्धति, बच्चों के मानसिक तनाव और कुंठा का कारण कैसे बन रहा है,



जैसी विषयो को लेखिका ने इस कहानी में प्रस्तुत किया है। लिसा अपने बाबुल के अँगने में माँ-बाप के साथ हंसी खुशी रहना चाहती है परन्तु माँ नैसी अपनी 18 साल की बेटी लिसा को अलग से अकेले फ्लैट लेकर रहने को कहती है। बेटी अपने पिता का घर न छोड़ने की धमकी देती है। -

"यह कैसी माँ है?...लिसा सोचती है....यहां...तो बच्चे घर छोड़कर भागने के चक्कर में होते हैं। यह मुझे भागने के चक्कर चला रही हैं..... हमारे डैडी तो हम तीनों बहनों के लिए ही यह घर छोड़कर गए हैं कि हम सुखी रहे।" (23)

माँ अपने पति को तलाक देकर अपने यार फिल को घर ले आती है। फिल एक गैर जिम्मेदार, खुदगर्ज आदमी है। लिसा को दरिद्रता फिल बिल्कुल पसंद नहीं। लिसा की दोनों छोटी बहने फिल को अपने साथ खेलने वाला खिलौना समझकर खेलती, उसके अंदर के वहशीपन से नजरअंदाज है। लेखिका ने लिसा जैसी लड़कियों के द्वारा बालमन की गहराइयों को छूने का प्रयत्न किया है। माँ, हराम का खाने वाले फिल के सभी व्यवहारों को नजरअंदाज करती रहती है जिसे देख लिसा का गुस्सा बढ़ता जाता है, जिसे लेखिका ने इस तरह प्रस्तुत किया है -

"समस्याओं ने तो उसका घर ढूँढ लिया था। घर तो उसी दिन दुखों की सुपर मार्केट बन गया था जिस दिन वह दुम हिलाता कुत्ता फिल इस घर में आया था।" (24)

पाश्चात्य देशों में 18 वर्ष की अवस्था में अलग फ्लैट लेकर स्वतंत्र रहने की व्यवस्था है परन्तु ऐसे कितने ही बच्चे हैं जो हंसी-खुशी से ऐसे फ्लैटों में रहते हैं। माँ-बाप का तलाक, आपसी मन - मुटाव बच्चों के जीवन को नरक तुल्य बनाता है। दरिद्रता फिल के वासना का शिकार जब लिसा बनती है, तब उसकी मानसिक स्थिति को लेखिका ने इस प्रकार प्रस्तुत किया है -

"बेबस लिसा अपने सर को मारने लगी। लिसा का गुस्सा बढ़ता जा रहा था। जैसे-जैसे उसे अहसास हो रहा था। अपना कुछ खो जाने का लुट जाने का, अपने ही घर में आँखों के सामने डाका पड़ जाने का और अपनी मजबूरी का।" (22)

लिसा अपनी छोटी बहनों के लिए चिंतित है की जैसे उसके साथ हुआ वैसा कुछ बहनों के साथ हुआ तो उनका क्या होगा? क्या यह माँ-बाप का कर्तव्य नहीं कि बच्चों का भविष्य संवारे। पारिवारिक विघटन बच्चों के जीवन को कुंठा ग्रस्त कर रही है। "बाबुल मोरा" कहानी में बालमन के अंतर्द्वंद्व को लेखिका ने बखूबी प्रस्तुत किया है। अंततः लिसा अलग फ्लैट में रहने चली जाती है परन्तु अपनी बहनों के लिए चिंतित रहती है। बच्चों के मन में उलझे जटिल अनुभवों के दरमिया को प्रस्तुत किया है।

"मेरे हिस्से की धूप" ऐसी कितनी ही कुंवारी शम्मो की कहानी है जो घर की आर्थिक परिस्थिति के कारण अपना जीवन, अपने परिवार को चलाने एवं संभालने में गुजार देती है। जब जवान शम्मो की शादी की बात आती है तो उसकी शादी भी एक तमाशा बन जाता है। शम्मो जैसी एक साधारण, सीधी और जिम्मेदार लड़कियों के बदरंगी जीवन की उमस और बैचेनी को लेखिका ने प्रस्तुत किया है। ऐसी कुंवारी लड़कियों की खामोशी ऐसे शून्य की ओर ले जाता है जहां सिर्फ ख्वाहिशें ही खेलती हैं और जीतती भी हैं। हकीकत तो हमेशा



हारती ही रहती है। बढ़ती उम्र के साथ-साथ शम्मो हमेशा अपनी शादी के सपने देखती और शर्म से लाल हो जाती -

"काश! उसके घूँघट से भी कोई ऐसे ही ताक-झांक करता। वह शरमाती, लजाती, इकरार के अंदाज में इंकार करती और फिर.... फिर अपने आपको किसी को सौंप देती। किन्तु वह कब आएगा? क्या उसके सपने बिना किसी राजकुमार के आए ही टूट जाएंगे?" (28)

शम्मो को देखने तो कई लोग आए मगर, किसी ने पक्के रंग की शिकायत की तो किसी को शम्मो की नाक चपटी लगी। किसी को शम्मो की बड़ी-बड़ी काली आँखें भी छोटी लगी। हर ग्राहक के जाने के बाद शम्मो अपने आपको घंटों टूटे हुए आईने में देखा करती। शम्मो की बहन रानी पारे की तरह चंचल है। छेड़-छाड़ उसकी आदत थी। हमेशा दुनिया जहाँ में घूमती-फिरती मौज मनाती। जो किसी की न सुनती। शम्मो से एक साल छोटी थी रानी, परन्तु उसके शरीर का रंग, नाक-नकशे शम्मो से अच्छे थे।

शम्मो का रिश्ता बूढ़े अंकल जी से तय कर दिया जाता है। शम्मो से कोई इजाजत नहीं ली जाती है। अपनी चिंता न करते हुए, घर-बार, भाई-बहनों को संभालती शम्मो जब अपने छोटे भाई को भी अपनी दीदी (शम्मो) की शादी में कोई एतराज नहीं रहता तब शम्मो अधिक दुखी होती है। भाई जब कहता है - "तो क्या हुआ अगर अंकल जी की दूसरी पत्नी बन रही है। इसकी तो पूरी इजाजत है हमारे मजहब में। शम्मो हैरान जिस बच्चे को अपने हाथों से खिलाया, नहलाया, धुलाया, समझाया आज वही उसकी किस्मत का फैसला करने बैठ गया क्योंकि वह मजहबी हो गया था।" (36)

हमेशा की तरह शम्मो अपनी जिंदगी के फैसले भी माँ-भाई पर छोड़ देती है परन्तु अपनी छोटी बहन को देखकर सोचती है - "काश मैं भी इसकी तरह दूसरे नंबर पर जन्म लेती तो शायद मैं भी मस्त चंचल और लापरवाह होती।" अंततः शादी के सपने देखने वाली शम्मो के सपने भी सपने ही रह जाते हैं और बूढ़े अंकल जी से बहन रानी निकाह कर लेती है। इस कहानी में लेखिका ने नारी जीवन के समझौते और उद्वेग को प्रस्तुत किया है। आधुनिक जीवन के बदलते परिवेश में चाहे औरत कंधे से कन्धा मिलाकर क्यों न चल रही हो लेकिन आज भी कितनी ही शम्मो अपनों के बीच रहकर भी उसके जीवन का निर्णय वह स्वयं नहीं ले रही और मानसिक क्षोभ को झेल रही है। नारी जीवन सम्बन्धी अनेक समस्याओं को लेखिका ने उजागर किया है। नारी का पारिवारिक संघर्ष, युवतियों का अपने ही सदस्यों द्वारा शोषण जैसे अनकहे अंशों को प्रस्तुत कर नारी को शोषण विहीन करने का सन्देश दिया है।

"ढीठ मुस्कुराहटें" कहानी मन को मसोस कर रख देती है। मानवता के दायरे और हैवानियत की पराकाष्ठा ही है यह कहानी। औरत को मात्र एक वस्तु समझने वाले पुरुषों के कमीनेप अहंकार और वासना लिप्सा की शिकार बनी एक गरीब सुंदर औरत सलोनी की कहानी है। इस कहानी में उधार के पैसे वापस लेने के लिए उसे मानसिक और शारीरिक रूप से तंग किया जाता है। जबरजस्ती शारीरिक शोषण किया जाता है। सरजी-सरजी कहती सलोनी कितनी ही मिन्नते करती पैर पकड़ती, वास्ते देती परन्तु पौरुष का दम्भ लिए पुरुष अपने हवस को पूरा करते हैं। उन दरिंदों के साथ आई पुलिस वालिया सलोनी के दोनों हाथ बांधकर पजामा में चूहों को डालकर कसकर गांठ बांध देती है -



"वहां सलोनी की चीख पुकार सुनने वाला कोई नहीं था। सब एक आवाज यही कह रहे थे... अब निकाल पैसे कहाँ छुपाकर रखे हैं।...वह तड़प रही थी और सब हंस रहे थे...उसकी आवाज आकाश से टकराती धरती पर फैलकर गुम हो जाती। हाथ उसके बंधे हुए थे...औरतो को औरत होने का वास्ता देती पर वहां तो सब दरिंदे थे..... तमाशा देखने आये थे पैसे निकलवाने के नाम पर.....।" (47)

यह कहानी उन लोगों के मुँह में ताला लगती है जो समाज में यह कहते फिरते हैं की औरतें आज स्वतंत्र हैं। उन्मुक्त हैं। अस्मिता की पहचान बनाने निकली हैं। यह कहानी नारी के साथ शारीरिक एवं मानसिक रूप से किये जाने वाले खिलवाड़ और आत्मीयता के आभाव को प्रस्तुत करती है।

यांत्रिक जीवन में कहीं न कहीं आज नयी पीढ़ी और पुरानी पीढ़ी एक दूसरे से दूर होती जा रही है। यह ठीक संकेत नहीं है। वी के अब्दुल जलील के शब्दों में- "आधुनिक नारी अपना जीवन यथार्थ के धरातल पर जीना पसंद कराती है, सौंदर्य के मायाजाल में नहीं। भारत के सामाजिक व्यवस्था में आए परिवर्तन ने नारी के व्यक्तित्व को अवश्य बदल दिया है, किन्तु पारिवारिक दृष्टि से आज भी नारी परिवार का केंद्र बिंदु है।" पारिवारिक रिश्तों में आते बदलाव विशेषकर संतान के व्यवहार से क्षोभित माता-पिता के मानसिक अन्तर्द्वन्द्व को लेखिका ने "सांकल" कहानी में प्रस्तुत किया है। सामाजिक जीवन में पीढ़ी-दर-पीढ़ी सांस्कृतिक जीवन शैली और सोच में परिवर्तन आ रहा है जिसके फलस्वरूप घर में सभी सदस्य अजनबीपन, अकेलापन और उत्पीड़न का शिकार हो रहे हैं। आधुनिक नारी अपना दोहरा दायित्व सफलता पूर्वक निभा रही है। अपने परिवार को संभालती साथ ही उनके पालन - पोषण के लिए नौकरी भी कर रही है। नारी जितनी स्वाभिमानि और आत्मनिर्भर हुई है, वहीं उसे आत्मनिर्भरता का मूल्य चुकाना पड़ रहा है। "सांकल" कहानी में माँ समाज में सम्मानित पद पर है परन्तु घर का वातावरण भिन्न है। माँ जब अपने बेटे को घर में दूसरी लड़की के साथ देखती है और आपत्ति प्रकट करती है तब बेटा माँ पर हाथ उठाता है। माँ के दुःख को लेखिका ने इस प्रकार बताया है -

"वह शर्म से गड़ी जा रही थी की आज यह नौबत आ गई है कि समीर उस नीरा के कारण उस पर हाथ उठा दें.....अपनी पूरी ताकत उस पर निकाल दी। कैसे दरवाजे के ऊपर रखकर दोनों बाजू भींच दिए थे।" (108)

माँ अपने घर में बेटे से डरकर रहती है। रात भर करवटे बदलती रहती है। डरती है की कहीं बेटा मार न दे और दरवाजे की सांकल लगाकर निश्चिन्त होती है और चैन से सोती है। यह कहानी संस्कृति और व्यक्ति के सोच में आ रहे व्यापक फलक को प्रस्तुत करती है। नारी जीवन की अविभाज्य विसंगतियों को अपनी कहानियों द्वारा पाठकों के सामने रखने में लेखिका सफल हुई है।

"मारिया" कहानी भी माँ-बेटी मार्था और मारिया के जिंदगी के घुटन और भटकाव की कहानी है। जिसमें उनके जटिल अनुभवों का सैलाब प्रश्न चिह्न बनाकर पाठकों के सामने लाकर खड़ा कर देती है जो आज के बदले परिवेश का एक कड़वा सच है। जाकिया जी की संवादशैली मन और पैनी दृष्टि देश या विदेश के सामाजिक विसंगतियों में नारी वजूद को हिलाने वाली अन्याय पर आक्रोश को प्रस्तुत करती है। आज भी हम कितनी ही लिसा, शम्मो, मार्था, मारिया और सलोनी जैसी वनिताओं के दर्द को सुनते और देखते आ रहे हैं। जाकिया जुबैरी की कहानियाँ नारी वजूद पर प्रश्न-चिह्न हैं।



बेबाक कहानीकार जकिया जुबैरी के हर पात्र बोलते से नजर आते हैं। परिस्थितियाँ और संघटनाएँ कहानी में जान डाल देती हैं। पाठक कहानियों में निरलुप्त हो जाते हैं। नारी जीवन के अनेक तहों को कुरेदती हुई सच का स्पर्श कराती हैं। लेखिका की रचनाएँ विद्रोही हैं। उनका विद्रोह नारी के प्रति, सामाजिक मानसिकता में परिवर्तन लाना है। स्त्री -पुरुष समानता हेतु है। जकिया जी की रचनायें नारी जीवन - मूल्य, नारी विकास, सामाजिक परिप्रेक्ष्य आदि दृष्टि से अत्यंत रोचक, प्रेरक एवं उपादेय हैं। समसामयिक जीवन की जीवंतता जकिया जुबैरी की कहानियाँ हैं। भारतीय संस्कृति और पाश्चात्य जीवन के विभिन्न पहलुओं को लेखिका ने प्रस्तुत किया है। आज के जीवन शैली के परिप्रेक्ष्य में अत्यंत ही यथार्थ संकलन है, जकिया जुबैरी की "सांकल" कहानी संग्रह।

सन्दर्भ ग्रन्थ -

संकल्य पत्रिका अक्टूबर -दिसंबर 2018 पृष्ठ -59

कहानी :अनुभव और अभिव्यक्ति -राजेंद्र यादव पृष्ठ -78

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