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Contamination status and health risk assessment of heavy metals in *Oreochromis mossambicus* of Budha Sagar pond, Rajnandgaon, Chhattisgarh, India

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Abstract

Heavy metals are known pollutants due to their ability of bioaccumulation in organisms. Sewage may be contaminated by presence of heavy metals in it. Sewage fed fishery is of common occurrence in urban settlements, especially in under developed municipal areas. Effects of heavy metals on fishes are still thoroughly unexplored area in state of Chhattisgarh and Rajnandgaon town in particular. Present study is conducted to throw some light on this issue. Large number of population feeds on fishes so any negative deviation in any health related parameter may cause public health threat. This study was conducted on *Oreochromis mossambicus* fish in year long duration for three season namely winter, Summer and Post monsoon season to know concentration of heavy metals Fe, Cd, Cr, Pd and Hg in fish tissues (Gill, Liver and Muscle).

For determination of quality of water and intensity of heavy metal contamination, indices like OWQI, THQ and MPI are employed. OWQI shows that budha sagar pond is in good and fair condition. THQ is used for determination of contamination due to non-carcinogen. Overall THQ is in the safe limit for all the metals investigated. Mean MPI is recorded highest in gills and lowest in muscles, so we can say gills are mostly and directly affected by heavy metals. All the investigated parameters in present study are within the safe limit but heavy metals like Cd and Hg are reported here so measures should be applied to curb the menace of heavy metals in this urban wetland.

Keywords: heavy metals, overall water quality index, target hazard quotient, metal pollution index

1. Introduction

Over exploitation of natural resources, unsustainable development, Rapid population explosion, as well as increasing urbanization and food demand on the globe combined with the use of contaminated water and food make up a potential food safety hazard. The information of nutritional intake of essential and non-essential heavy metals in India especially Chhattisgarh is inadequate. In Living systems, heavy metals are responsible to affect cellular organelles and mechanism such as cell membrane, mitochondria, lysosome, endoplasmic reticulum, nuclei, and some enzymes concerned in metabolism, detoxification, and damage repair^[1].

Some metals are essential for human health. Metals are naturally occurring elements that become contaminants when their level increases above optimum level^[2]. Heavy metals are classified in two main categories, essential and non-essential. Some of the essential heavy metals are Cu, Co, Zn, Fe and Mn. they required in very trace amount for the appropriate working and vital activities of organs, RBC formation and vitamin synthesis in body but metabolic disturbances are encountered in case of disturbance of optimum level^[2].

Heavy metal pollution is a grave and extensive environmental concern due to their toxicity. Heavy metals enter the environment through different natural channels and human activities. They can bio accumulate in fishes and other living beings. There is a growing concern that metals accumulated in different fish tissues and pose health risk, especially for

populations with high fish dependence^[4, 5, 6].

Heavy metals are considered harmful because of their toxicity, long persistence, bioaccumulation and bio-magnification in the food chain^[8]. The extent of contamination depends on the pollutant type, fish species, sampling location, trophic level, and their mode of feeding^[9]. Monitoring heavy metal contamination in freshwater systems by using fish tissues helps to assess the quality of aquatic ecosystems^[10].

Fishes are used as bio-indicators and may play an important role in monitoring heavy metals pollution^[11].

Heavy metals enter fish through five main routes (food, non-food particles, gills, water, and skin), then flows into the blood, and carried to either a storage point or to the hepatic cells for its transformation or storage^[12].

The liver is the main site of accumulation, biotransformation, and excretion of pollutants in fish^[13].

2. Material and Methods

Study area

This study was carried out in the Budhasagar pond of Rajnandgaon town it is basically sewage fed urban pond. Municipal sewage line is directly connected to this pond. Fish samples were taken in morning hours. *Oreochromis mossambicus* fish of around 100 gm weight was taken for the study. Freshly captured fishes were taken to the laboratory for analysis. Fish samples dissected to separate organs (gills, liver and muscles). The separated organs were put in oven to dry at 110°C until reaching a constant weight. The separated organs



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were placed into digestion flasks and ultrapure Conc. HNO_3 and H_2O_2 (1:1 v/v) was added. The digestion flasks were heated to 130°C until dissolution, diluted with water and analyzed for heavy metal concentration using atomic absorption Spectrometer [14, 15, 16].

Health Risk assessment of Pond Water Overall Water Quality Index (OWQI)

Singh *et al.* (2015) developed OWQI Overall to classify the surface water into five categories, viz. excellent, good, fair, poor and polluted. For this purpose, the concentration ranges have been defined on the basis of the Indian Standards (IS) and Central Pollution Control Board (CPCB) standards, also taking into account other International standards of World Health Organization (WHO) and European Commission (EC). Sixteen parameters are selected based on social and environmental impact and weights are assigned on their relative importance to impact the quality of water. The proposed index improves understanding of water quality issues by integrating complex data and generates a score which describes the status of water quality [17].

$$OWQI = \sum_{i=1}^n w_i \cdot Y_i$$

Where
 w_i = weight of the i th water quality parameter, Y_i = sub-index value of the i th parameter
 Based on the status of water quality, the index value range from 0 to 100 and is classified into five categories: heavily polluted (0-24), poor (25-49), fair (50-74), good (75-94) and excellent (95-100). The status of water corresponding to different OWQI

Health Risk Assessment for Fish Consumption Target Hazard Quotient (THQ)

The target hazardous quotient (THQ) represents a multifaceted parameter which is developed by the US Environmental Protection Agency (EPA 1989). It is used for the assessment of the potential of non-carcinogenic threat associated with exposure to contaminants, such as heavy metals from food for instance fish. As published by USEPA (2010), if the THQ value is < 1.00 that means the exposed population is supposed to be safe; however, when $THQ > 1.00$ there is a potential risk related to the studied metal in the exposed population [18].

$$THQ = EF E_D F_{IR} C / R_{FD} W_{AB} T_A \times 10^{-3}$$

where E_f is exposure frequency (365 days/year), E_D is the exposure duration (65 years), equivalent to the average lifetime, F_{IR} is the food ingestion rate (g/person/day) 4.73 gm/day [19], C is the metal concentration in food (mg/kg); R_{FD} is the oral reference dose (mg/kg/day) obtained from USEPA, W_{AB} is the average body weight (55kg for adults and 20 kg for children), and T_A is the averaging exposure time for non-carcinogens (365 days/year X number of exposure years, assuming 65 years in this study).



Metal Pollution Index (MPI)

Metal Pollution Index (MPI) [20] MPI shows cumulative effect of all the heavy metals investigated.

$$MPI = (C_1 \times C_2 \dots C_n)^{1/n}$$

where C_n = concentration of the metal n in the sample.

3. Results and Discussion

OWQI

Water quality parameters contribute information about health of water bodies. To evaluate this we have taken five water quality parameters Tem, pH, DO, TH and TA. Singh classified water bodies in to the five classes according to contamination status of water. He gave heavily polluted, Poor, Fair, Good and Excellent. After analyzing for that we got score 71.6 for winter season it comes under the fair class, In summer season score was 65.83 and it was also of fair class and post monsoon season score was highest as 84.66 It is in good class. So we can conclude that this water body as far as above water parameters are concerned is fair and Good, Quality of water increases in post monsoon season. (Table 1, 2 and 3).

THQ

Target hazard quotient is observed both for adults and children. In adults its highest value is found 0.16 for Iron in post monsoon Liver sample and lowest value is 0.006 recorded again for same metal in winter muscle sample. In children highest value found is 0.236 for Iron. It is found in sample of Liver in summer season and lowest as 0.006 for mercury in gill sample of post monsoon season. Although few studied metals are not found in some samples but as far as THQ is concerned for present metals we are observing that there is a tendency towards gradual increase. THQ is hazardous when its value is above 1. Its higher values are found for Iron but iron is not considered as carcinogenic element. Its increased level may cause some other abnormalities in fish itself and also on animals feeds on them. (Table 4, 5).

MPI

Metal pollution index shows cumulative effect of all the heavy metal investigated. Highest value of MPI (4.29) is found in sample of Liver in summer season. Lowest value (2.20) is also found in sample of liver of winter season. Mean MPI is found in order of Gill>Liver>Muscle. (Table 6)

Table 1: Parameters for OWQI (Figures in mg/l)

Season	Winter	Summer	Post Monsoon
Temperature	19	27.6	23.6
pH	6.8	7.1	6.9
Dissolved Oxygen	4.6	3.9	6.2
Total Hardness	141	172	124
Total Alkalinity	221	276	179

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Table 2: OWQI and corresponding class and status of water quality

Class	OWQI Value	Status of Water
Heavily Polluted	0 - 24	Unsuitable for all Purpose
Poor	25 - 49	Special Treatment Needed
Fair	50 - 74	Needs Treatment (Filtration & Disinfection)
Good	75 - 94	Acceptable
Excellent	95 - 100	Pristine Quality

Table 3: OWQI result of Budhasagar pond

Season	Score	Status Of Water
Winter	71.6	Fair
Summer	65.83	Fair
Post Monsoon	84.66	Good

Table 4: Target hazard Quotient (THQ) (Adult)

Metal	Gill			Liver			Muscle		
	Summer	Post Monsoon	Winter	Summer	Post Monsoon	Winter	Summer	Post Monsoon	Winter
Mercury (Hg)	BDL	0.021	BDL	BDL	BDL	BDL	BDL	BDL	BDL
Lead (Pb)	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL
Iron (Fe)	0.048	0.038	0.044	0.086	0.16	0.006	0.007	0.016	0.006
Cadmium (Cd)	BDL	BDL	BDL	BDL	0.009	BDL	BDL	BDL	BDL
Chromium (Cr)	0.072	0.075	BDL	0.059	0.065	BDL	0.030	0.075	BDL

Table 5: Target hazard Quotient (THQ) (Children)

Metal	Gill			Liver			Muscle		
	Summer	Post Monsoon	Winter	Summer	Post Monsoon	Winter	Summer	Post Monsoon	Winter
Mercury (Hg)	BDL	0.006	BDL	BDL	BDL	BDL	BDL	BDL	BDL
Lead (Pb)	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL
Iron (Fe)	0.132	0.105	0.121	0.236	0.441	0.017	0.020	0.045	0.018
Cadmium (Cd)	BDL	BDL	BDL	BDL	0.025	BDL	BDL	BDL	BDL
Chromium (Cr)	0.199	0.207	BDL	0.163	0.181	BDL	0.084	0.208	BDL

Table 6: Metal Pollution Index

Tissue	Gill	Liver	Muscle
Season			
Summer	3.97	4.29	2.30
Post Monsoon	2.52	3.16	3.23
Winter	3.24	2.20	2.21
Mean MPI	3.24	3.21	2.58

4. Conclusion

We are living in age of pollution and contamination. We can see ill effects of pollution everywhere from new born babies to old age persons in form of diseases and deformities. Food items are badly effected by pollution, Fishes are major source of food. Fishes lives in constant contact of water and accumulate different contaminant in their life time especially heavy metals.

The present study was carried out to measure contamination of heavy metals in sewage fed pond of urban Budha Sagar pond, This pond is used for fishery purpose, regular fishing activities are carried out in this pond. *Oreochromis mossambicus* commonly known as Tilapia is a major fish procured from this pond.

So present study is the first study to measure the magnitude of heavy metals found in fishes. In this study indexing approach is employed to quantify the effects of heavy metals on consumers, Two indices Target Hazard Quotient (THQ) and Metal pollution Index (MPI) for heavy metal and another

Overall Water Quality Index (OWQI) for surface water quality.

THQ for studied fish is under safe limit (THQ<1.00) both for adults and children. When we see comparative chart of THQ both for adults and children, It is observed that THQ is somewhat higher for children. MPI shows cumulative effect of heavy metals on different organs. In this study gills are the organ which shows highest metal pollution index and muscles are least affected.

OWQI gives status of water quality, it is observed for three seasons and according to it water is fair and Good.

At the end we can say that there is no immediate threat to consumers who depends on fishes procured from this pond. But we observed presence of Fe, Cr, Cd, and Hg except Pb, which was not found in any sample. Surprisingly Cr, Cd, and even Hg showed their presence although they are in very trace amount but in future their amount may increase. So it is responsibility of concerned authorities and local civil society to protect this pond from sewage and other contamination. So we can save this pond for future generation.

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UPTAKE OF HEAVY METALS BY *Oreochromis mossambicus* FROM SEWAGE FED BUDHA SAGAR POND OF RAJNANDGAON, CHHATTISGARH

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ABSTRACT

Heavy metals have a tendency to accumulate in living system. Investigations on the bioaccumulation of heavy metals (Fe, Pb, Cr, Cd and Hg) are observed in Muscles, Gills and Liver of fish "*Oreochromis mossambicus*". The results revealed that heavy metals tend to accumulate in different tissues of fish. The accumulation is observed in tissues such as gills, liver and muscle. All the tissues investigated shows accumulation of Fe and Cr. Only one sample of gills from all tissues investigated shows presence of Hg. Their pattern of accumulation in investigated tissues was Fe > Cr > Hg > Cd. Pb did not found in any sample. Fe shows maximum tendency of accumulation. Fe accumulation is found in order of Liver > Gill > Muscle. Cr is second most abundant metal. It shows maximum tendency to accumulate in muscle than gills and after that in liver. Although Fe is found in higher concentration but except Cr other metals are found in limit prescribed by FSSAI/ FAO/ WHO.

KEYWORDS: Heavy Metals, Bioaccumulation

The pollution of the aquatic environment with heavy metals has become a worldwide concern during recent times because they are persistent and bioaccumulative in nature and have toxic effects on organisms (MacFarlane and Burchett, 2000).

Metals are omnipresent in nature and with increasing industrialization the threat of metal poisoning is increasing rapidly. A metal in trace amount less than 0.01 percent is vital and in the absence of that metal an organism is unable to sustain however the same trace metals may prove to be toxic when the concentration level exceeds the threshold limit required for proper functioning by increase in forty to two hundred times. (Venugopal and Luckey, 1975). Metals are broadly categorized as essential and non essential as far as human health is concerned. Some metals are essential for functioning biological activity of body. Heavy metals enter fish through routes like food particles, gills, water and skin, flows into the blood and are carried to either a storage point in body or to the liver for its transformation or storage.

Amid environmental pollutants, heavy metals are of particular concern, due to their possible noxious effect and ability to bioaccumulate in aquatic ecosystems (Censi *et al.*, 2006). Heavy metals in aquatic organisms, along with bioaccumulation have been extensively studied in diverse places around the globe (Amaranemi 2006; Dural 2007; Teodorovic *et al.* 2000; Yilmaz *et al.* 2007; Hamilton, 2008).

Heavy metals are present in the aquatic environment where they bio accumulate in the food chain. Accumulation occurs in the tissues of aquatic animals and may become toxic for fishes and also for people depending on them when it reaches a certain

high level. An example of an environmental tragedy due to heavy metal occurred in 1952 in the vicinity of the Japanese coast of Minimata. A previously unknown Minimata disease erupted and spread rapidly and became epidemic. It was caused due to mercury compounds (Vandecasteele & Block, 1991). It was well known case where fishermen and natives from vicinity of Minimata Bay and Jintu River died or suffered from mercury and cadmium poisoning, respectively. From this point of time understanding of heavy metals in aquatic living being particularly fishes became important for human health. (Ravera, 1979; Cid *et al.* 2001).

According to Teodorovic *et al.* (2000) and Abdullah (2008) heavy metals studies in aquatic living system give an idea that heavy metals in aquatic living system could be more reliable water quality indicator than chemical analysis of any other indicator. Fishes can be considered as one of the ideal organism in freshwater systems for the estimation of metal pollution level (Rashed, 2001). Fish is significant indicators in freshwater systems for the estimation of heavy metal pollution level because it is an important food source for human and it is organisms of high trophic level in the aquatic food chain (Abdel Baki *et al.*, 2011; Agah *et al.*, 2009; Blasco *et al.*, 1998 and Rashed 2001)

MATERIALS AND METHODS

Fish *Oreochromis mossambicus*, Mean weight 100 gm, were collected from the sewage fed pond. Procured fishes were directly kept in pre-cleaned polythene bags, sealed and stored in an ice box for further examination. The present study was conducted to investigate the accumulation of heavy metals (Fe, Cd, Hg, Cr, and Pb) in various tissues (gills, liver and

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muscle). The separated organs were put in petridishes to dry at 120° C until reaching a constant weight. The separated organs were placed into digestion flasks and ultrapure Conc. HNO₃ and H₂O₂ (1:1 v/v) was added. The digestion flasks were heated to 130° C until dissolution, diluted with water and analyzed for heavy metal concentration using atomic absorption Spectrometer. Heavy metals testing process was conducted at NABL recognized testing lab (Abida Begum *et al.* 2008)

RESULTS AND DISCUSSION

The aquatic environment of the sewage fed pond is subjected to many stressful factors, heavy metals are one of the pollutants that reach the aquatic habitat and also a matter of concern. For this reason, this work is projected to examine the hazardous effects of heavy metal on one of the most common fish species *Oreochromis mossambicus* in the sewage fed pond budha sagar of Rajnangaon (C.G.) In this study level of heavy metals in different tissues of *Oreochromis mossambicus* was examined.

Results of present study indicate that in general Liver was the most affected organ where maximum accumulation of heavy metals takes place followed by Gill & Muscles, amongst the heavy metals Fe accumulated in higher concentration in all tissues. Malik *et al.* (2010) evaluated heavy metal in tissues of *L. rohita* and observed accumulation of heavy metals was in the sequence liver > gills > muscles.

Chatterjee *et al.* (2006) studied *Oreochromis* spp. at East Calcutta Wetlands and observed maximum concentration of heavy metals in Liver and least accumulation in muscles. Giripunje *et al.* (2014) studied heavy metal pollution status in *Oreochromis mossambicus* of Futala, Gandhisagar and Ambazari lakes of Nagpur city and found higher level of Pb, Cd, Fe in muscles of fish.

In this study Fe was the most plentiful heavy metal in all tissues of *Oreochromis mossambicus*, its highest value was observed in liver followed by gill than muscle. (Table 1)

Shrivastava *et al.* (2003) investigated shahpura lake of Bhopal and found higher level of Fe in fish tissues. Different researchers concluded that metal concentrations were always lowest in the muscle and highest in the liver and gill. This may be due to their physiological function in fish metabolism. It has been shown that target tissues of heavy metals are metabolically active ones, like the liver and gill. Therefore, metal accumulation in these tissues occur

higher level compared to other tissues like the muscle, where metabolic activity is relatively low (Heath, 1987; Langston, 1990; Roesijadi and Robinson, 1994; Canli *et al.*, 1998).

Cr was the most abundant metal after Fe. Gill shows higher concentration than Liver and least in muscle but if we see individual season wise higher concentration it was high in muscle in post monsoon season. As far as higher concentration of Cr is concerned it is comparatively higher in relation to FSSAI, food safety and standards regulation given for refined sugar (20 ppb) and gelatin (10 ppb). Sample of post monsoon season of gill shows presence of Hg and sample of post monsoon season of liver shows presence of Cd except this these two metals are not found in any sample. Pb was not found in any sample. Nandi *et al.* (2012) studied accumulation of Cd & Pb in *laheo rohita* and *catla catla* of east Kolkata wetland and found higher level in liver and muscle of both fishes. Arain *et al.* (2008) studied *Oreochromis mossambicus* of polluted Manchar Lake and found higher concentration of Fe, Cr, Pb in muscles of fish. Trace amount of Cd and Hg in two samples indicate that these metals are entering in food chain. Although Cd and Hg are in trace amount and below the permissible limit but in future they may increase in concentration (Table 2& Figure 1-4).

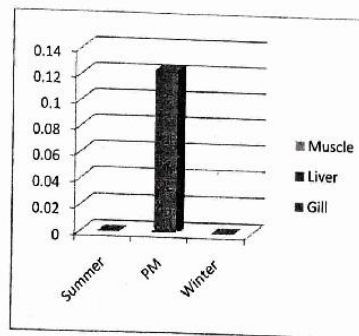


Figure 1: Hg in different Season (Con. In mg/kg)

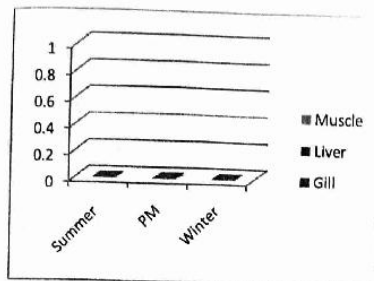


Figure 2: Pb in different Season (Con. In mg/kg)

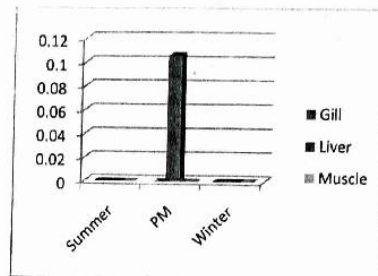


Figure 4: Cd in different Season (Con. In mg/kg)

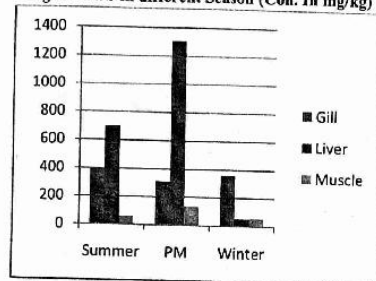


Figure 3: Fe in different Season (Con. In mg/kg)

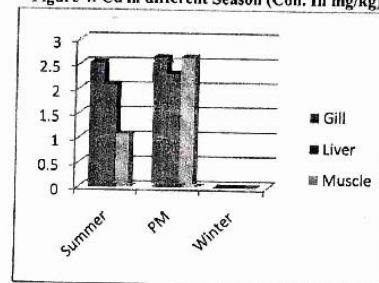


Figure 5: Cr in different Season (Con. In mg/kg)

Table 1: Heavy metal concentration in different Tissues

Metal	Gill			Liver			Muscle		
	Summer	Post Monsoon	Winter	Summer	Post Monsoon	Winter	Summer	Post Monsoon	Winter
Mercury (Hg)	BDL	0.124	BDL	BDL	BDL	BDL	BDL	BDL	BDL
Lead (Pb)	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL
Iron (Fe)	391	312	360	700	1308	51.8	60.6	135	53.8
Cadmium (Cd)	BDL	BDL	BDL	BDL	0.106	BDL	BDL	BDL	BDL
Chromium (Cr)	2.53	2.63	BDL	2.08	2.30	BDL	1.07	2.64	BDL

Values expressed in mg/kg=ppm, d.w, BDL- Below Detection Limit.

Table 2: Mean concentration of heavy metals in different tissues

Metal	FSSAI	Codex FAO/WHO	BIS 10500 for Water Mg/l	EU	Gill	Liver	Muscle
Pb	2.5	0.3	0.01	0.30	0 ± 0	0 ± 0	0 ± 0
Cd	1.5	2 (bivalve)	0.003	0.050	0 ± 0	0.035 ± 0.061	0 ± 0
Hg	1.0	0.5	0.001	0.50	0.0413 ± 0.071	0 ± 0	0 ± 0
Cr	10 ppb (Gelatin)	-	0.05	-	1.72 ± 1.49	1.46 ± 1.26	1.23 ± 1.32
Fe	-	-	0.3	-	3.54E2 ± 3.981	6.86E2 ± 6.28E2	8.33E1 ± 4.48E1

Values expressed as Mean ± SD, d.w., Unit mg/kg=ppm.



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CONCLUSION

This study was carried out to find out presence of heavy metal concentrations in *Oreochromis mossambicus* from sewage fed pond, and its potential health risk for local population due to their consumption. The majority of heavy metal concentrations in the fish samples analyzed were within the permitted limits set by various authorities except Fe and Cr which are found in higher concentration and may pose health risks for the local population due to high consumption of fish.

Budha sagar pond is domestic sewage fed pond it has no connection of industrial or agriculture waste water but surprisingly, amount of non essential heavy metal Hg and Cd is seen in trace amount. Budhasagar is now shrinking in area due to encroachments and land filling. It is also polluted by sewage water so this is need of the hour to make effort to save this historical urban wetland.


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SELECTIVE EXTRACTION AND SPECTROPHOTOMETRIC
DETERMINATION OF VANADIUM (V) AS MIXED LIGAND
COMPLEX WITH
DETERMINATION OF MINOR QUANTITIES OF IRON (III) USING
N - HYDROXY N (4-METHYL) PHENYL N' (4-FLUORO) PHENYL
BENZAMIDINE HYDROCHLORIDE AND THYOCYANATE.

The proposed reagent reacts with Iron (III) in presence of thiocyanate ion to form orange-red complex which is extractable in benzene. The colour reaction is very sensitive. On this basis a rapid extraction-spectrophotometric method has been developed for the determination of micro quantities of Iron (III) in iron samples. The absorbance of the coloured complex is maximum at 470nm. With molar absorbance 13440 50 mole⁻¹ cm⁻¹ in benzene. The extraction is quantitative in the pH range 0.25-.70 M hydrochloric acid. The colour is stable for at least 48 hrs at 25 5c. the system obeys Beer's law in the range 0.8 ppm to 4.0 ppm. Most of the common ions generally associated with Iron in its ores and alloys e.g Co (II), Ni (II), Fe (II), W (VI), So4²⁻, Cl⁻ etc do not interfere with the determination. The method has been successfully applied for the determination of Iron (III) in steel samples, iron ores, and water samples.

Key Words:-

Solvent Extraction, Mixed Ligand Complex, vanadium, Spectrophotometer, Absorbance, Sandell sensitivity.

Introduction:-

Iron is most essential micro nutrient for human beings but when more than 0.3 ppm iron is present in drinking water it is toxic 1-6. Literature reveals a number of methods to determine iron spectrophotometric ally. In the present investigation new method has been developed for extraction spectrophotometric determination of micro amount of Iron (III) in different iron samples.

The well known red iron thiocyanate complex method 7-13 suffers from various experimental limitations such as stability of the colour, reproducibility, nonlinearity of Beer's law, amount of thiocyanate etc. even the modified method lacks selectivity. When Iron (III) is reacted with thiocyanate and N-Hydroxy-N-(4-Methyl) phenyl N' (4-Fluoro) phenyl benzamidine. The formation of thiocyanate mixed complex not only increases the sensitivity but also the selectivity. The proposed method is simple rapid, and free from strict control of analytical variable such as volume of aqueous phase, time of standing, effect of temperature,

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reagent concentration. The method is free from interference of Iron (III), Vanadium (V), Cobalt (II), Nickel (II). The method has been successfully applied for the determination of iron in ores, iron alloys, soil samples and water samples. The results were compared with standard methods.

Apparatus

Systronicspectrophotometer model 166 (digital) was used for absorbance measurement. The results were verified with Carl ZiessZena SPEKOL Spectrophotometer pH values were determined with a systronic pH meter type "321.

Reagents and Chemicals

All the reagents and chemicals used were of analar grade.

A 0.1% (W/V) reagent HMPFBH solution in benzene was used for extraction purpose. A 2% aqueous solution of potassium thiocyanate was employed throughout experiment. Reagent grade benzene was used for preparation of reagent solution and extraction work.

Standard Iron (II) Solution

E. Merck iron wire was dissolved in 30% nitric acid. The oxides of nitrogen were removed by boiling. The solution was standardised gravimetrically¹⁵

Colour Reaction

Iron (III) in hydrochloric acid medium forms a benzene extractable. Orange red ternary complex with HMPFBH and thiocyanate for which the optimum acidity range is 0.25 to 0.70 M. Hydrochloric acid. The mixed complex absorbs strongly at 470nm. having the molar absorptivity to be $13440 \text{ Mole}^{-1} \text{ cm}^{-1}$.

Procedure

An aliquot of Iron (III) solution containing 50 μg of iron (III) was taken in a 125 ml separatory funnel To this 5.0 ml thiocyanate solution was added. The acidity was adjusted between 0.25 M to 0.70 M hydrochloric acid in a final dilution of 25 ml To this added 25 ml of 0.1% benzene solution of HMPFBH. Equilibrated the solution for 2 minute. The orange-red benzene extract was dried over 2.0 g of anhydrous sodium sulphate. The absorbance were measured at different wavelength; to find out wavelength of maximum absorbance against reagent blank.

Results and Discussion

Choice of solvent

Various solvents were tried for extraction of Fe (III)-SCN-HMPFBH ternary complex. Benzene, Toluene, Carbon tetrachloride, chloroform all extracted the orange red complex quantitatively but benzene was found to be most suitable extraction solvent as in this, the ternary complex gets most readily extracted.

Effect of acidity

The acidity of the aqueous phase was adjusted with 2 M hydrochloric acid. Other acids gave low absorbance value. The optimum acidity range was found to be 0.25 M to 0.70 M and above 0.70 M HCl. The effect of acidity on absorbance values are tabulated in table 3.2 and shown in Fig. 3.2 On increasing the acidity of the aqueous phase, rate of extraction was decreased. Therefore 0.40 M HCl was selected for extraction work.

Effect of Reagent

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selective and sensitive method has been proposed for extraction - spectrophotometric determination of Iron (III) in Slag, Soil, water samples etc.

Acknowledgement –

I am thankful to the Principal of Digvijay College Dr. R.N. Singh for providing me the laboratory for my work and also I am very thankful to the head of the Department of Chemistry for their guidance.

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SELECTIVE EXTRACTION AND SPECTROPHOTOMETRIC DETERMINATION OF MOLYBDENUM (V) WITH N-HYDROXY-N (4-METHYL) PHENYL N' (4-FLUORO) BENZAMIDINE HYDROCHLORIDE AND THIOCYANATE

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RECEIVED : 22 February, 2016

N-Hydroxy N-(4 methyl) phenyl N' (4 fluoro) phenyl benzamidine hydrochloride is newly synthesised reagent Mo (VI) is reduced to Mo (V) with ascorbic acid in hydrochloric acid solution and then complexed with thiocyanate. The orange red complex is extracted with benzene solution of N-hydroxy N (4 methyl) phenyl N' (4 fluoro) phenyl benzamidine hydrochloride and thiocyanate. The coloured mixed chelate absorbs at 470 nm, with molar absorptivity $3840/\text{mole}^{-1} \text{cm}^{-1}$. Beer's law is obeyed in the range is 5.0-20ppm of molybdenum. The optimum acidity range is 2.2 to 3.5 M HCl. Most of the common ions including Al (III), Cr (III), Fe (III), Fe (II), Ni (II), Zr (IV), V(V), Ti (IV), Zn (II) etc do interfere. The method has been used for the determination of molybdenum for steel.

KEY WORDS : Solvent Extraction, Mixed Ligand Complex, Spectrophotometer, Absorbance.

INTRODUCTION

Molybdenum is a trace element distributed widely in nature which plays an important role in plants and animal nutrition and in our industrial society. While there are areas in the world where optimum growth of crops is not possible because of the deficiency of molybdenum, there are also many areas where naturally occurring high levels of molybdenum in forage lead to livestock [1] health problems. This needs study of environmental effects of molybdenum.

Many methods have been published for colorimetric determination of Molybdenum. The most important thiocyanate method [2] with is stated to be the most reliable for trace molybdenum analysis [3] or the dithiol method [4] have some drawbacks such as low stability, extraction of coloured complex, interference of ions and low sensitivity.

The N-Hydroxy N-(4 methyl) phenyl N' (4 fluoro) phenyl benzamidine hydrochloride and thiocyanate method is very effective [5]. It is very simple, rapid and highly selective. It is free from, volume ratio of aqueous phase, concentration of reagents, order of addition of reagents, temperature, standing time etc.

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EXPERIMENTAL

1. Chemicals

0.1% solution of HMPFBH in benzene was used for the extraction and spectrophotometric determination of molybdenum. Freshly prepared 10% solution of ascorbic acid and 2% solution of NH_4SCN thiocyanate were employed. Standard solution was prepared. The solution was standardised with β . Hydroxy quinoline [6].

2. Apparatus -

A Carl-Zeise-Zena spectrophotometer spekol was used for colorimetric determination of complex and the pH values were determined with systronic pH type 321.

3. Colour Reaction -

Molybdenum (VI) is reduced to Mo (V) with ascorbic acid in hydrochloric acid medium & complexed with thiocyanate ions. The orange complex formed is then extracted with benzene solution of hydroxyamidine.

Procedure -

The aliquot of solution containing 200 μg of molybdenum was taken in a 125 ml separatory funnel To this 5ml of ascorbic acid solution was added. Then added 2.5 ml ammonium thiocyanate solution. The acidity of solution was adjusted between 2.2 -3.5 M with hydrochloric acid keeping the total volume of aqueous phase to 25 ml. Then add 25ml of benzene solution of the reagent and equilibrated for 5 minutes. The benzene layer was separated dried over anhydrous sodium sulphate and the absorbance was measured at 470 nm.

RESULT AND DISCUSSION

Choice of solvent - Chloroform, CCl_4 , benzene, toluene etc were found to extract the mixed complex quantitatively. Benzene found to be best extracting solvent as in this the sensitivity of the complex is enhanced and complete extraction is relatively rapid.

Effect of acidity - Acidity of the solution was maintained with hydrochloric acid. Optimum acidity range was found to be 2.2 to 3.5 M HCl.

Choice of reducing agent - Stannous chloride, hydroxyl amine hydrochloride, ascorbic acid were tried as reducing agents But ascorbic acid was found to be the best to reduce Molybdenum (VI) to molybdenum (V) stannous chloride and hydroxylamine hydrochloride results low and erratic. Crouthamel, Johnson [7-13] reported this.

Effect of Reagents -

(A) **Effect of HMPFBH** - A 1 : 20 molar ratio of metal to reagents was found to give maximum colour intensity. In practice a 50 fold molar excess of reagent over that of molybdenum was used for colour development.

(B) **Effect of Thiocyanate** - 1 to 275 fold molar ratio of metal to thiocyanate is necessary for complete extraction of molybdenum (V) as mixed complex.

Influence of diverse ions -

To study the effect of various anions and cations on the determination of molybdenum, a fixed amount of molybdenum (8 ppm) was mixed with known quantity of foreign ion under



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study and the acidity of the solution was adjusted to 3.0 M Mo (V) was extracted and determined according to procedure, a reasonable amount of many anions and cations are tolerated.

Comparison with other Methods -

A number of reagent such as thiocyanate in (II) chloride [14-16], chloranilic acid [17], mercapto acetic acid [18-19], dithio oxamide [20], 4-methyl λ -bentanol [21] etc have been reported for extraction spectrophotometric determination of molybdenum.

Sample	Certified Value %	Average Value %	Standard deviation
60B	0.430	0.410	± 0.0061
64A	4.11	4.070	± 0.0071
153 [Tool Steel]	8.38	8.372	± 0.0042
111B	0.255	0.259	± 0.0027

The disadvantages are overcome successfully in the present N-hydroxy-N (4 methyl) phenyl N' (4 fluoro) phenyl benzamide hydrochloride and thiocyanate method.

CONCLUSION

N - Hydroxy N (4 methyl) phenyl N' (4 fluoro) phenyl benzamide hydrochloride is proposed as a newly synthesized reagent for selective extraction and spectrophotometric determination of molybdenum with thiocyanate. The brown red mixed complex of these reagent is extractable into benzene. The extraction is quantitative at 2.2 to 3.5 M Hydrochloric acid. The wave length of maximum absorption, molar absorptivity and Sandell's sensitivity of 1 : 22 (Mo : SCCN : HMPFBH) mixed complexes are 470 nm $3840/\text{mole}^{-1} \text{ cm}^{-1}$ and $0.0285 \mu\text{g}$ of the molybdenum/ cm^2 respectively. The colour system obey's Beer's law in the range 5ppm to 20ppm of the metal and is stable over 24 hrs. The method is suitable for the determination of molybdenum in steel samples, ores and alloys.

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SELECTIVE EXTRACTION AND SPECTROPHOTOMETRIC
DETERMINATION OF VANADIUM (V) AS MIXED LIGAND COMPLEX WITH N-
HYDROXY-N (2-METHYL) PHENYL N' (4-FLUORO) PHENYLENNZAMIDINE
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DOI: 10.5281/zenodo.817980

ABSTRACT

A novel extraction spectrophotometric method has been proposed for the determination of vanadium (v) using N-Hydroxyl-N-(2-Methyl) N'-(4-fluoro) phenyl benza-amidinedihydrochloride and thiocyanate HMPFBH reacts with vanadium in acidic medium to form 1:2 (metal:ligand) blue-violet complex in chloroform. The absorption spectra consist of a flat peak in the range of 550-590 nm with molar absorbance 700 ± 20 mole⁻¹ cm⁻¹ when thiocyanate is added to this solution a marked increase in wave length of maximum absorbance is observed. On this basis a simple rapid and sensitive method has been developed for the determination of microgram quantities of vanadium in alloy steels. The ternary complex V(v) HMPFBH-SCN-absorbs strongly at 590nm with molar absorbance 6114 mole⁻¹cm⁻¹ and sandell sensitivity 8.34×10^{-3}

The system obeys Beer's law in the range 1.6 pH to 3.2 pH. Ions like Cl⁻, SO₄²⁻, F⁻, etc. Fe²⁺, Cu²⁺, CO₂, Ni²⁺ do not interfere in the determination. The method has been applied for the determination of vanadium in steel sample.

KEYWORDS: Solvent Extraction, Mixed ligand Complex, Vanadium, Spectrophotometer, Absorbance, Sandell's sensitivity.

I. INTRODUCTION

The toxic effect of vanadium and its compounds is considered to be similar as that of lead and mercury. These effects are due to industrial exposure to vanadium compounds are followed by different ailments in man such as bronchitis, pneumonia, irritation of mucous membrane, gastro intestinal and nervous disorders¹⁻⁶ Talvite⁷ estimated vanadium in biological sample with 8 hydroxyl quinolone N-benzoylphenyl hydroxylamine and its analogies are ardelyused as reagents for vanadium but Donaldson⁸ claims that low and erratic results are obtained by these methods.

Many monobasic and bidentate chelating agents reacts with vanadium form 1:2 (metal: reagent) complex having a basic V=O group and acidic V=OH group in the same molecule. The basic group reacts with acidic substances to give a hyper and bathochromic effect while the acidic group reacts with basic substances. To give a hyper and Hypsochromic effect coloured mixed and the anion⁹⁻¹⁵

N-hydroxy-N-(2-methyl)phenyl N'(4fluoro) phenyl benzamidine hydrochloride reacts with vanadium to form blue-violet 1:2(metal: ligand) complex in chloroform. These complexes absorbs in the region 550-590 nm having low absence value. In presence of complexing agent like thiocyanate, the wave-length of this coloured species shift to longer wave-length with an increase in absorbance value at λ max. on the basis of strong synergism which is attributed to 1:2:2 (metal: reagent : thiocyanate) mixed complex formation, for solvent extraction and spectrophotometric determination of microgram amounts of Vanadium (v) has been developed. This method is suitable for accurate determination of vanadium in standard steel samples.



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II. EXPERIMENTAL**Apparatus**

A CARL Zeiss Zena spectrometer spekol was used for colorimetric determination of the complex. The pH values were determined with a systronic pH meter type 321.

Standard Vanadium solution

Vanadium (v) stock solution containing approximately 0.05 mg vanadium per ml was prepared by dissolving B.D.H. Analar grade ammonium meta vanadate in doubly distilled water. The vanadium content of this solution was determined volumetrically using potassium permanganate¹⁶ from this stock solutions, a solution containing 20 ug vanadium (v) ml⁻¹ was prepared.

Chloroform

Commercial chloroform was washed five or six times with half its volume of distilled water & dried over fused calcium chloride.

Reagent Solution

A 0.3% solution of HMPFBH in chloroform was employed for extraction work. This was stable for several weeks when kept in amber coloured bottles.

A 2% aqueous solution of ammonium thiocyanate were prepared and used for colour development.

Colour Reaction

The hydroxyamidine synthesised in this investigation react with vanadium (v), in the presence of thiocyanate to form 1:1:2 greenish blue adduct extractable into chloroform over the wide pH range. The colour are stable for over 24 hrs. at room temperature & follow Beer's Law.

Procedure-

Take a solution containing 100 µg of vanadium (v) in 125 ml separatory funnel, add 5 ml of Ammonium thiocyanate solution and bring the total volume of aqueous phase to 15 ml adjusting the pH 1.0 to 3.2 with HCL or ammonia. Introduce 10 ml chloroform solution of the reagent and shake vigorously for 2 min. separate the chloroform layer in a 50 ml beaker. Wash the aqueous phase with 2x4 ml. portion of chloroform and add the washing to the contents of the beaker. Dry the combined extract into a 25 ml standard flask and make up to volume with chloroform. Measure the absorbance at wavelength of maximum absorption (590 nm) against chloroform as a blank

III. RESULT AND DISCUSSION**Choice of solvent for extraction**

Various water immiscible organic solvents were tried to accomplish the extraction of vanadium mixed complexes. Benzene, toluene, CCl₄, chlorobenzene. Chloroform were found suitable where alcohols & esters were unsuitable for extraction work as the mixed chelater were unstable & less sensitive.

Chloroform was found to be most satisfactory because HMPFBH is more soluble in it. The vanadium complex are more readily extractable in this solvent more over this solvent also offers various advantages over other such as its cheapness, easy recovery and handling effect of pH

The pH adjustments were done with 2M found unsuitable for extraction work and colour development optimum pH range is 1.0 to 3.2.

Effect of HMPFBH

The effect of amount of HMPFBH was studied by taking fixed amount of vanadium (v) and constant excess of thiocyanate, keeping other variable constant A 8 fold molar ratio of HMPFBH to vanadium was adequate for complete extraction of mixed complexes with thiocyanate. Addition of excess reagent up to 100 fold molar excess caused no adverse effect on the λ max employed for extraction works.



Name of steel alloy	Table Determination of vanadium in BSC steel.		certified value
	Vanadium found	Average	
241.1 Alloy steel	1.560, 1.550	1.555	1.570
	1.548, 1.552		
	1.568		
64 Alloy steel	1.58, 1.56	1.57	1.570
	1.56, 1.55		
	1.64		
252 low Alloy steel	0.456, 0.468	0.459	0.460
	0.450, 0.454		
	0.468		

Obtained from Bureau of Analysed sample Ltd
Newhan Hall Middlebrough Newyorks.

IV. COMPARISON WITH OTHER METHODS

The reagents and methods employed for spectrophotometric determination of vanadium (v) has been recently reviewed by G. Svohla and G.Tolg¹⁹ Benzohydroxamic and N-Benzoylphenyl hydroxylamine²⁰, 8 hydroxiquinoline etc. have been recommended. It suffers from the interference of iron & other elements such as chromium, manganese. Copper, cobalt, Nickel etc. which are associated with vanadium in its ores & alloys.

V. CONCLUSION

Simple, rapid, sensitive and selective method has been developed for extraction spectrophotometric determination of vanadium (v) with N-hydroxy-N-(2-methyl) phenyl N' (4-fluoro) phenyl benzamide hydrochloride and thiocyanate. The coloured mixed complexes are extractable into chloroform. This method have been applied to determine the vanadium contents of BCS steel samples Mo(vi), W(vi), Nb(V), Ta(v), Zr(IV), Al(III), Cr(III), Ni(II), Co(II), Mn(II) etc. Associated with vanadium in its ores and alloys.

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X ray diffraction (XRD) analysis and evaluation of antioxidant activity of copper oxide nanoparticles synthesized from leaf extract of *Cissus vitifolia*

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ABSTRACT

Nanoparticles have a diameter of up to 100 nm and a higher surface-to-volume ratio, enabling more active surface atoms to contribute to implementations and improve material properties. In nanoparticle preparation, the ability to control particle size, shape, and morphology is important. The most important tool for studying nanomaterials is XRD, it is a vital characterization tool in solid-state chemistry and materials science. For any compound, XRD is a simple method for determining the unit cell's size and shape. This study explains how copper oxide nanoparticles are formed in *Cissus vitifolia* leaves. The antioxidant function and XRD study of the synthesized CuONPs were also investigated. According to the XRD results, the copper oxide nanoparticles formed by reducing Cu²⁺ ions by *Cissus vitifolia* leaf extract are crystalline in nature. CuONPs have an average crystalline size of ~32.32 nm, according to the Debye-Scherrer formula. CuONPs have higher antioxidant activity than plant extract and are closest to ascorbic acid in terms of standard.

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1. Introduction

Nanoparticle biosynthesis offered an appealing alternative to chemical synthesis methods. They predict that dyes will be used to treat contaminated water sources in the future, and they are also a promising candidate for a variety of medical applications Fig. 1.

A bottom-up 'green' route can be used to make silver nanoparticles (AgNPs). They are spherical in shape and range in size from 20 to 30 nm. Several pathogenic bacteria were demonstrated by antibacterial and synergistic activity with conventional antibiotics. Nanoparticles can enhance the antibiotic potential and also treat bacterial infections. The photosynthesis of *U. dioica* extract AgNPs

is found to be cost-effective, straightforward, and environmentally friendly [1].

Green synthesized AgNPs were tested for antimicrobial activity against a variety of microorganisms. This research demonstrated that biomaterials could be used to synthesise silver nanoparticles using green chemistry principles.

A new electrolysis of silver nanoparticles using AgNO₃ for metal precursors, which is economical and environmentally friendly, is mentioned in this review. Ag nanoparticles were detected in microbiology experiments to be effective against *E. coli* and *B. megaterium* bacteria. The actual surface area (SSA) is 24 m² per gramme. The particles measure 24 nm. Bacterial SSA studies show that antimicrobial agent reactions have a major role to play. This method provides for the synthesis without the need of additional agents of nanopowder tunable particle size at room temperature to be safe, non-toxic, environmentally friendly and effective. Two

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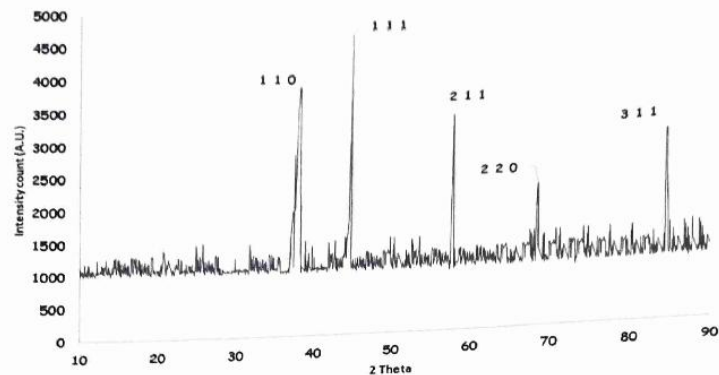


Fig. 1. XRD pattern of copper oxide nanoparticles synthesized by *Cissus vitifolia* leaf.

different methods have been used to investigate SSA of Silver Nanoparticles and the higher SSA has been found to lead to a rise in antibacterial activity of silver nanoparticles. The synthesised silver nanopowder can be used in a number of applications [2].

One of the most common and interesting nanomaterials is silver nanoparticles (AgNPs). More research is required to fully understand the synergistic impact of the two cytotoxic agents simultaneously. It will aid in developing a novel device with multiple components that work together to treat different forms of cancer. Studies are unavoidable to ensure the biosafety of AgNP usage in humans. Nanotechnology-based therapy could outperform current treatments. It should be able to overcome the limitations of the current system [3].

Efforts were made to conduct pharmacognosy studies on *Cissus*. Tannins, protein, and steroid were found in most of the extracts in the three primary forms of plant matter: leaf, root, and stem. Fruits are edible, as well as claimed to be useful as medicinal. In various developed and developing countries, primary healthcare is in great demand due to its numerous medical and biological actions and lower costs [4].

Copper ions (Cu + ions) can be valuable in several therapeutic applications. Biosynthesis copper-plate can be done successfully using plant extract from *C. amotiana*. Gram-negative bacteria exhibited the most antibacterial properties because of their very thin peptidoglycan layer and CuN Ps. We are excited about the results because they lay the groundwork for an entirely new field of study in bacterial and antioxidant activity nanotechnology. In this manner, CUPS is a treatment for ulcers.

Silver nanoparticles were created by chemically reducing silver nitrate solution with ethanol. Nanoparticle synthesis is critical to the advancement of contemporary science. According to this research, the particles are mainly spherical in shape and have sizes of less than 18 nm. In the UV-Vis absorption spectra, the surface plasmon resonance peak exhibits maximal absorption at 422 nm. The presence of the SPR peak is the primary indicator of the formation of metal nanoparticles.

Conventional methods of decontamination are not appropriate for treating spices. The thermolability of many essential oil components means that heat cannot be used. The decontamination of high volumes due to its short penetration is not successful by UV radiation. The best method for microbial decontamination of the spices and plants without altering the condiment consistency

seemed to be β -irradiation. Commercial irradiation in over 40 countries has already been used in the US, France, Holland, Belgium and China with prescribed doses [5].

Nanoparticles of copper (II) oxide (or copper oxide nanoparticles) have gained notoriety for their chemical and physical properties. Useful for gene therapy are the relatively rapid growth, transparency, and small zebrafish embryos' small size. It's been suggested that the zebra fish is an in-vitro experimental model for new drug discoveries. The speed of their proliferating tissues allows for the assessment of new medications. The resulting information depends on the size and number of NP. Antioxidants, anti-cancer, anti-inflammatory, and antimicrobial activities, as well as antiviral activity Silver, was found to be an antimicrobial against several pathogenic microbes in combination with other ingredients in it. Featured in nanotubes can enhance the active surface and initial optical, chemical, and electrochemical properties. A new composite of copper and bismuthide is reported to have higher catalytic activity than monometallic copper for copper bismuthide applications [6].

The Ti plant is found in many agricultural and ornamental farms. Anticancerous claims are made about this plant. Green syntheses of nanoparticles have gained attention in the last decade as a way to create nontoxic compounds over the last decade. In the present investigation, researchers synthesized copper nanoparticles using water extracts of one plant, *Cucumaria frondosa*, which is also known as sea cucumber. It was determined by the Free Radical Catalyzing Determination Test that the antioxidant properties of the nanoparticles [7].

Survey of the *Cissus vitifolia* plant leaves focussing on the phytochemical components, antimicrobial activity and trace metal levels. Leaves from the district of Tiruchirappalli, Southern India, have been collected. A new pharmaceutical drug could be isolated and identified as a bioactive compound accountable for these antimicrobial activities. Antimicrobial sensitivity to *C. Vitifolia* has been tested for bacterial and fungal strains. The methanol extracts from the leaves of the plants had a higher inhibition zone than the fungal strain. This study showed that the leaves contain all the phyllosmetics components. In the coming years, the plant could be a fungal antibiotic alternative [8].

Tissue extracts of *Cissus affinis*, flavonoids, polyphenols, steroids, saponins, glycosides, terpenoids, and triterpenes were found in leaves of the *Cissus* plant. Inorganic elements found in *Cissus*



found the presence of calcium, sodium, potassium, sulphate, bicarbonate, boronate, and phosphates, but did not mention any of Chloride or This type of treatment can be applied to diseases that have not been linked to vitamin deficiency, such as hypertension, diabetes, and cancer for human health. Phytochemicals are biologically active chemicals, present in all plant matter, which assist the human body in healing and general well-being. They keep plant life going and protect their colour, scent, and taste. The conclusion of the study stated that *Cissus viticella* had positive phytochemical and mineral content. Useful human disease-related diseases such as cardiovascular disease, diabetes, hypertension, and cancer can be supplemented with this. Our investigation has determined that *CISSus Vitis* extract can be a rich source of phytochemicals [9].

Nano-copper was discovered commercially to be produced in the fruit fungus *Cephalotyceria*. Synthesised nano-copper was examined for urinary tract infections. We observed that the particles effectively killed pathogenic bacteria but didn't significantly hamper the urinary tract activity. They had a significant antimicrobial and antioxidative effect against pathogenic strains of urinary tract infection (UTI). As shown by these experiments, green-related copper may well be a promising option for treating infected urinary tract bacteria [10].

Cissus is a genus of a couple of dozen different plant species, widely distributed across the world, that have been used in traditional medicine in various parts of the world for a variety of ailments. Further investigation is required to assess the concentration and determine the precise mechanisms involved. These plants could be useful in treating diabetes and osteoporosis and a source for drug discovery and research [11].

Four-fifty percent of allopathic medicines are derived from chemical ingredients. Many species of the genus *Cissus* have been used traditionally to treat a variety of ailments in various regions throughout the world. Additional studies are needed to examine and quantify their role. The lack of knowledge of the long-term impacts of this study is going to have on the ecosystem has brought my work to a screeching halt [12].

The operational parameters that are critical to the synthesis of silver nanoparticles were discussed in this chapter. The synthesis is influenced by the concentration, volume ratio, contact time, temperature, and pH. It can be concluded that relevant nanoparticle research is based on both operating conditions and excellent characterization. The surface plasmon resonance absorption band can be determined with UV-Vis spectroscopy. The functional types are determined by FTIR and the morphology is determined by the SEM and TEM.

Traditionally, wet chemicals were used to make silver nanoparticles and often dangerous and inflammable chemicals are in use [13].

2. Materials and methods

2.1. Synthesis of copper oxide nanoparticle (CuONPs)

"2.8 g copper acetate monohydrate was dissolved in 500 ml deionized water and magnetically stirred at room temperature for 5 min in a standard reaction mixture. Following that, an aqueous extract of *Cissus vitiginea* leaves was added dropwise when stirring; as soon as the leaves extract comes into contact with copper ions, the blue colour of copper ions changes to green. The resulting green mixture was held at room temperature while being stirred. Ghidan et al., (2016) [6] observed that after 10 min, the blue mixture began to transition to a green suspended mixture, suggesting the development of water-soluble monodispersed copper oxide nanoparticles.

2.2. Leaves extract preparation

"Thanjavur has been used to collect good *Cissus vitiginea's* fresh leaves. The leaves were washed several times with water to remove dust particles before being dried in the shade for two weeks to remove any residual moisture. The leaves of *Cissus vitilinea* were collected aqueously in a 500 ml glass beaker with 10 g of dried fine powder in 400 ml of sterile distilled water. The solution was boiled for 10 min or until the colour of the watery, brown-yellow solution changed. The blend was then allowed to cool down to room temperature before filtering it with Whatman No. 1 filter paper and centrifuged to extract biomaterials for about 5 min at 1200 rpm. The extract was kept at room temperature to be used in future research."

2.3. Characterization of nanoparticles

2.3.1. X-ray diffraction method and electron microscopy

Using Cu K α radiation, the phase evolution of calcined powder and sintered samples was analyzed using an XRD technique. The voltage and current of the generator were set to 40KV and 30 mA, respectively. In continuous scan mode, the Cu sample was scanned in the 2 θ ranges 15 to 700 °C. The scan speed was 0.03 s per second. The diffracted intensities were noted from 35 to 90° 2 θ angles The TEM study was done by CM30-Philips at functioning voltage of 80 kV. The energy dispersive x-ray spectroscopy (EDS), attached to the SEM, conducted a compositional analysis of the sample.

2.4. DPPH radical-scavenging activity

Shimada approach is used to assess DPPH radical-scavenging operation. At various concentrations (20, 40, 60, and 80 g/ml), a two ml aliquot of DPPH methanol solution (25 g/ml) was applied to a five ml sample solution. The mixture was vigorously shaken before being left at room temperature for 30 min in the dark. The absorbance was then measured in a spectrophotometer at 517 nm. The reaction mixture's lower absorbance demonstrated higher free-radical scavenging activity.

3. Results and discussion

3.1. Synthesis of copper oxide nanoparticles

The photosynthesis of CuO nanoparticles was investigated using an aqueous leaf extract of *Cissus vitiginea*. During the visual test, copper acetate that had been incubated with leaf extract changed colour from blue to green, while copper acetate that had not been incubated with leaf extract did not change colour. The presence of green colour in leaf extract treated flasks is a clear indication of CuO nanoparticles' formation, as stated by Gnanasundaram and Velavan's previous research (2020). According to Gnanasundaram and Balakrishna (2018), the efficiency of *Cissus vitiginea* leaf extract in the faster synthesis of CuO nanoparticles with a variety of fascinating morphologies is due to the presence of various classes of phytochemicals such as polyphenols, anthraquinones, terpenoids, phenolics, reducing sugars, anthrones in the leaf extract and, flavonoids.

3.2. XRD pattern of CuONPs synthesized from *Cissus vitiginea* leaf

Powder XRD is one of the most popular methods used by mineralogists and solid-state chemists to investigate unknown materials' physicochemical composition. For any compound, XRD is a simple method for determining the unit cell's size and shape.



Powder diffraction methods help qualitative, quantitative, and other types of analysis. Peak Locations reveal translational symmetry, specifically the size and shape of the unit cell. On the other hand, Peak Intensities provide details on electron density within the unit cell, i.e. where the atoms are located [10]. Theivasanthi and Alagar, Theivasanthi and Alagar, Theivasanthi and Alagar,

Several Bragg reflections with 2θ values of 38.02, 44.56, 57.68, 68.51 and 84.540 indicate the (110), (111), (211), (220), and (311) reflections of metallic copper specify the cubic crystalline face-centred cubic structure of copper. Here, the constant is 40.8 (136.9–96.1 = 40.8). Biosphere crystallisation on the nanoparticle surface could activate the unassigned peaks. Macromolecules were most likely responsible for copper ion lowering and exacerbated the plant extract's peak enlargement and noise. The XRD pattern has therefore shown that the nanoparticle produced in this synthesis is crystalline in copper oxide. There are other unallocated peaks and Bragg peaks that show copper nanocrystals, which indicate that the bio-organic process crystallises on copper nanoparticles' surfaces. The expansion of the pits is primarily due to the small size of the particle. Table 1 and Table 2 contain indexed data.

3.3. Particle size calculation

In this research, the average particle size was determined in light of the peak at degrees by using Debye-Scherrer formula Sun et al., (2002) [11], Nath et al., (2007) [12], Nath et al., (2008) [13], Branauer et al., (1938) [14].

$$D = 0.9 \lambda / \beta \cos \theta$$

Where,

D = particle diameter size.

θ = diffraction angle

β = Full width at half maximum,

λ = wave length of X-Ray (0.1541 nm),

The average calculated crystalline size by Debye-Scherrer eq has been 32.32 nm.

The biosynthesized CuONPs of the leaf extract was tested on an X-ray diffraction pattern. Indexing is the process by which cell dimensions from top positions are determined. This is the first step in the analysis of diffraction patterns. The Miller Indices (hkl) should be assigned to each Cullity peak (1978) to index a pattern of polvo diffraction [15]. A Copper Nanopowder Sample XRD analysis of the Goniometer was performed. For the 2-fold range, data were collected from 10 to 90° with the step of 0.03°. The powder diffraction pattern indexing was performed, with the first phase assigned to Miller indices (hkl) for each top. Two different methods have been used to index, and Table 1 and Table 2 are used for the data. The same result is achieved with these two methods. A dividing constant must be found in Table 1. The 3rd column values become whole (approximately). Here, the constant is 40.8 (136.9–96.1 = 4

Table 1
Copper oxide nanoparticles synthesised by *Cissus vitiginea* leaf XRD pattern simple Peak indexing process.

1000 x Sin 2 θ	Peak Position	1000 x Sin 2 θ /40.8	Reflection	Remarks
96.1	38.02	2.3553	2	110
136.9	44.56	3.3553	3	111
230.4	57.68	5.647	6	211
313.6	68.51	7.862	8	220
448.9	84.54	11.004	11	311

Table 2
The grain size of copper oxide nanoparticle.

2 θ of intense peak (deg)	Miller indices (hkl)	θ of the intense peak (deg)	FWHM of intense peak (β)	Size of the particle (D) nm
38.02	110	19.01	0.3314	24.5773
44.56	111	22.28	0.3888	21.9349
57.68	211	28.84	0.5033	18.8878
68.51	220	34.255	0.5978	14.2526
84.51	311	42.27	0.7377	81.968
Average size of particles				32.3241

0.8). Moreover, the high intense peak for FCC materials is generally (111) reflection, which is observed in the sample.

X-Ray Diffraction pattern confirmed the successful synthesis of copper nanoparticles with a shell of copper oxide; wherein the main diffraction peaks characterize the elemental copper were detected at $2\theta = 38.08, 44.56, 57.68$ and 68.51 which correspond to the (110), (111), (211) and (220) crystal faces of copper and compared with the standard powder diffraction card of JCPDS, copper file No. 01-078-2076 Berra et al., (2018) [16]. It is also noteworthy that there are other peaks at $2\theta = 38.02$ and 68.51 that are characteristic for Cu₂O and both peaks were attributed to the presence of a Cu₂O shell covering the copper core Johan et al., (2011) [17], Zhu et al., (2012) [18]. Whereas the peaks at 2θ value of 29.85°, 36.44°, 42.29°, and 61.41° correspond to the planes (110), (111), (200), and (220) of cubic crystal structures of Cu₂O much well with the standard as JCPDS Card No. 01-078-2076.

Fig. 2 exhibits TEM images of the synthesized copper oxides nanoparticles. It is clearly shown that in general the particles are roughly spherical and irregular shaped, which are free from agglomeration. The majority of the CuO and Cu₂O nanoparticles in the mixture are spherical in nature; additionally, the particles are agglomerated to form foam like many particles. For Cu₂O nanoparticles is observed that there is more than one shape (spherical nanoparticles) as depicted in TEM image. The nanoparticles become greater in dimension having the form of foam like bunch.

3.4. In vitro antioxidant activity of *Cissus vitiginea* leaves and copper oxide nanoparticles

The DPPH radical is stable since a spare electron is delocalized over the molecule, preventing dimer formation. The DPPH radical scavenging power assay is used to assess antioxidants' capacity to quench the DPPH radical. When DPPH is decreased to its non-radical form by antioxidants, the dark purple colour is lost. DPPH is stable organic nitrogen centred free radical with a dark purple colour that becomes colourless when reduced to its nonradical form. The model system of DPPH radicals is commonly used to investigate the scavenging behaviours of various natural compounds. The colour of the reaction mixture changes from purple to yellow as the DPPH radical is scavenged, with decreasing absorbance at 517 nm. (2009) [19].

DPPH radical scavenging activity of *Cissus vitiginea* leaves extract, CuONPs and standard as ascorbic acid are presented in Table 3 and Fig. 3. The half inhibition concentration (IC₅₀) of *Cissus vitiginea* leaves extract, CuONPs and ascorbic acid were 50.51, 45.29 and 41.33 $\mu\text{g/ml}$ respectively. The CuONPs exhibited a significant dose dependent inhibition of DPPH activity (Table 3) as compared to *Cissus vitiginea* leaves extract. The potential of L-ascorbic acid to scavenge DPPH radical is directly proportional to the concentrations. CuONPs has potential antioxidant activity than *Cissus vitiginea* extract and near to standard. Antioxidant activity CuONPs



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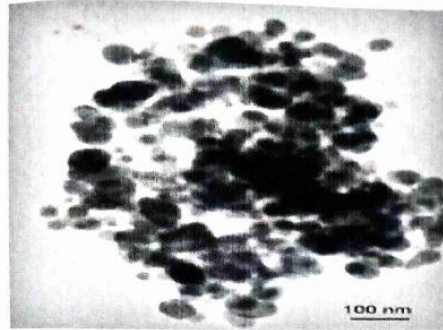


Fig. 2. TEM analysis of copper oxide nanoparticles synthesized by *Cissus vitiginea* leaf.

Table 3
DPPH radical scavenging activity of *Cissus vitiginea* leaves extract, CuONPs and Ascorbic acid at different concentrations.

Concentrations (µg/ml)	% of inhibitions		
	<i>Cissus vitiginea</i>	CuONPs	Std. (Ascorbic acid)
20	20.26 ± 1.41	24.22 ± 1.69	25.99 ± 1.81
40	31.71 ± 2.21	40.96 ± 2.86	48.01 ± 3.36
60	63.43 ± 4.44	68.28 ± 4.77	73.56 ± 5.14
80	82.37 ± 5.76	86.78 ± 6.07	90.31 ± 6.32
IC ₅₀ (µg/ml)	50.51	45.29	41.33

Values are expressed as Mean ± SD for triplicates.

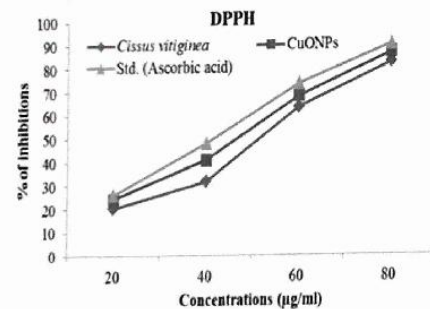


Fig. 3. DPPH scavenging activity of *Cissus vitiginea* leaves extract, CuONPs and Ascorbic acid at different concentrations.

is better than plant extract and nearest to standard as ascorbic acid.

4. Conclusion

The green synthesis is eco-friendly, thus cheap and CuONPs can be produced. The leaf extract from *Cissus vitiginea* is used as a reduction and stabilising agent. CuONPs confirmed green-synthesized copper oxide nanoparticles' surface plasmon resonance. The results of X-ray diffraction show that *Cissus-vitiginea* leaf extract copper oxide nanoparticles formed by reducing Cu₂ + are

crystalline in nature. According to the Debye-Scherrer formula, CuONPs average crystalline sizes are ~32.32 nm. In this analysis, X-ray diffraction confirmed the crystalline nature of CuONPs. Cu₂O nanoparticles are shown to have more than one form, as shown in TEM picture (spherical nanoparticles). CuONPs antioxidant activity confirmed in the present study.

CRediT authorship contribution statement

Minakshi A. Thakar: Investigation, Writing - original draft. **Subhesh Saurabh Jha:** Conceptualization, Writing - review & editing, Supervision. **Khongdet Phasinam:** Formal analysis, Data curation. **Ravi Manne:** Conceptualization. **Yaser Qureshi:** Writing - review & editing. **V.V. Hari Babu:** Conceptualization.

Declaration of Competing Interest

The authors declare that they have no known competing financial interests or personal relationships that could have appeared to influence the work reported in this paper.

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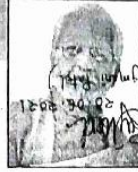
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चिड़िया की चहक, शोर में गायब होते-होते।

□ □ □

गुरुनानक देव के प्राकट्योत्सव के पावन पर्व वैसाखी प्रसंग को लेकर उपर्युक्त
प्रार्थना के साथ ही, कव्हर पृष्ठ 43 पर प्रस्तुत सभी कवितारें तथा विशेष खण्ड की 40
पृष्ठीय सामग्री, इस बार की सम्पादकीय में सम्मिलित की जा रही है।

इसका उद्देश्य भी यही है, कि 'गुरु ग्रंथ साहब' जिसमें 15 गुरु वाणियाँ
सम्मिलित की गई हैं, वे सभी काव्य में हैं। वे भी सबद हैं। ...और ये कवितारें भी एक
तरह से सबद की उपासना ही हैं। कोई भी कवि शब्द का ही उपासक होता है। समय के
ताप में तपी-पकी इन कविताओं के भिन्न विषय होकर भी इस बात की ओर संकेत करते
हैं कि ईश्वर एक है। गुरुनानक देव ने भी इस बात को अपने उपदेशों में व्यक्त किया
है। उन्होंने कहा है कि 'भगवान एक है, लेकिन उसके कई रूप हैं। वो सभी का
निर्माण भी करता है और वो खुद मनुष्य का रूप लेता है। उस एक ब्रह्म की
चमक से ही, सबकुछ प्रकाशमान हैं। उसकी हजारों आँखें हैं। उसके हजारों
रूप हैं, फिर भी कोई एकरूप नहीं है। वह निराकार है। एक आँकार है। इसलिए
उसे तर्क के द्वारा नहीं समझ सकता, भले ही वो युगों तक तर्क करता रहे।
इसलिए प्रभु का सुमिरन करना चाहिए। उसे के भक्तों की संतों की, सेवा
करनी चाहिए और उसके सेवकों के सेवक बन जाना चाहिए।' गुरुनानक देवजी
ने यह भी कहा कि 'ईश्वर न एक बच्चा है, न एक नवयुवक है। वह पौराणिक
भी नहीं है और न ही उसकी कोई जाति, धर्म या सम्प्रदाय है।' उनके विचार में
'जब वह जन्मा ही नहीं, तो उसकी मृत्यु नहीं हो सकती है। दुनिया में किसी भी व्यक्ति
को इस भ्रम में नहीं रचना चाहिए कि बिना गुरु के कोई भी उसे नहीं जान सकता है। उसे
सभी जान सकते हैं। वह अपने अंदर ही बसता है। मृत्यु भी बुरी नहीं है, यदि हम जानते
हैं कि मृत्यु के लिए कौन सी तैयारियों की जानी चाहिए और मर कैसे जाता है।
सांसारिक सम्पत्ति, धन-समृद्धि से युक्त बड़े-बड़े राज्यों के राजा-महाराजाओं
की तुलना में छोटी सी चींटी बड़ी हैं, जो ईश्वरवीय प्रेम से परिपूर्ण है। इसलिए
प्रेम सर्वोपरि है। कबीर ने भी कहा है कि बाईं आखर पड़े सी पंडित होई। प्रेम
पूर्वक किया गया व्यवहार और आचरण ही सबसे बड़ी पूजा है।

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शोध-पत्र भेजने संबंधी नियम

- (1) शोध-पत्र 1500-1700 शब्दों से अधिक नहीं होना चाहिए।
- (2) हिन्दी एवं मराठी माध्यम के शोधपत्रों को कृतिदेव 10 (Kriti Dev 010) में टाईप करवाकर 'पेजमेकर 6.5' में भेजें।
- (3) पंजाबी माध्यम के शोधपत्रों को अनमोल लिपि (AnmolLipi) या अमृत बोली (Amritboli) या जॉय (Joy) में टाईप करवाकर 'पेजमेकर 6.5' में भेजें।
- (4) अंग्रेजी माध्यम के शोधपत्र टाइम्स न्यू रोमन (Times New Roman), एरियल फॉन्ट (Arial) में टाईप करवाकर 'पेजमेकर 6.5' या 'माइक्रोसॉफ्ट वर्ड' में भेजे जा सकते हैं।
- (4) शोधपत्र की विधि - (1) शीर्षक (2) एबस्ट्रैक्ट (3) की-वर्ड्स (5) प्रस्तावना/प्रवेश (5) उद्देश्य (6) शोध परिकल्पना (7) शोध प्रविधि एवं क्षेत्र (8) सांख्यिकीय तकनीक (9) विवेचन या विश्लेषण (10) सुझाव (11) निष्कर्ष एवं (12) संदर्भ ग्रंथ सूची।
- (6) संदर्भ ग्रंथ सूची इस प्रकार दें -

For Books :

- (1) Name of Writer, "Name of Book", Publication, Place of Publication, Year of Publication, Page Number/numbers.

For Journals :

- (2) Name of Writer, "Title of Article", Name of Journal, Volume, Issue, Page Numbers.

Web references :

- <http://utc.iath.virginia.edu/interpret/exhibits/hill/hill.html>
- (7) गुजराती माध्यम के शोधपत्र हरेकृष्णा (Harekrishna), टेराफॉन्ट वरुण (Terafont Varun), टेराफॉन्ट आकाश (Terafont Aakash) में टाईप करवाकर 'पेजमेकर 6.5' में भेजे जा सकते हैं।
 - (8) शोधपत्र की साफ्टकोपी रिसर्च लिंक के ई-मेल आईडी researchlink@yahoo.co.in पर भेजने के बाद हार्डकोपी, शोधपत्र के मौलिक होने के घोषणा पत्र के साथ हस्ताक्षर कर 'रिसर्च लिंक' के कार्यालय को प्रेषित करें।

'रिसर्च लिंक' की सदस्यता का शुल्क भुगतान राष्ट्रीयकृत बैंकों द्वारा रोधे ट्रांसफर या जमा किया जा सकता है। बैंक का विवरण निम्नानुसार है-
बैंक : स्टेट बैंक ऑफ इण्डिया ब्रांच : ऑलक प्रलासिया, इन्दौर,
कोड - SBIN 000 3437
खाते का नाम : रिसर्च लिंक,
खाता नंबर - 63025612815
भुगतान की भुल रसीद, शोध-पत्र एवं सोधों के साथ कार्यालयों पर भेजना अनिवार्य है।





ओशो अनुयायियों के गृहस्थ जीवन का समाजशास्त्रीय विश्लेषण (राजनांदगांव (छत्तीसगढ़) नगर के विशेष संदर्भ में)

प्रस्तुत शोधपत्र में ओशो अनुयायियों के गृहस्थ जीवन का समाजशास्त्रीय विश्लेषण छत्तीसगढ़ के राजनांदगांव नगर के विशेष संदर्भ में किया गया है। वर्तमान समय में अनेक व्यक्तियों का वैवाहिक जीवन तनाव, मतभेद, हिंसा, वैमनस्य आदि विकारों से जूझ रहा है। विवाह-विच्छेद आज आम घटना बन चुकी है। 20वीं सदी के विश्वविख्यात आध्यात्मिक गुरु ओशो ने गृहस्थ जीवन को आनंदित एवं शांतिमय बनाने हेतु कई महत्वपूर्ण सुझाव दिए हैं। शोध अध्ययन हेतु ओशो ध्यान केन्द्र, राजनांदगांव से सम्बंधित 40 ओशो प्रेमियों में से 20 का चुनाव देव-निदर्शन द्वारा लॉटरी प्रणाली से किया गया है। साक्षात्कार अनुसूची के माध्यम से तथ्यों का संकलन किया गया है। प्राप्त तथ्यों के विश्लेषण द्वारा यह परिणाम सामने आए कि ओशो प्रेमियों का गृहस्थ जीवन आनंदित एवं शांतिमय है तथा ओशो देशना एवं ध्यान विधियों से ओशो प्रेमियों को अपना गृहस्थ जीवन मंगलमय बनाने में बहुत सहायता प्राप्त हुई है।

स्नेह कुमार मेश्राम* एवं डॉ. अमरनाथ शर्मा**

प्रस्तावना :

20वीं सदी के विश्वविख्यात आध्यात्मिक गुरु ओशो ने जीवन के हर पहलू को अपनी अन्तर्दृष्टि से समृद्ध किया है। ओशो ने जीवन को जीने व देखने का ऐसा अनोखा दृष्टिकोण दिया, जो मानव जीवन में आनंद, शांति एवं आत्म संतुष्टि का मधुर रस घोल देता है, जिससे हम आज के चुनौतीपूर्ण तनाव भरे युग में भी अवसाद तथा अन्य मानसिक विकारों से स्वयं को मुक्त रख सकते हैं।

ओशो ने गृहस्थ जीवन को आनंदित एवं शांतिमय बनाने हेतु भी कई बहुमूल्य सुझाव दिए हैं, जिनका अनुप्रयोग ओशो प्रेमी एवं प्रशंसक युगल अपने जीवन में करते हैं। यहीं छत्तीसगढ़ के राजनांदगांव नगर के ओशो प्रेमियों के गृहस्थ जीवन के समाजशास्त्रीय विश्लेषण का प्रयास किया गया है, ताकि हमें यह पता चल सके कि ओशो देशना एवं ध्यान-साधना प्रयोग व्यक्तियों के गृहस्थ जीवन को मंगलमय बनाने में कितने सहायोगी हैं।

उद्देश्य :

- (1) ओशो प्रेमियों के गृहस्थ जीवन का अध्ययन करना।
- (2) ओशो देशना एवं ध्यान प्रयोगों की गृहस्थ जीवन में भूमिका का अध्ययन करना।

उपकल्पना :

- (1) ओशो अनुयायियों का गृहस्थ जीवन आनंदित एवं शांतिमय है।
- (2) ओशो देशना एवं ध्यान-विधियों ने ओशो अनुयायियों के गृहस्थ जीवन को मंगलमय बनाने में निर्णायक भूमिका निभायी है।

विषय का वर्णन :

दांपत्य जीवन में तनाव, दुख, विषाद, आज सर्वव्याप्त है।

विवाह-विच्छेद की घटनाएँ दिन-प्रतिदिन अतिशय रूप से बढ़ती जा रही हैं। पश्चिमी देशों से भारत में तलाक की दर कम है, क्योंकि भारतीय संस्कृति के अनुसार विवाह दो आत्माओं का जन्म-जन्मांतर का पवित्र संबंध है, जिसे तोड़ना पाप समझा जाता है।

हिन्दुओं में तो विवाह एक प्रमुख संस्कार है तथा विवाह के द्वारा ही व्यक्ति आश्रम व्यवस्था के दूसरे सोपान गृहस्थ आश्रम में प्रवेश करता है। अतः हिन्दू धर्म में विवाह का अत्यधिक महत्व है, यह केवल एक सामाजिक संस्था व सामाजिक व्यवस्था का महत्वपूर्ण भाग न होकर इससे भी उच्च आदर्श धार्मिक-जीवन का उत्कृष्ट अंग है। हिंदू धर्म में पत्नी को पति की अधिगिनी तक कहा गया है, परन्तु आधुनिक युग के तनाव, चुनौतियों व प्रतिस्पर्धा से भरे जीवन ने तथा पाश्चात्य संस्कृति के अधानुकरण एवं सांस्कृतिक मूल्यों के ह्रास से भारत में विवाह विच्छेद की दर काफी बढ़ रही है। एक सर्वेक्षण के अनुसार भारत में घरेलू हिंसा के प्रतिदिन औसतन 50 हजार मामले पुलिस स्टेशनों में दर्ज होते हैं, जिनमें से अधिकतर दांपत्य जीवन से संबंधित होते हैं।

मूल रूप से यदि देखा जाए तो दांपत्य जीवन को विकृत करने में नकारात्मक मानव वृत्तियाँ जैसे:- काम, क्रोध, लोभ, अहंकार, भांका, ईर्ष्या, गुलाम बनाने की प्रवृत्ति आदि जिम्मेदार होती हैं। यही विषाक्त प्रवृत्तियाँ वैवाहिक जीवन को दूषित कर दांपत्य जीवन को नर्क बना देती हैं। आध्यात्मिक गुरु ओशो ने इन विषाक्त वृत्तियों से मुक्त होने के लिए बहुत सी ध्यान-विधियों के उपाय बताए हैं। ओशो के अनुसार केवल सम्यक समझ एवं ध्यान विधियों के अभ्यास से ही, वैवाहिक जीवन को विषाक्त करने वाली नकारात्मक वृत्तियों से छुटकारा एवं नियंत्रण संभव है तथा उच्च मानवीय गुणों जैसे:- प्रेम,

* शोधार्थी, पं. रविशंकर शुक्ल विश्वविद्यालय, रायपुर (छत्तीसगढ़)

** सहायक प्राध्यापक, पं. रविशंकर शुक्ल विश्वविद्यालय, रायपुर (छत्तीसगढ़)



करुणा, सद्भाव, समादर, पारस्परिक सहयोग आदि का विकास हो सकता है।

ओशो के अनुसार दांपत्य जीवन में सामंजस्य अत्यावश्यक है। पति एवं पत्नी के मध्य जब तक आपसी सामंजस्य नहीं होगा, तब तक सारी सुख-संपदा होने के बावजूद वैवाहिक जीवन कष्टमय होगा तथा परिवार पतन की ओर अग्रसर हो जाएगा, जबकि यदि पति एवं पत्नी के मध्य बेहतर सामंजस्य हो तो कम संसाधनों में भी वे सुखी जीवन व्यतित कर सकते हैं तथा परिवार प्रगतिमान होगा। ओशो प्रेम विवाह के पक्षधर हैं तथा वे विवाह के आधार को जाति-धर्म, प्रतिष्ठा, सामाजिक-आर्थिक प्रस्थिति की बजाय भावी वैवाहिक युगल के मध्य परस्पर प्रेम, आपसी सामंजस्य एवं समझ को आधार बनाने का सुझाव देते हैं। ओशो के अनुसार प्रेमपूर्ण समाज का निर्माण प्रेमपूर्ण वैवाहिक संबंधों द्वारा ही संभव है। चूंकि परिवार समाज की ईकाई है तथा विवाह परिवार का आधार है।

अनुसंधान पद्धति :

उपरोक्त अध्ययन वर्णनात्मक शोध-प्रारूप के अन्तर्गत किया गया है। अध्ययन हेतु छत्तीसगढ़ के राजनांदगांव नगर के 40 ओशो प्रेमियों में से 20 ओशो प्रेमियों का चुनाव देव निदर्शन के अन्तर्गत लॉटरी प्रणाली द्वारा किया गया तथा साक्षात्कार अनुसूची द्वारा तथ्यों का संकलन किया गया है, साथ ही प्राप्त तथ्यों के आधार पर विश्लेषण किया गया है।

तथ्य संकलन एवं विश्लेषण :

तथ्य संकलन हेतु छत्तीसगढ़ के राजनांदगांव नगर में स्थित ओशो ध्यान केंद्र, मोतीपुर से संबंधित 40 ओशो प्रेमियों में से 20 ओशो प्रेमियों का चुनाव देव निदर्शन के अन्तर्गत लॉटरी प्रणाली द्वारा किया गया है। तथ्य संकलन हेतु साक्षात्कार अनुसूची का प्रयोग किया गया है।

विश्लेषण :

निम्नलिखित तालिका में छत्तीसगढ़ राज्य के राजनांदगांव नगर के ओशो अनुयायियों के गृहस्थ जीवन से संबंधित रुझानों का प्रदर्शन किया गया है।

(अ) गृहस्थ जीवन में प्रवेश करने हेतु प्रेरक एवं निर्णायक कारक : (1) पारिवारिक दबाव (35%), (2) स्व-विवेकाश्रित निर्णय (40%), (3) ओशो देशना (25%)।

(ब) ओशो देशना का जीवन में प्रारंभ : (1) विवाह पूर्व स्वप्रेरणा से (30%), (2) विवाह पश्चात् (50%), (3) पारिवारिक संस्कार की तरह (20%)।

(स) ओशो एवं आध्यात्म में प्रेरक तथा निर्णायक कारक : (1) जीवन के संघर्ष व दुख (35%) (2) आध्यात्म एवं धर्म में स्वाभाविक रूचि (25%) (3) ओशो का तजेरवी व्यक्तित्व (40%)।

(द) ओशो देशना से जीवन में किस प्रकार का अमृतपूर्व रूपांतरण हुआ : (1) वैचारिक (40%) (2) आध्यात्मिक (30%) (3) समय रूपान्तरण (30%)।

(इ) बच्चों को ओशो देशना एवं ध्यान से आत्मसात करने हेतु प्रेरित करने में (1) बहुत अधिक (30%) (2) सामान्य

रूप से (60%) (3) बिल्कुल नहीं (10%)।

(फ) यदि बच्चे ओशो देशना एवं ध्यान प्रयोगों में कमी रूचि न लें तो भाव होगा : (1) थोड़ा दुःख होगा (50%) (2) बहुत अधिक दुःख होगा (20%) (3) कोई फर्क नहीं पड़ेगा (30%)।

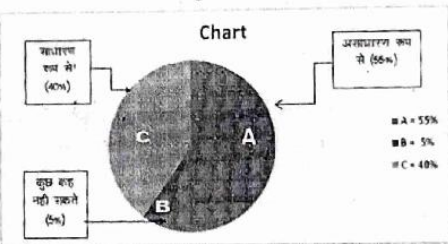
(ज) ओशो देशना एवं ध्यान प्रयोगों को समाज के लिए उपयोगी मानते हैं : (1) बहुत अधिक (70%) (2) साधारण रूप से (30%)।

(घ) ओशो देशना एवं ध्यान प्रयोग सामाजिक समस्याओं के निदान में समर्थ : (1) बहुत अधिक (65%) (2) साधारण रूप से (35%)।

(ङ) ओशो देशना एवं ध्यान प्रयोगों का भविष्य आने वाली पीढ़ियों एवं भविष्य के समाज के परिप्रेक्ष्य में उज्ज्वल है : (1) बहुत अधिक (70%) (2) साधारण रूप से (30%)।

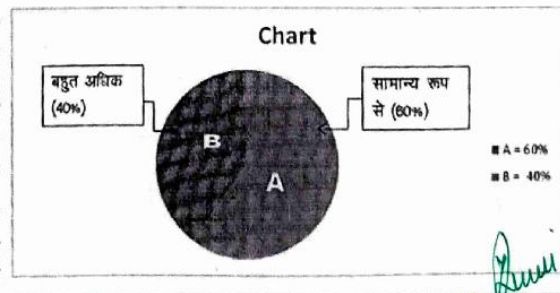
शोध अध्ययन के पश्चात् प्राप्त तथ्यों के संबंध में विशिष्ट रुझान :

(1) ओशो देशना एवं ध्यान-विधियों ओशो प्रेमियों के गृहस्थ जीवन की समस्याओं को सुलझाने में सहयोगी रहे हैं :



उपरोक्त चार्ट द्वारा यह प्रदर्शित किया गया है कि अध्ययन द्वारा हमें ज्ञात हुआ कि ओशो देशना एवं ध्यान विधियों को 55% ओशो प्रेमियों ने असाधारण रूप से, 40% ने साधारण रूप से अपने गृहस्थ जीवन की समस्याओं को सुलझाने में सहयोगी माना है। अतः ओशो देशना एवं ध्यान विधियों को हम गृहस्थ जीवन की समस्याओं को सुलझाने हेतु काफी सहयोगी मान सकते हैं, जबकि आधुनिक युग में हमारे समाज में नागरिक गृहस्थ जीवन की समस्याओं को सुलझाने में सफल नहीं हो पा रहे हैं तथा इसके लिए विभिन्न संस्थाओं, विशेषज्ञों एवं मनोविश्लेषकों की मदद ले रहे हैं।

ओशो प्रेमी अपने गृहस्थ जीवन से कितने आनंदित एवं संतुष्ट हैं :



चार्ट द्वारा यह प्रदर्शित किया गया है कि अध्ययन द्वारा हमें ज्ञात हुआ कि 60% ओशो प्रेमी सामान्य रूप से तथा 40% ओशो प्रेमी बहुत अधिक अपने गृहस्थ जीवन से आनंदित एवं संतुष्ट हैं, जबकि समाज में लोगों का गृहस्थ जीवन दुख एवं संताप से पीड़ित है, अतः गृहस्थ जीवन को आनंदित एवं शांतिमय बनाने में ओशो देशना एवं ध्यान प्रयोग बहुत उपयोगी है।

ओशो के संबंध में कुछ विशिष्टज्ञों के विचार :

(1) ओशो एक प्रबुद्धगुरु हैं, जो मानव जाति को चेतना के विकास के कठिन दौर से उबारने की समस्त संभावनाओं के साथ मानव जाति की मदद कर रहे हैं।

दलाई लामा (तिब्बती राजनैतिक एवं धर्म प्रमुख)

(2) ओशो लंबे समय तक 20वीं सदी के महान दार्शनिक संत और रहस्यदर्शी के रूप में याद रखे जाएंगे। उनका जीवन व कार्य भविष्य की पीढ़ियों का पथ प्रदर्शन करेंगे।

डॉ. मनमोहन सिंह (पूर्व प्रधानमंत्री, भारत सरकार)

(3) ओशो जैसे प्रबुद्धजन अपने समय से बहुत आगे होते हैं। यह अच्छा है कि अधिकाधिक युवा अब उनके शब्दों को पढ़ रहे हैं।

श्री के. आर. नारायणन (पूर्व राष्ट्रपति, भारत सरकार)

(4) ओशो की पुस्तकों का अध्ययन करने के परचात् अंतरमन की आवाज उठी कि भारत में इस सदी में शायद ही कोई इतना मौलिक चिंतक है, जितने कि ओशो थे।

श्री लालकृष्ण आडवाणी (पूर्व उप-प्रधानमंत्री, भारत सरकार)

(5) हमारी विस्मृत हो रही धरोहर से ओशो ने हमारी आज की भाषा में हमारा एक बार फिर से परिचय करवा दिया है, जिसकी दुरुह टीकारैं व व्याख्याएँ होती रही थी। वह सारा ज्ञान सरल भाषा में हमें ऐसी जीवंतता के साथ ओशो ने उपलब्ध करवा दिया है कि हम उसकी मौलिकता को छू सकते हैं, उसकी ऊँचाई पर चढ़कर सांस ले सकते हैं, उसकी गहराइयों में उतर सकते हैं।

श्री शिवराज सिंह पाटिल (पूर्व गृहमंत्री, भारत सरकार)

(6) भारत ने अब तक जितने विचारक पैदा किए हैं, उनमें ओशो सबसे मौलिक, सबसे उर्वर, सबसे स्पष्ट और सर्वाधिक सर्जक विचारक हैं। शब्दों की अभिव्यक्ति की उन्हें जन्मजात भेंट मिली है। उनके जैसा कोई व्यक्ति हम सदियों तक न देख पाएंगे। एक विचारक की भांति उन्हें महामानवों में गिना जाएगा।

श्री खुशवंत सिंह (वरिष्ठ लेखक-पत्रकार स्तंभकार)

निष्कर्ष :

(1) ओशो प्रेमियों का गृहस्थ जीवन आनंदित एवं शांतिमय है।
(2) ओशो देशना एवं ध्यान-विधियों ओशो प्रेमियों के गृहस्थ जीवन को सुखमय एवं कल्याणमय बनाने में बहुत सहयोगी रही हैं।

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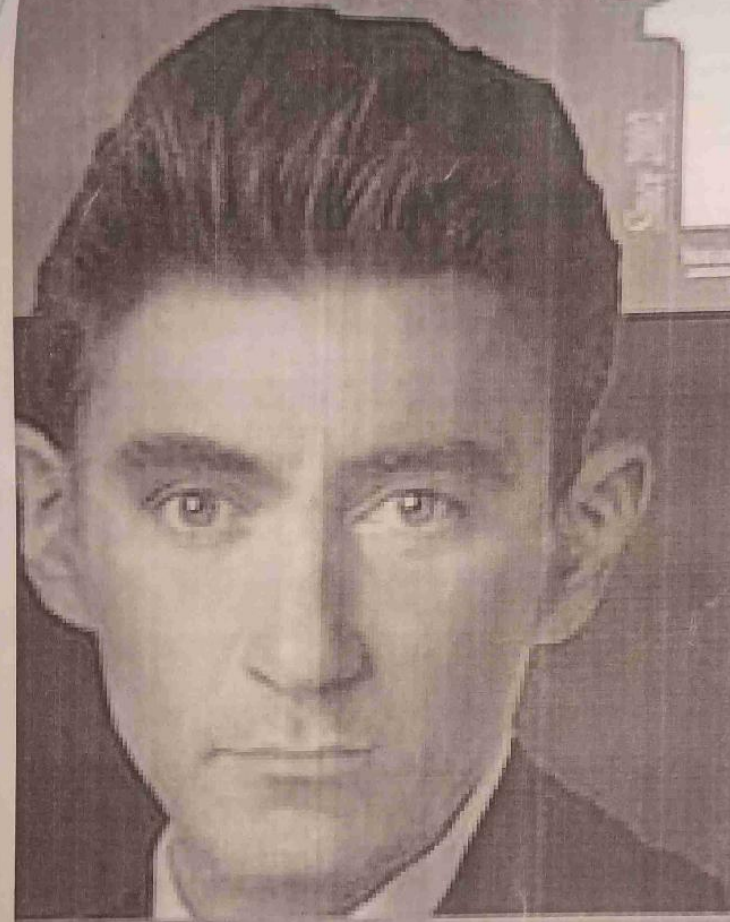
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I write different-
from what I speak,
I speak different-
from what I think...

I think different-
from the way
I ought to think,
and as it all
proceeds into
deeper darkness

Frank Kafka

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ओशो की कल्याणकारी समाज की अवधारणा - 'कम्यून्' का समाजशास्त्रीय विश्लेषण (ओशो ध्यान केन्द्र, भिलाई से सम्बंधित अनुयायियों के विशेष संदर्भ में)

प्रस्तुत शोधपत्र, ओशो की कल्याणकारी समाज की अवधारणा-'कम्यून्' के समाजशास्त्रीय विश्लेषण से सम्बंधित है। ओशो उपयान ध्यान केन्द्र भिलाई में एक सावधिक ओशो कम्यून् है, जहाँ ओशो अनुयायी ध्यान शिविरों के आयोजन, विशेष गतिविधियों आदि के समय एकत्रित होते हैं तथा ध्यान केन्द्र के समस्त कार्यों का संचालन एवं आर्थिक प्रबंधन सामुहिक रूप से स्वयं के वहन द्वारा किया जाता है। अध्ययन हेतु छत्तीसगढ़ के भिलाई नगर के ओशो ध्यान केन्द्र से सम्बंधित 100 ओशो अनुयायियों में से 50 ओशो प्रेमियों का चुनाव देव-निदर्शन के अंतर्गत लॉटरी प्रणाली द्वारा किया गया तथा निश्चित उद्देश्यों की पूर्ति हेतु साक्षात्कार अनुसूची द्वारा तथ्यों का संकलन किया गया है। साथ ही प्राप्त तथ्यों के आधार पर विश्लेषण किया गया है।

स्नेह कुमार मेश्राम* एवं डॉ. ए. एन. शर्मा**

प्रस्तावना :

बीसवीं सदी के विश्वविख्यात आध्यात्मिक गुरु ओशो के अनुसार कल्याणकारी समाज के निर्माण हेतु शिक्षा तंत्र में परिवर्तन करते हुए आध्यात्मिक शिक्षा को भी अन्य विषयों के साथ जोड़ते हुए शिक्षा का केन्द्र महत्वकांक्षा नहीं, बल्कि मानवता, करुणा-प्रेम, पारस्परिक सहयोग-सद्भाव बनाना होगा। कल्याणकारी समाज के निर्माण हेतु हमें जनसंख्या नियंत्रण करते हुए प्राकृतिक संतुलन पुनः स्थापित करने के विश्वव्यापी प्रयास करने होंगे।

ओशो ने कल्याणकारी समाज के निर्माण हेतु सभी राष्ट्रों, धर्म, वर्गों, जातियों से परे छोटे-छोटे 'कम्यून्' के संगठन रूपी एक विश्व समाज की अवधारणा प्रस्तुत की। ओशो के अनुसार 'कम्यून्' प्राकृतिक वातावरण के मध्य बसा ऐसा मानव समूह है, जिसमें व्यक्ति मानवता को परमधर्म मानते हुए समान सम्मान एवं सुविधाओं में निवास करते हैं तथा समाज के भौतिक एवं आध्यात्मिक विकास में अपनी प्रतिभा एवं क्षमता के अनुरूप संलग्न रहते हैं। ओशो के शिष्यों ने ऐसे ही कल्याणकारी कम्यूनों का निर्माण, ओशो इंटरनेशनल मेडीटेशन रिजार्ट पूणे भारत रजनीशपुरम सिटी अमेरिका सहित संपूर्ण विश्व में किया। ओशो उपयान ध्यान केन्द्र भिलाई भी एक सावधिक ओशो कम्यून् है, जहाँ ओशो अनुयायी ध्यान शिविरों के आयोजन, विशेष गतिविधियों इत्यादि के समय एकत्रित होते हैं तथा ध्यान केन्द्र के समस्त कार्यों का संचालन एवं आर्थिक प्रबंधन सामुहिक रूप से स्वयं के वहन द्वारा करते हैं।

उद्देश्य :

(1) ओशो अनुयायियों के अन्य व्यक्तियों से सामाजिक सम्बंधों की वस्तुस्थिति का अध्ययन करना।

(2) ओशो के कल्याणकारी समाज की अवधारणा, कम्यून् की वर्तमान परिस्थिति में उपयोगिता एवं प्रासंगिकता का अध्ययन करना।

उपकल्पना :

(1) ओशो अनुयायियों के अन्य व्यक्तियों से सामाजिक संबंध संतोषजनक हैं।

(2) ओशो के कल्याणकारी समाज की अवधारणा, कम्यून् वर्तमान परिस्थिति में उपयोगी एवं प्रासंगिक है।

विषय का वर्णन :

वर्तमान समय में मानव समाज ने धन, पद प्रतिष्ठा की अंधी दौड़ व गलाघोट प्रतियोगिता को समाज में केन्द्रीय मूल्य के रूप में स्थापित कर दिया है तथा मानवीय मूल्यों प्रेम, करुणा, कर्तुत्व तथा परम मूल्य-जीवन सत्य की खोज, स्वयं के अस्तित्वगत सत्य का अन्वेषण, ईश्वर की खोज, आत्मज्ञान एवं मोक्ष केवल किताबी बातें बनकर रह गई हैं। ओशो के अनुसार, धन-पद-प्रतिष्ठा की अंधी दौड़ व गलाघोट प्रतियोगिता वास्तव में अपने अन्दर की रिक्तता, सारहीनता व अर्थहीनता को भरने का व्यक्ति के अहंकार का प्रयास है, जो बुनियादी रूप से गलत है। व्यक्ति जीवन भर धन-पद-प्रतिष्ठा के पीछे अपना जीवन नष्ट करता है और वह मृत्यु के अतिरिक्त और कहीं भी नहीं पहुँचता है और अहंकार ही आत्मज्ञान की प्राप्ति में सबसे बड़ा बाधक है।

ओशो के अनुसार समाज, वास्तविक अर्थ में मनुष्य के लिए तभी कल्याणकारी सिद्ध होगा जब सभी वर्ग-भेद, जाति-भेद राष्ट्र व धर्म भेद विलीन हो जाए तथा पूरी पृथ्वी एक मानवीय ईकाई की तरह रहे और मनुष्य के भीतर छिपी हुई प्रतिभा को निखारने में उसकी हर संभव मदद करे। ऊँच-नीच की सारी



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विभाजनकारी रेखाएँ मिट जाएँ। एक समृद्ध मानवीय समाज में एक इंजीनियर तथा एक कारपेंटर को समान सम्मान व सुविधाएँ प्राप्त हों, क्योंकि दोनों ही अपनी प्रतिभा से समाज को समृद्ध करने में योगदान दे रहे हैं तथा दोनों में से किसी के भी योगदान को कमतर नहीं आँका जाना चाहिए। समाज मनुष्यों को अपने अस्तित्वगत सत्य की खोज हेतु प्रेरित करे तथा सहायता प्रदान करे। ओशो के अनुसार व्यक्ति को किसी विशिष्ट धार्मिक संप्रदाय से बंधे रहने और अनुयायी होने की भी कोई आवश्यकता नहीं है। ओशो के अनुसार जिस तरह विज्ञान किसी संप्रदाय विशेष से न जुड़ा होकर सारी मानवता के लिए सर्व-सुलभ है, उसी प्रकार धर्म भी किन्हीं विशिष्ट संप्रदायों में बँटा न होकर सारी मानवता हेतु सर्वसुलभ बनाया जाना चाहिए।

ओशो की इसी वसुधैव कुटुम्बकम् की कल्पनाकारी जीवन दृष्टि वाले समाज के स्वरूप के दो प्रमुख प्रयोग निम्नलिखित हैं।
(1) ओशो आश्रम (ओशो इंटरनेशनल मेडिटेशन रिजार्ट), पूणे, भारत :

सन् 1974 में ओशो सन्यासियों द्वारा प्रारंभ किया गया। यह वृहदतर आश्रम अब विश्व में 'ओशो इंटरनेशनल मेडिटेशन रिजार्ट' के नाम से जाना जाता है। जहाँ 90 से अधिक देशों से ओशो सन्यासी, सत्य के खोजी, दूरिस्ट तथा कलाकार लगातार यहाँ आते रहते हैं। यह संपूर्ण विश्व में ध्यान-साधना पद्धतियों एवं मनोविश्लेषण, धैर्यपी तथा आत्मविकास का सुंदरतम सबसे विशाल केन्द्र है। यहाँ संपूर्ण विश्व के विभिन्न राष्ट्रों भाषाओं तथा संस्कृतियों के लोग एक साथ समस्वरता तथा मैत्री के प्रेमपूर्ण वातावरण में रहकर जीवन सत्य तथा आत्मविकास की वृहदतम साधना पद्धतियों से लाभान्वित होते हैं।

(2) रजनीशपुरम, ऑरेगॉन स्टेट, अमेरिका:

सन् 1981 में ओशो के 5 हजार विदेशी ओशो सन्यासियों ने अमेरिका के ऑरेगॉन स्टेट में 64 हजार एकड़ जमीन खरीदी तथा उन्होंने अपने अथक परिश्रम व नवीनतम तकनीकों का प्रयोग कर इस बंजर मरुस्थल भूमि को मरुधान में परिवर्तित कर दिया। यहाँ सन्यासियों ने स्वयं प्रतिदिन 16 घंटे मेहनत करके उच्चस्तरीय भवनों, सब्जी फार्म, तालाबों, वाटर फिल्टरिंग सिस्टम, खेतों तथा एयरपोर्ट का निर्माण किया। धीरे-धीरे इस मरुस्थल की भूमि हरे-भरे मरुधान में परिवर्तित हो गई तथा दूर-दूर से पशु-पक्षी आकर्षित होकर यहाँ आने लगे।

ओशो सन्यासियों की प्रेम तथा उत्सवपूर्वक की गई कड़ी मेहनत रंग लाई तथा पूरे शहर का निर्माण हो गया, जिसे उन्होंने रजनीशपुरम (ओशो का वास्तविक नाम रजनीश चंद्रमोहन जैन था) नाम दिया। यहाँ सभी सन्यासियों को समान दर्जा व सुख-सुविधाएँ प्राप्त थीं चाहे वे कृषक हों या पायलट अथवा डॉक्टर। ओशो के अनुसार यह मानव सभ्यता के अपने पूरे इतिहास में अब

तक का एक मात्र व पहला केन्द्रीय वातानुकूलित शहर था। यहाँ मुद्रा की कोई चलन प्रवृत्ति नहीं थी, जिसे जिस वस्तु की आवश्यकता होती, उसे वह आवश्यक मात्रा में मिल जाती थी तथा वह व्यक्ति अपनी प्रतिभा व योग्यता से अपना रुचिपूर्ण कार्य पूरी निष्ठा व प्रार्थना से कर अपना सहयोग प्रदान करता था।
अनुसंधान पद्धति :

उपरोक्त अध्ययन वर्णनात्मक शोध-प्राकृतिक के अन्तर्गत किया गया है। अध्ययन हेतु छत्तीसगढ़ के भिलाई नगर के ओशो ध्यान केन्द्र से संबन्धित 100 ओशो अनुयायियों में से 50 ओशो प्रेमियों का चुनाव देव निदर्शन के अन्तर्गत लॉटरी प्रणाली द्वारा किया गया तथा साक्षात्कार अनुसूची द्वारा तथ्यों का संकलन किया गया है। साथ ही प्राप्त तथ्यों के आधार पर विश्लेषण किया गया है।

तथ्य संकलन एवं विश्लेषण :

तथ्य संकलन छत्तीसगढ़ के भिलाई नगर के ओशो ध्यान केन्द्र से संबन्धित 100 ओशो अनुयायियों में से 50 ओशो प्रेमियों का चुनाव देव निदर्शन के अन्तर्गत लॉटरी प्रणाली द्वारा किया गया तथा तथ्य संकलन हेतु साक्षात्कार अनुसूची का प्रयोग किया गया है।

विश्लेषण :

निम्नलिखित तालिका में छत्तीसगढ़ राज्य के भिलाई नगर के ओशो ध्यान केन्द्र से संबन्धित ओशो अनुयायियों के ओशो की 'कम्यून अवधारणा' के अनुसरण से संबन्धित रुझानों का प्रदर्शन किया गया है :

क्र	विषय	पूर्वत सहमत	सहमत	तटस्थ	असहमत	पूर्वत असहमत
1.	जीवन में सामुदायिक भावना (हम की भावना) का विकास हुआ	24%	40%	48%	04%	00%
2.	स्वयं के प्रति पहले से अधिक उत्तरदायित्व महसूस करते हैं	44%	42%	10%	04%	00%
3.	अन्य व्यक्तियों से आपसे विद्वेष एवं वैमनस्य दूर हुए	20%	58%	10%	12%	00%
4.	'कम्यून' की अवधारणा को आप समाज के लिए आवश्यक मानते हैं	40%	60%	00%	00%	00%
5.	इससे समाज में जातिगत समस्याओं का समाधान संभव है	28%	32%	20%	20%	00%
6.	इससे समाज में धर्मगत समस्याओं का समाधान संभव है	40%	24%	30%	06%	00%
7.	इससे समाज में वर्गीय संबंधों समस्याओं का समाधान संभव है	22%	50%	20%	08%	00%
8.	इससे समाज में राजनीतिक समस्याओं का समाधान संभव है	20%	28%	40%	12%	00%
9.	इससे समाज में भाविक समस्याओं का समाधान संभव है	30%	38%	12%	20%	00%
10.	इससे समाज में प्रशासनिक समस्याओं का समाधान संभव है	32%	40%	16%	12%	00%

शोध अध्ययन के पश्चात् प्राप्त विशिष्ट तथ्यों के संबंध में रुझान :

(1) कम्यून अवधारणा के अनुसरण से सामाजिक संबंधों के प्रबंधन में सहयोग मिला : मनुष्य एक सामाजिक प्राणी है एवं समाज सामाजिक संबंधों का जाल है। सामाजिक संबंधों का प्रबंधन आज के आनपाधापी व तनाव से भरे युग में



बहुत कठिन है। परंतु यह भी सत्य है कि सामाजिक संबंधों के बेहतर प्रबंधन में ही मनुष्य के सुखी जीवन का आधार है। ओशो की 'कम्यून' अवधारणा के अनुसरण से उत्तरदाताओं के सामाजिक संबंधों के प्रबंधन में सहयोग का विश्लेषण तालिका 1 में किया गया है।

तालिका 1 : 'कम्यून' अवधारणा सामाजिक संबंधों के प्रबंधन में सहयोगी

क्र.	रुझान	आवृत्ति	प्रतिशत
1.	पूर्णतः सहमत	12	24
2.	सहमत	20	40
3.	तटस्थ	15	30
4.	असहमत	03	06
5.	पूर्णतः असहमत	00	00
	कुल	50	100.00

तालिका 1 से स्पष्ट है कि 'ओशो' की 'कम्यून' अवधारणा के अनुसरण से उत्तरदाताओं के सामाजिक संबंधों के प्रबंधन में सहयोगी है। 24 प्रतिशत उत्तरदाता इस तथ्य से पूर्णतः सहमत हैं 40 प्रतिशत उत्तरदाता इस तथ्य से सहमत हैं, 30 प्रतिशत उत्तरदाता इस तथ्य के प्रति तटस्थ हैं तथा 06 प्रतिशत उत्तरदाता इस तथ्य से असहमत हैं। अतः कह सकते हैं कि ओशो की 'कम्यून' अवधारणा के अनुसरण से उत्तरदाताओं के सामाजिक संबंधों के प्रबंधन में सहयोगी है।

(2) 'कम्यून' अवधारणा के अनुसरण से समाज के प्रति पहले से अधिक उत्तरदायित्व महसूस करते हैं : ओशो के अनुसार, "जितना तुम स्वयं को, दूसरों के प्रति उत्तरदायित्व महसूस करो, उतना ही समझना कि तुम सही मार्ग में हो!" अर्थात् व्यक्ति जितना समाज के प्रति उत्तरदायित्व महसूस करेगा, समाज के सम्यक् विकास की उतनी ही संभावना है। ओशो की 'कम्यून' अवधारणा के अनुसरण से उत्तरदाता समाज के प्रति पहले से अधिक उत्तरदायित्व महसूस करते हैं, इस तथ्य का विश्लेषण तालिका 2 में किया गया है।

तालिका 2 : समाज के प्रति पहले से अधिक उत्तरदायित्व महसूस करते हैं

क्र.	रुझान	आवृत्ति	प्रतिशत
1.	पूर्णतः सहमत	21	42
2.	सहमत	15	30
3.	तटस्थ	10	20
4.	असहमत	04	08
5.	पूर्णतः असहमत	00	00
	कुल	50	100.00

तालिका 2 से स्पष्ट है कि 'ओशो' की 'कम्यून' अवधारणा के अनुसरण से उत्तरदाता समाज के प्रति पहले से अधिक उत्तरदायित्व महसूस करते हैं। 42 प्रतिशत उत्तरदाता इस तथ्य से पूर्णतः सहमत हैं, 30 प्रतिशत उत्तरदाता इस तथ्य से सहमत हैं, 20 प्रतिशत उत्तरदाता इस तथ्य के प्रति तटस्थ हैं तथा 08 प्रतिशत उत्तरदाता इस तथ्य से असहमत हैं। अतः कह सकते हैं कि ओशो की 'कम्यून' अवधारणा के अनुसरण से उत्तरदाता समाज के प्रति पहले से अधिक उत्तरदायित्व महसूस करते हैं।

निष्कर्ष :

(1) ओशो अनुयायियों के समाज में अन्य व्यक्तियों से सामाजिक संबंध संतोषजनक कहे जा सकते हैं।

(2) ओशो के कल्याणकारी समाज की अवधारणा, 'कम्यून' वर्तमान परिस्थिति में समाज हेतु उपयोगी एवं प्रासंगिक है।

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