

# Impact on body weight gain in broiler chicks due to electronic devices.

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## Abstract

The present work deals with the studies of impact on weight gain in early-age broiler chicks through electronic devices. World wise more use of various electronic devices by the people in various sector concern to this study. Particularly in poultry industry the more use of electronic devices creates a serious health related problem in the early age broiler chicks. Broiler chicks provide protein rich food and a good source of animal protein for the human being. It also provide additional income source to the farmers to improve their economic condition, for that it is necessary to maintain the proper health condition particularly weight of the broiler chicks. In the developing field of technology and by using modern techniques it is necessary to manufacture many electronic devices those are popularly used by the peoples. Cell phone is one of the most popular and widely used electronic devices. The radiation emitted from the media of electronic devices in the environment causes various hazardous effect on the health of living organisms. Considering the environment of the poultry farming during the rearing period of early age broiler chicks, this study indicates that the continuous use of cell phones emits Electro-Magnetic Radiation (EMR) in the poultry environment, ultimately affects the health of chicks. For this study the experiment of three different groups was conducted to investigate the effect of electro-magnetic radiation on the body weight of early age broiler chicks. Group I was kept as a control and groups II and III were subjected both short and long duration of exposure of electromagnetic radiation respectively. From the above analysis it was found that long-term radiation exposure showed a reduction in average body weight compare to short-term radiation duration. Other details discussed in the text.

**Keywords:** Body weight, Broiler chicks, Electronic devices.

## Introduction

Poultry industry is an important business based on agriculture and also having economic importance. The growth rate of poultry production in India is nearly higher than other sectors like crop husbandry, livestock production, gross domestic products etc. In this allied agricultural industry annual output of eggs was eight times more in the 1995 than early seventies. Poultry raised for meat production is called broiler. Broiler industry had started before three decades in India. Its negligible output of 4 million in 1971 reached to 190 million in 1990 and there is tremendous growth as well as have high potential to develop to higher extent as there is full scope and prospectus to the industry. Broiler chicks provide the deadly growing people with high protein-rich food and a good source of animal protein. It provides farmers with an additional source of income and helps to improve their economic status, biological and economical point of view conservation and proper health condition of the broiler chicks in poultry farming is a very important task.

In this digital world, the electronic technology is developing faster and faster, many electronic products appear with advanced functions to facilitate, improve and even change the life of the whole society. Among all these electronic products, the computer and smartphone are thought to be most common because of a lot of benefits brought by them and seem to become the necessity in daily life, [1]. Electronics having various electrical circuit and including number of electronic components. Through the interconnections of these electronic components, the technique develops a device commonly known as electronic device. Recently various types of electronic devices used by the peoples in various sector. Technological innovations in the electronic devices change the results in between the benefit and harm, such as cell phone, iPad, laptop etc. Mobile communication technology increases the speed of communication and contact within poultry farming, making services delivery more efficient, [2].

Beneficial use of these electronic devices also hazardous effect to the life of living organism. Most of the electronic devices emit various range of electromagnetic radiation in the environment. Electromagnetic radiation produced by the electronic devices such as cell phone in the environment of poultry farming effects the weight of early-age broiler chicks. It has been observed in every position since the late 1990s. Considering the environment and weight gain of early age broiler chicks, this study reveals that the continuous use of mobiles cell phones by people from various industries. Electro-Magnetic Radiation (EMR) was emitted in the environment due to the excessive use of cell phones. High frequency electromagnetic field can be responsible for bringing alterations in growth and development in ovo amniotic vertebrates, [3]. Different hazardous effects of electro-magnetic radiation (EMR) observed on the health of living organisms. Similarly hazardous effects of Electro Magnetic Field (EMF) are also developed on chick embryo health [4]. Electromagnetic radiation from Cell phone and cell tower affects the birds, animals, plants and environment, [5]. Various factors like light intensity, radiation frequency and duration of exposure affects the poultry environment. Exposure to radiation increased the mortality in chick embryos, [6]. Exposure of chick embryos to a 2G cell phone caused structural changes in different types of cells, [7]. Growth rate in the form of weight gain in early age broiler chicks is one of the most important factors influenced by radiation from the cell phone. Due to the exposure of various range of electromagnetic radiation some changes in behavioral and physical activity of the early age broiler chicks.

## Methodology

Ninety, day old broiler chicks were procured from commercial hatchery and kept separately under house with normal environmental condition and these chicks reared by adopting deep litter system. The birds were fed with starter mash up to three weeks of age during the experimental period. These early age broiler chicks were randomly divided in to three groups. Each groups containing 30 numbers of early age broiler chicks and

named groups I, II and III. Group I Control Group (CG) was kept as a control and was not exposed to any electromagnetic radiation, and the remaining groups II Short Duration Exposure Group (SDEG) and III Long Duration Exposure Group (LDEG) were subjected to use of cell phone handset for electromagnetic radiation of both short and long duration exposure respectively. Daily exposure of short duration is three hours and long duration is six hours. Comparative study and effect of electromagnetic radiation with short and long duration exposure was evaluated on the basis of average body weight, overall body weight gain of the early age broiler chicks in different groups. The body weight of all the early age broiler chicks was recorded and average body weight and overall body weight gain was calculated for each group recorded at weekly intervals up to three weeks.

## Results and Discussions

Comparative study and effect of electromagnetic radiation with short and long duration exposure was evaluated on the basis of average body weight, overall body weight gain of the early age broiler chicks in different groups. The body weight of all the early age broiler chicks was recorded and average body weight and overall body weight gain was calculated for each group recorded at weekly intervals up to three weeks. From the table 1 it is evident that the group II (SDEG) and group III (LDEG) shows variation in the values of weight gain as compare to group I (CG). The mean body weights in all the groups varied from (100.21 to 108.43 Gm) during first week, (221.47 to 241.56 Gm) in second week, and (311.74 to 372.38 Gm) at the end third week.

Table 1: Comparative effect on body weight gain of broiler chicks in different groups.

Experimental Groups	Average body weight (Gm) per weeks			Overall body weight gain (Gm)
	I	II	III	
Group I: CG	108.43	241.56	372.38	263.95
Group II: SDEG	102.64	233.85	338.27	235.63
Group III: LDEG	100.21	221.47	311.74	211.53

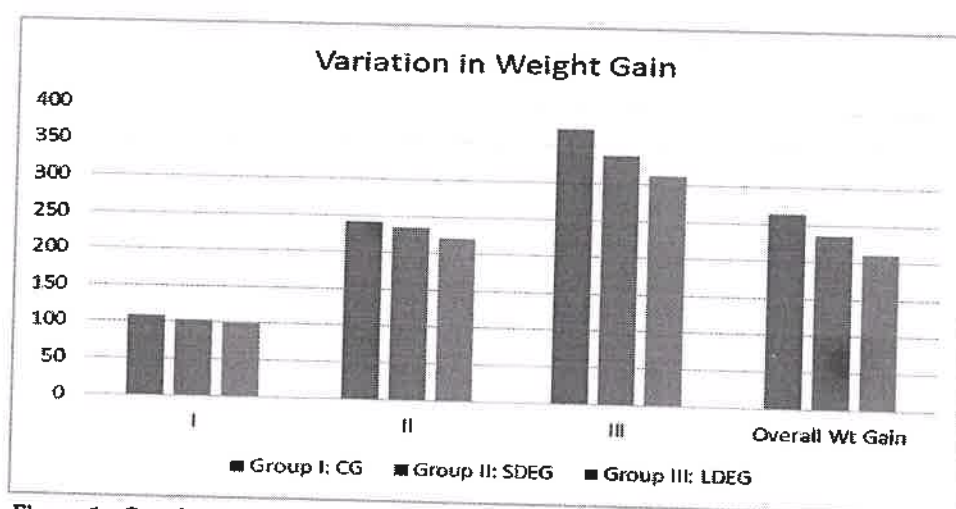


Figure 1: Graph showing the body weight gain of broiler chicks in different groups.





These values show differences in the weights between different groups during the experimental period and at the end of third weeks of early age broiler chicks. During the first week the early age broiler chicks of group I (CG) shows higher body weights (108.43 Gm) than the other group II (SDEG) and group III (LDEG), the values of body weight of these groups shows (102.64 Gm and 100.21 Gm) respectively. During the second week the early age broiler chicks of group I (CG) shows higher body weights (241.56 Gm) than the other group II (SDEG) and group III (LDEG), the values of body weight of these groups shows (233.85 Gm and 221.47 Gm) respectively.

During the last week of the experiment that is at the end of third week the early age broiler chicks of group I (CG) shows higher body weight (372.38 Gm) than the other group II (SDEG) and group III (LDEG), the values of body weight of these groups shows (338.27 Gm and 311.74 Gm) respectively, these results are not correlate to the results of [8], he reported that no radiation effect on the body weight at hatching or at 7 days of age was detected.

From the data of body weights in different groups, it is evident that the overall gain in body weight among the group I (CG) of broiler chicks was highest (263.95 Gm) for those are the group II (SDEG) and group III (LDEG), the values of overall gain in body weight among these groups shows (235.63 Gm and 211.53 Gm) respectively. From the data it is also apparent that early age broiler chicks among the group II (SDEG) had better gain in body weight (235.63 Gm), than the chicks among the group III (LDEG) and values shows lower weight gain (211.53 Gm), these finding more or less similar to the findings reported by Shatey, T. M., et. al. [9], chickens exposed to different MF treatment had lower weight gain than those of the non-exposed treatment of MF at 39 days of age.

## Conclusion

In conclusion this study has shown that the early age broiler chicks expose to long-term duration of electromagnetic radiation showed a reduction in average body weight compare to the chicks expose to short-term duration of electromagnetic radiation. Ultimately the overall gain in body weight of early age broiler chicks shows decrease values in group II (SDEG) followed by group III (LDEG). It may be due to the increase physical activity of the early age broiler chicks exposed to short and long duration of electromagnetic radiation, which in turns effects on the weight gain of the chicks.

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**PRINCIPAL**

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## Histochemical demonstration of protein concentration in intestinal tissue of coccidiosis infected broiler chicks treated with *Mercurius corrosivus*

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### Abstract

The present investigation includes the study of protein concentration in intestinal tissue of coccidiosis infected broiler chicks orally inoculated by the infection of *Eimeria tenella* sporulated oocysts and treated with *Mercurius corrosivus* by using the methods of histochemical techniques. The treatment of homoeopathic medicine *Mercurius corrosivus* was administered to the coccidiosis infected group of broiler chicks. For the study of protein concentration in intestinal tissue of the coccidiosis infected and non-infected broiler chicks, the histochemical technique was used. Histochemical study indicates that the presence of different concentration of protein content found in the intestinal tissue of the broiler chicks. Intestinal tissue of all the chicks of different groups have presence of protein content in variable concentrations. It is also observed that the presence of protein concentration was variable in different region and shows different traces like minimum, medium and maximum amount of protein content found in different region of the intestinal tissue. The amount of protein concentration was observed high in group B(INC) in comparison to the other group of chicks observed during the experimental period. The concluded results of the study by using histochemical techniques shows that the protein concentration in the intestinal tissue is demonstrated by the variable staining reaction. The concentration of protein content is maximum in the parasitic stages showing the utilization of the protein from the host tissue. Whereas the infected and treated group with homoeopathic medicine *Mercurius corrosivus* also showed variable staining reaction according to the presence of protein in the intestinal tissue.

**Key Words:** Broiler chicks, Coccidiosis, Histochemical technique, Intestinal tissue, *Mercurius corrosivus*, Protein

### Introduction

In India the fowl production company commenced as the family type in the rural areas as a subsidiary occupation to reap some extra profits however in the private sector the poultry end up management intensive enterprise which offers excessive profits and emerged as an industry in many of the smaller poultry devices in the recent years. Rural areas are genuinely based totally upon the local fowls. Such units generally have a very constrained range of birds which varies from 20 to 100 and are viewed as capacity to complement the household income. Such smaller units are run via agricultural landless labour, the smaller and marginal dryland farmers etc. This unit depends in reality upon neighborhood material, often the bird surely scavenging on the feed regionally handy in the rural areas. The birds are normally reared in the rural areas. The birds are commonly hard and are tolerant to quite a few diseases. Poultry birds are a domestic species of

avian group of animal kingdom. Poultry birds particularly broiler chicks and backyard chicks are reared by the farmers as allied agricultural business for improving the economic status of the farmer as well as provide protein rich food to the rural population. During the rearing period farmers face many health related problems of chicks. Disease occurrence is the major problems in poultry faced by farmers in various region in India. These problems are related to various issues like differences in climate conditions in different region, also types of management system

Most of parasitic diseases occurred in broiler chicks. Protozoan disease of poultry particularly coccidiosis is most dangerous and significant disease which causes loss to the farmers and is related to the methods of management in poultry farming. Coccidiosis is the major disease of broiler chicks, particularly it affects the early aged broiler chicks. Coccidiosis disease is not only the major disease but the rate of mortality is too high. During management of poultry industry, if proper action is not taken against the disease, it can destroy the total

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poultry industry due to high mortality. Ultimately it affects the total economic loss of the poultry industry. There are quite a few species of genus *Eimeria*, a sporozoan parasite which have many fold results on broiler production. The *E. tenella*, found all over the country creates the caecal coccidiosis in chicken inflicting sizable economic losses which are basically due to excessive rate of morbidity and mortality, terrible weight gain and feed conversion. This is one of the most serious and steady problems in poultry, particularly tropical nations like India. Coccidiosis is one of the most necessary and important disorder in broiler birds, (Pellerdy, 1974) and most essential causes of financial losses within the poultry industry, (Williams *et al.*, 1999). This sickness is induced by way of *Eimeria* parasites, which infect epithelial cells of the gut of the birds. A few anticoccidial compound or allopathic medicines are accessible, (Singh *et al.*, 1982) for the control of caecal coccidiosis in poultry, which is welcomed on by method of microbe *Eimeria tenella*, larger part of such medicines neglect to test totally the malady, particularly in the event of consolidated disease and, for example, a final product there will be development of safe hints of the protozoan parasites, (Gill and Bajwa, 1979). The pharmaceutical companies from Homoeopathic remedy are diverting their attention to find out the active principles from herbs, minerals and organic matters, (Homoeopathic drug) and patent the same. There has been renewed thrust all over the world in the direction of developing ecofriendly homoeopathic drug from such remedies as alternatives to the chemical drugs, (Farrington, 1989). Homoeopathic remedies can therefore be used in the confidence that, even if the wrong remedy is chosen, while it will achieve no cure it will do no harm, (Day Christopher, 1988). The remedy being only energy, than fades and the body is cured of its disease process. The symptoms then cease. Homoeopathic remedies tested, on the same human basis, in animals. It is very sensible choice of treatment in animals whenever the similia principle can be established. The use of some homoeopathic drug on different diseases of poultry is given by (Narhari, 1996). For the effective remedy and manage of coccidiosis and to fight the development of drug resistance, new types of anticoccidial medicines are being synthetic and

tried every so often. Use of some homoeopathic medicine to fight different illnesses in animals (Madrewar, 1996). The importance of homoeopathic medicine and their powerful sustainable use apart from in people is defined nicely by using (Naveen; 2005). Many authors have studied the histopathology and histochemistry of different birds, (Hodges, 1974). Al-Saffar *et al.* (2016) reported that the submucosal connective tissue revealed positive reaction for mercury bromophenol blue technique in birds. In this mild at some point of the existing study, the homoeopathic medication *Mercurius corrosivus 1 M* potency become tried towards experimental coccidiosis of broiler chicks. Its effect was analyzed on one of the parameters, eg. Protein concentration in intestinal tissue by using histochemical technique.

#### Material and Methods

For conducting the experiment a day old, one hundred and twenty broiler chicks vaccinated against Marek's disease were brought from a hatchery. All the broiler chicks were reared up to six weeks in the Laboratory Animal House under managerial conditions as described by (Narhari, 1996). The experimental rearing house is made completely sterilized before housing of chicks. During the experiment the broiler chicks had been maintained in a condition of non-coccidia climate with coccidiostat unfastened starter ration up to the pre weeks of age accompanied through finisher ration for subsequent three weeks with unfastened access to regular ingesting water. *Mercurius corrosivus* is a powerful remedial agent in disease of the intestinal tract, (Chaudhari, 1990). By taking into consideration the basic principle of homoeopathy let like be treated by like and with minimal dose, the drug *Mercurius corrosivus* is selected. For comparative study here the reference anticoccidial drug, Amprolium (Merck) is selected and used in experimentation. For the experimentation the broiler chicks already reared up to three weeks of age were allotted at equal into four groups A to D (30 each) marked and banded the broiler chicks individually from each group. The experimental group A to D are kept separately in the experimental house, managed and fed by following the routine managerial practice. The chicks from Group A (NHC) served as



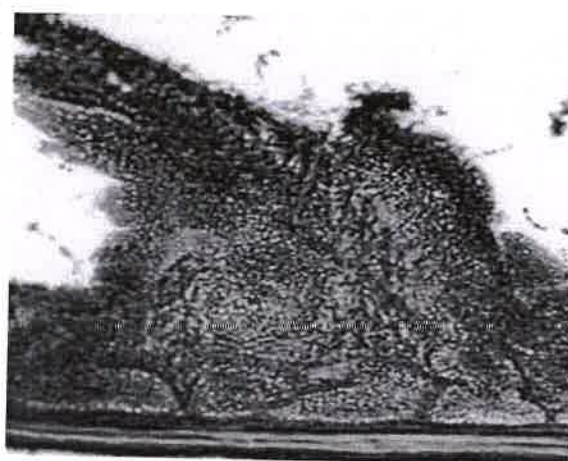
### Histochemical demonstration of protein concentration

non-infected healthy chicks. The chicks from group B to D was infected with 50,000 sporulated oocysts of *E. tenella* on 23<sup>rd</sup> day of age. The chicks from Group B(INC) were infected non-treated and the chicks from group C (IAC) were infected and treated with reference anticoccidial drug Amprolium (0.1%) dose after 3<sup>rd</sup> day of post-infection for three days through drinking water, while the chicks from group D (IMC) were infected and treated with liquid dilutions of homoeopathic medicine *Mercurius corrosivus* 1 M potency after 3<sup>rd</sup> day of post infection for three days through drinking water. The chicks from each group were observed up to the age of sixth week. For histochemical technique, the intestine of the dead and sacrificed (treated and untreated) chicks was subjected to demonstration of protein content. For demonstration of protein contents suitable pieces of intestine were collected and fixed in Carnoy's fluid, (Singh *et al.*, 1997). The tissues had been processed to attain paraffin sections of about 7 micron thickness, (Mukharji, 1990). The sections had been stained with the aid of Mercury bromophenol blue stain, protein content material of the tissues stained blue in color (Bonhag, 1955).

### Results and Discussion

Demonstration of protein concentration in intestinal tissue of infected and non-infected broiler chicks from treated and non-treated groups are studied by using histochemical techniques. The presence of protein concentration demonstrated by variable traces like minimum, medium and maximum. The amount of protein content in different region of the intestinal tissue are variable, it is due to the parasitic infection. During the experiments the homoeopathic medicine *Mercurius corrosivus* 1 M potency has shown the variation in protein concentration demonstrated by weak or strong staining reaction in the intestinal tissue. During the experiment results of the present investigation by using histochemical techniques shows that the group A (NHC) non-infected healthy chicks, normal intestinal tissue demonstrate more amount of protein concentration. Muscular layer, submucosa and mucosa of intestinal tissue have protein content but particularly in the glandular tissue shows the high traces of protein content (Fig 1). According to the experimental schedule on the

day 5<sup>th</sup> of the period of post infection the intestinal tissue of group B (INC) infected non-treated chicks shows that, the different region of the intestinal tissue observed different traces of the concentration of protein.



Group A (100x)

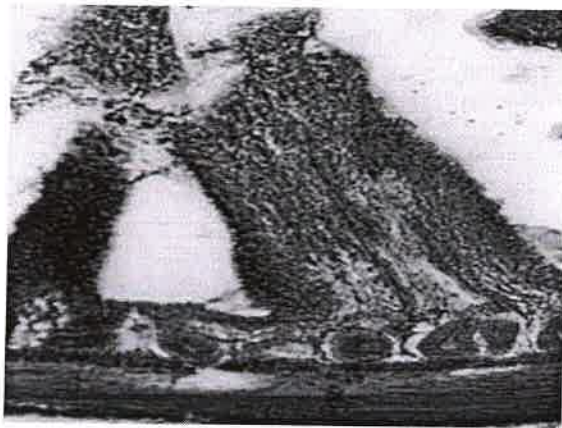
Fig 1. Group A (NHC)\* no infected healthy chicks showing the distribution of protein content in the transverse section of normal intestine.

\*Group: A-NHC: Noninfected healthy chicks

Submucosal layer, internal epithelium and villous tissue of intestine shows high concentration of protein content. The intestinal tissue of group C (IAC) infected and Amprolium treated chick's shows that the muscular layer and intestinal mucosa presence of high amount of protein concentration. The region of the intestinal tissue particularly villi shows the amount of protein concentration is moderate as compare to the other region that is muscular layer of the intestinal tissue. The intestinal tissue of group D (IMC) infected and *Mercurius corrosivus* treated chicks. The post infection period of this experimental group particularly the chicks were coccidiosis infected and treated with homoeopathic medicine *Mercurius corrosivus* 1M potency shows that the different region of the intestinal tissue have variation in the protein content. The protein content is maximum in the intestinal tissue particularly the muscular layer, mucosa and submucosa, medium amount in connective tissue while minimum amount of protein concentration in the villous epithelial cells (Fig 2).



Naphade



Group B (100x)



Group C (100x)



Group D (100x)

**Fig 2.** Group B (INC)\*\*, group C (IAC)\*\*\* and group D (IMC)\*\*\*\* showing the distribution of protein content in the transverse section of the intestine on 5<sup>th</sup> post infection day.

\*\*Group : B-INC: Infected nontreated chicks

\*\*\*Group : C-IAC: Infected and Amprolium treated chicks

\*\*\*\*Group : D-IMC: Infected and Mercurius corrosivus treated chicks

### Conclusion

From the above observations the present study concluded that the infection of coccidiosis of broilers chicks caused by giving the dose of *E. tenella* pathogen destruct the entire life process of the chicks. The severity of the disease is evaluated on the basis of histochemical changes occurred in the intestinal tissue due to *E. tenella* infection. It can be concluded that the intestinal tissue from all groups have the amount of protein in the form of different staining reaction. The protein concentration demonstrated by minimum, medium and maximum traces of staining reaction. It is either weak or heavy reaction with the staining but the protein content is maximum in the parasitic stages showing the protein utilization from the intestinal tissue. The present study contribute to understanding the protein concentration in intestinal tissue of coccidiosis infected broiler chicks treated with *Mercurius corrosivus* by using histochemical techniques. Changes occurred in various tissues of the chicks due to the disease resulting loss to the health of chicks ultimately loss to the farmers, so the broiler chicks should be under anticoccidial treatment by using homoeopathic medicine *Mercurius corrosivus*.

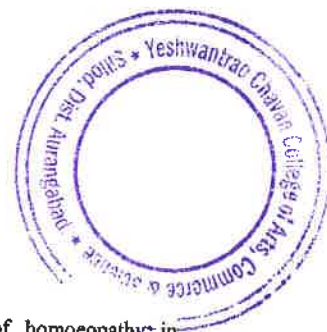
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**DIVERSITY OF PLANKTON WITH REFERENCE TO FISH FAUNA IN KELGAON  
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**Abstract:**

Kelgaon minor water reservoir (20°28'23.0"N 75°30'24.0"E) is located in Sillod tehsil from Aurangabad district of Marathwada region in Maharashtra state. Kelgaon perennial water reservoir is utilized for irrigation and drinking purposes to the nearby agricultural fields and villages. It is good source of fisheries with having economic status. In present study work water samples were collected and analyzed during period between June-2019 to March-2020 at each month of every season. To study the plankton diversity water samples were collected and preserved by standard methods. Plankton species were identified and classified with the help of standard key. In present research work a total 27 algal species belonging to 23 different genera have been identified and recorded. Among these, Chlorophyceae (51.94%) was dominant over rest of phytoplankton community. A total of 22 Zooplankton Species of 15 different Genera have been identified and recorded. Rotifera (41.04%) contributed highest population and species diversity in zooplankton community. The present research work revealed that the plankton diversity gradually increased from rainy season to summer season. In monsoon season (June-Sept 2019) plankton diversity was found minimum. Whereas it was maximum in summer season (Feb-March 2020) and in winter season (Oct-Jan 2020) it varied moderately. The planktons diversity is correlated with the diversity of fish fauna found in that water reservoir.

**Keywords:** Plankton diversity, Fish fauna, water reservoir.

**Introduction**

Water is most important resource available on earth planet. Organism cannot exist without the water. Air, water, land flora and fauna are interacted with each other and any one of them deteriorate for short time can causes the great influence in food chain. In nature water is available in marine, brackish and fresh water sources. Dam water is important source basically used for drinking and irrigation purposes. The fresh water reservoirs having water storing capacity during summer season is a good source of fishery and provides economic status in India. The fish diversity of any water reservoirs is depends on the abundance of abiotic and biotic factor in them. Abiotic factors are physical and chemical characteristics which is basic need of organism. Phytoplankton in water reservoir serves as the role of both oxygen producing industry and producer in food chain. Phytoplankton is one of the basic source of oxygen production by photosynthesis. Zooplankton is also food value for planktivorous organism in aquatic food chain. Zooplankton transfer energy from lower to higher trophic level. (Water, 1977) Floral and faunal diversity is varied from each water reservoir. During last two decades due to decreased rain fall might be deteriorate the water quality and plankton diversity. Increased human population is the fundamental cause of all the aspects regards aquatic flora and fauna issues. The present study work is deals with to investigate the status of plankton diversity related to fish fauna. Variuos researchers studied that the plankton diversity in fresh water bodies in India, Monika Dubey *et.al.*, (2014), Pawale R.G. *et.al.* (2014), Koushik Roy *et.al.* (2015) & Deshmuk D.R. *et.al.* (2010)

**Study Area**

Kelgaon perennial water reservoir is located in Sillod tehsil in Aurangabad district of Maharashtra state. Geographically it located at 20°28'23.0"N latitude and 75°30'24.0"E longitude. Geographic have shown in Fig.1. Construction of this project was completed in 1976. The main source of water filling in reservoir is Khelna river.



Fig. 1. Location of Kelgaon water reservoir in Geographic Map.





## Materials and Methods

### Plankton Sampling

Water samples were collected on monthly basis in first week of each month at morning session during study period June-2019 to March-2020. Automotive boat was used to approach and collect samples from selected site. for qualitative and quantitative analysis of plankton, sample were collected from centre of water body nearby area of right gate No.16. About 100 liter of water filter through planktonic net having mesh size of 35µm ( for phytoplankton) and 70 µm ( for zooplankton) and sample was concentrated upto 100ml. The filtrate preservation and fixation was done by adding 5% formaldehyde (formalin) that was buffered by borax. The collected water sample bottles were labeled with date, time of sampling, preservative, fixative used and other needed information. During sample collection care was taken that minimum disturbance of water to prevent avoidance reaction of zooplankton. (S.C. Goswami *et.al.*, March-2004).

After sedimentation of filtrate 1 ml of sample was taken for qualitative and quantitative analysis under microscope. Plankton sample were examined under compound, binocular and light microscope as per the need. The qualitative analysis (identification) of plankton at generic and species level done by standard keys and literature of Adoni (1985), Pennak (1968), Altaff (2004), Battish (1992), Murugavel & Kodarkar (1998), Needham and Needham (1964) and Edmondson (1963). The quantitative estimation of plankton was done by following Sedge wick-Rafter cell method and methods given by Ramchandra & Solanki (2007). 1 ml of subsample was analyzed for plankton identification and counting and converted it in to No./L. The planktonic quantitative estimation was done by using formula,

$$1. \frac{\text{No. of plankton/ ml}}{\text{Number of organism counted}} = \frac{\text{Number of replicates taken}}{\text{Number of replicates taken}} \quad 2. \frac{\text{No. of Plankton}}{L} = \frac{\text{average no. of plankton}}{\text{ml}} \times 1000$$

### Fish Sampling

Fish samples were collected randomly in one month of each season June-2019, Nov-2019 and Mar-2020. The fish samples were collected by using a variety of traps and nets with help of skilled local fisherman. Whatever fishes caught photographs were taken and identified to species level using standard taxonomic keys of Jayaram K.C. (2010), Qureshi and Qureshi (1983), Talwar and Jhingran (1991), and Shrivastava (1998). Web sites were referred to identify And classify fishes at species level I.T.I.S. (<http://itis.gov>) and Fish base ([www.fishbase.org](http://www.fishbase.org))

## Results and Discussion

Aquatic ecosystem is quite different than other habitats. Phytoplankton primary photosynthetic producer and zooplankton is primary consumer which are important in trophic level for planktivores fishes. The main object of present research work is to investigate qualitative and quantitative aspects of plankton so as to find out the capacity of water reservoir for fish industry in future might be successful.

### Phytoplankton Diversity

In present research work a total 27 algal species belonging to 23 different groups has been identified and recorded. Among these Chlorophyceae (13 Species of 13 Genera), Cyanophyce (9 Species of 6 Genera), Bacillariophyce (3 Species of 3 Genera) and Euglenophyceae (2 Species of 1 Genera). The details of recorded species data have been listed in Table.No.1 and Graphical representation have shown in graph 1 & 2. Chlorophyceae was dominant group in first trophic level among phytoplankton community. It contributed about 51.94% of total the total phytoplankton population. Cyanophyceae contributed about 25.76%, followed by Bacillariophyceae about 14.51% and Euglenophyceae contributed only about 7.80% in all Zooplankton composition. From present research work we have noticed that plankton population density of recorded groups were gradually increased from rainy to summer season. The highest population density was in month of March-2020 (Except Euglenophyceae). Viz. Chlorophyceae 182 No. /L, Cyanophyceae 113 No. /L and Bacillariophyceae 57 No./L. But highest population density of Euglenophyceae was in months of Dec.2019. And it was 27 No./L. The month wise population density has shown in Table.No.2. Similar results were reported by various researchers throughout the India, Sasikala, *et.al* (2016), Hassan, *et. al.* (2010) and minimum density of phytoplankton during monsoon and maximum during summer in reported by Gupta *et al* Monika Dubey *et., al.* (2014) and V.V. Bhoyar *et., al.* (2011)

### Zooplankton Diversity

A total 22 Zooplankton Species of 15 different Genera has been identified and recorded. Among these Rotifera (9 Species of 4 Genera), followed by Copepoda (6 Species of 4 Genera), Cladocera (4 Species of 4 Genera) and Protozoa (3 Species of 3 Genera). The identified and recorded Zooplankton Species have listed in Table.No.2 and Graphical representation have shown in graph no. 3 & 4. It was found that the highest population density of Zooplankton was belongs to Rotifera group as a second trophic level in aquatic food chain. Population density of different Zooplankton Groups as, Rotifera 41.04% followed by Copepoda 29.32%, Cladocera 25.13% and Protozoa contributed 4.5% only. During study period between Jun-2019 to March-2020 we have observed that population density of zooplankton in present study area gradually increased from rainy to summer season and touch peak level in month of March-2020. The highest species cells belongs to Rotifera group was counted 135 No./L in months of March-2020, followed by Copepoda 102 in months of March-2020, Cladocera 97 No./L in months of March-2020 and Protozoa 18 No./L was counted in March-2020. The month wise population density of Zooplankton community have shown in Table. No.4 These results were similar to results



obtained by Chatap *et al.* (2017) Jayabhaye *et al.* (2006), A. M. Watkar *et al.* (2013), Deshmukh D.R. *et al.* (2010) Dede *et al.* (2015), Gayathri *et al.* (2014) and Ramkrishna *et al.* (2014).

Table 1: List of phytoplankton species recorded in Kelgaon water reservoir during study period June-2019- March-2020.

Chlorophyceae		Cyanophyceae	
Genera	Species	Genera	Species
1. <i>Closterium</i>	<i>closterium sp.</i>	1. <i>Anabeana</i>	<i>Fertilissima</i>
2. <i>Chlorella</i>	<i>vulgaris</i>	2. <i>Nostoc</i>	<i>Azollea</i>
3. <i>Cladophora</i>	<i>Fracta</i>	3. <i>Oscillatoria</i>	<i>Limosa</i>
4. <i>Ankistrodesmus</i>	<i>falactus</i>		<i>Tenuis</i>
5. <i>Spirogyra</i>	<i>condensate</i>	4. <i>Merismopedia</i>	<i>Punctata</i>
6. <i>Chlorococcum</i>	<i>infusionum</i>		<i>Elegans</i>
7. <i>Pediastrum</i>	<i>Simplex</i>	5. <i>Lyngbya</i>	<i>Magnifera</i>
8. <i>Hydrodictyon</i>	<i>reticulatum</i>		<i>Spirulinoidus</i>
9. <i>Scenedesmus</i>	<i>quadricuada</i>	6. <i>Phormidium</i>	<i>Calciola</i>
10. <i>Chara</i>	<i>Brauni</i>		
11. <i>Stigeoclonium</i>	<i>Tenue</i>		
12. <i>Chlamydomonas</i>	<i>subcaudata</i>		
13. <i>Volvox</i>	<i>globator</i>		
Bacillariophyceae		Euglenophyceae	
Genera	Species	Genera	Species
1. <i>Nitzschia</i>	<i>angustata</i>	1. <i>Euglena</i>	<i>acus</i>
2. <i>Navicula</i>	<i>Viridula</i>		<i>Viridis</i>
3. <i>Cyclotella</i>	<i>meneghiniana</i>		

Table 2: List of zooplankton species recorded in Kelgaon water reservoir during study period June-2019- March-2020.

Rotifera		Copepoda	
Genera	Species	1. <i>Cyclops</i>	<i>nauplius</i>
1. <i>Brachiomus</i>	<i>caudatus</i>		<i>bicuspidatus</i>
	<i>falactus</i>	2. <i>Mesocyclops</i>	<i>Hyalinus</i>
	<i>quadridentatus</i>		<i>Leucarati</i>
	<i>Ruben</i>	3. <i>Heliodyptomus</i>	<i>Viduus</i>
	<i>calyciflorus</i>	4. <i>Udinula</i>	<i>Valgaris</i>
	<i>forficula</i>		
2. <i>Asplanchna</i>	<i>intermedia</i>		
3. <i>Keratella</i>	<i>tropica</i>		
4. <i>Filiana</i>	<i>longiseta</i>		
Cladocera		Protozoa	
1. <i>Ceriodaphnia</i>	<i>reticulata</i>	1. <i>Areolla</i>	<i>vulgaris</i>
2. <i>Daphnia</i>	<i>carinata</i>	2. <i>Paramecium</i>	<i>caudatum</i>
3. <i>Moina</i>	<i>brachiata</i>	3. <i>Verticella</i>	<i>campenella</i>
4. <i>Simocephalus</i>	<i>expinosus</i>		

Table 3: Seasonal fluctuation of recorded phytoplankton Genera (No/L) in Kelgaon water reservoir. (study period Jun-2019 to Mar.2020)

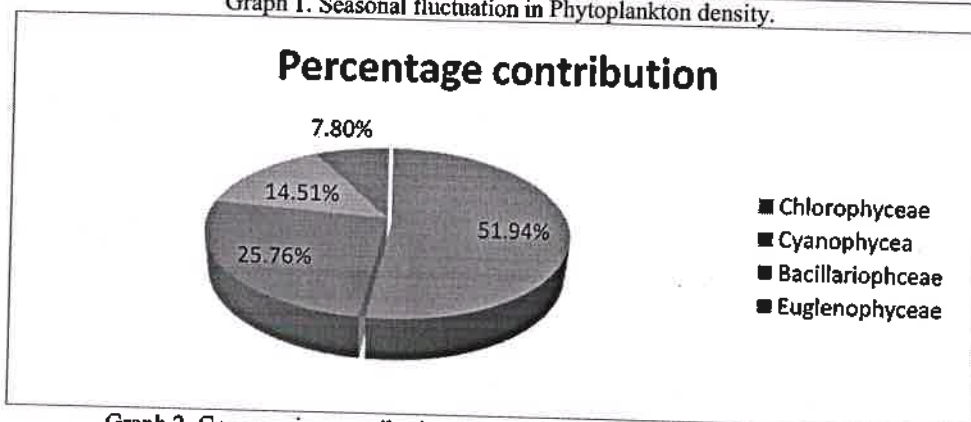
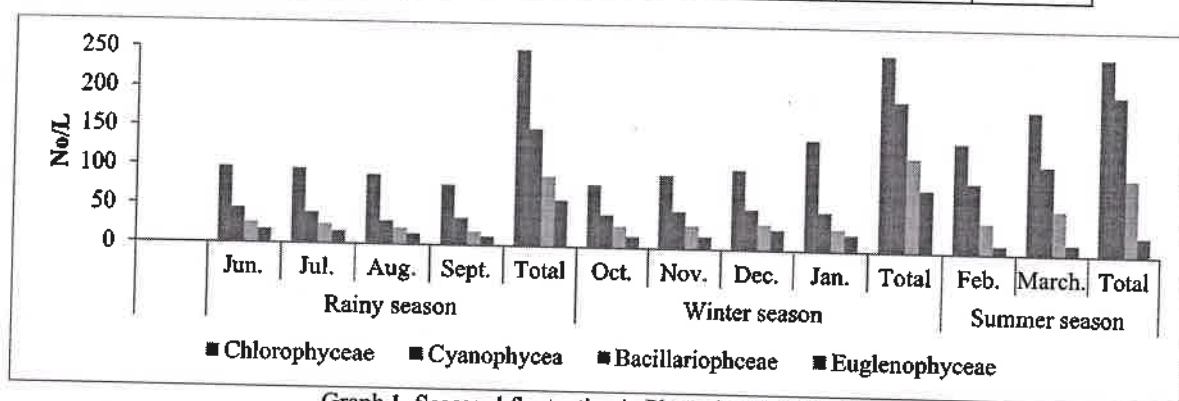
Season	Months	Chlorophyceae	Cyanophyceae	Bacillariophyceae	Euglenophyceae
Rainy season	Jun.	98	45	26	18
	Jul.	96	40	25	16
	Aug.	89	30	21	14
	Sept.	77	35	18	12
	Total	360	150	90	60
Winter season	Oct.	80	42	28	15
	Nov.	94	48	30	16
	Dec.	102	52	33	27
	Jan.	141	50	29	22

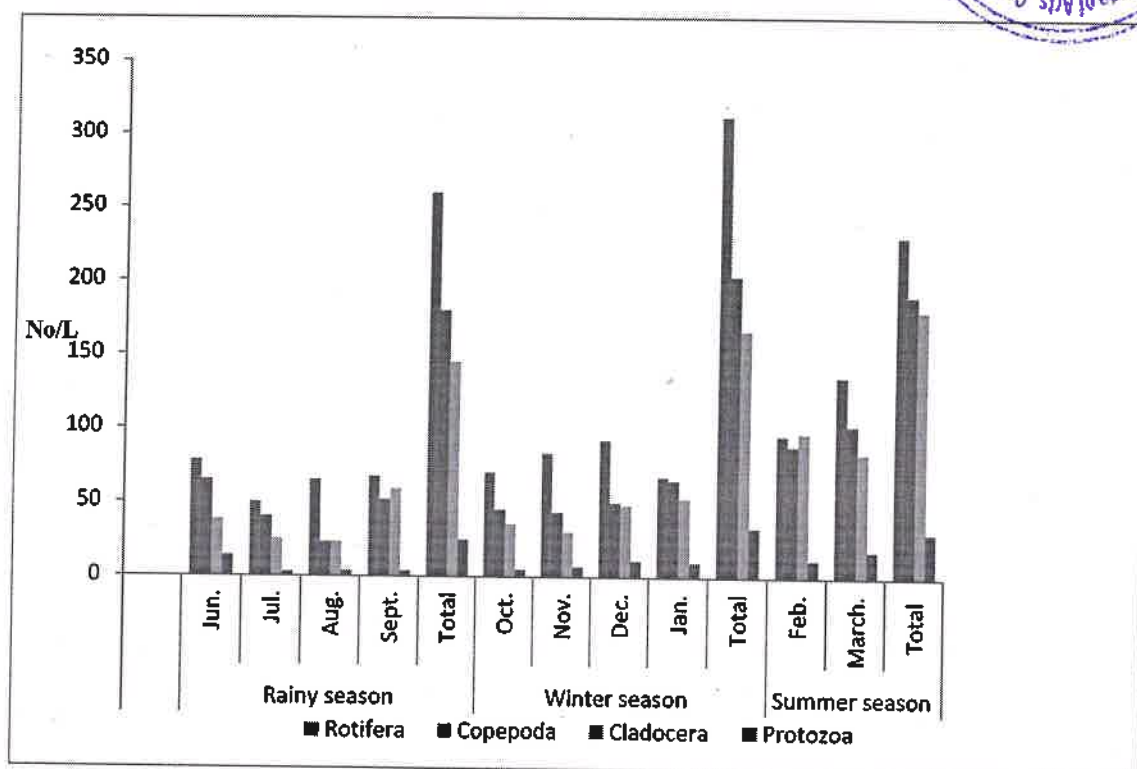


	<b>Total</b>	<b>417</b>	<b>192</b>	<b>120</b>	<b>80</b>
Summer season	Feb.	140	90	40	11
	March.	182	113	57	14
	<b>Total</b>	<b>322</b>	<b>203</b>	<b>97</b>	<b>25</b>
	<b>Grand Total</b>	<b>1099</b>	<b>545</b>	<b>307</b>	<b>165</b>
	Percentage	51.94%	25.76%	14.51%	7.80%

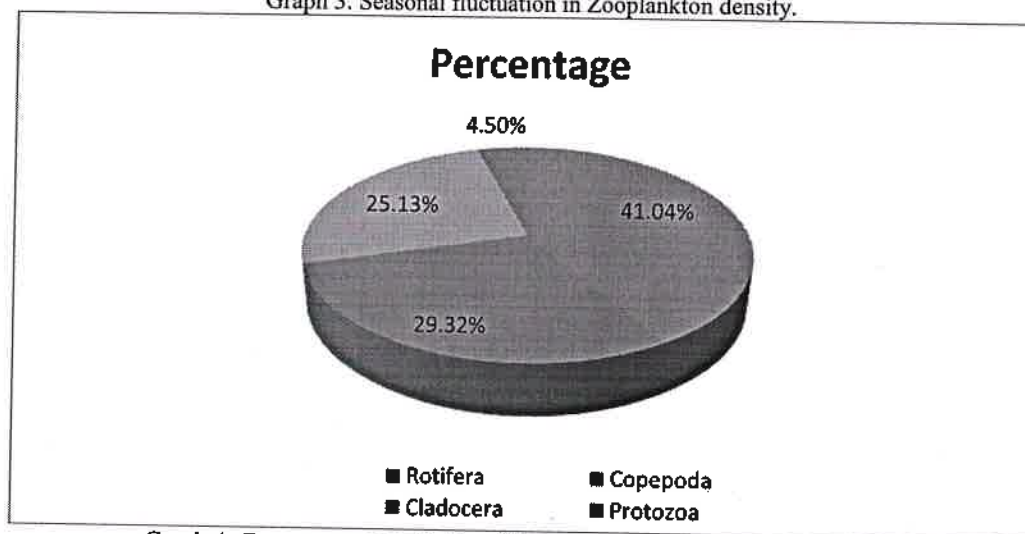
Table 4: Seasonal fluctuation of recorded Zooplankton Genera (No./L) in Kelgaon water reservoir (study period Jun-2019 to Mar.2020)

Season	Months	Rotifera	Copepoda	Cladocera	Protozoa
Rainy season	Jun.	78	65	38	14
	Jul.	50	40	25	3
	Aug.	65	23	23	4
	Sept.	67	52	59	4
	<b>Total</b>	<b>260</b>	<b>180</b>	<b>145</b>	<b>25</b>
Winter season	Oct.	70	45	35	5
	Nov.	83	43	30	7
	Dec.	92	50	48	11
	Jan.	67	65	53	10
	<b>Total</b>	<b>312</b>	<b>203</b>	<b>166</b>	<b>33</b>
Summer season	Feb.	95	88	97	12
	March.	135	102	83	18
	<b>Total</b>	<b>230</b>	<b>190</b>	<b>180</b>	<b>30</b>
	<b>Grand total</b>	<b>802</b>	<b>573</b>	<b>491</b>	<b>88</b>
	Percentage	41.04%	29.32%	25.13%	4.5%





Graph 3. Seasonal fluctuation in Zooplankton density.



Graph 4. Genera wise contribution (%) among total Zooplankton population

#### Ictyofaunal Diversity

The main object of this study work is to investigate, commercially important fish species from Kelgaon water reservoir related to fish industry in Sillod tahsil, of Aurangabad district in Maharashtra state. In present research work, a total of 6 fish species belonging to 1 order and 1 have been identified and recorded during study span June-2019 to March-2020. During seasonal investigation, fish family *Cyprinidae* was one of the dominant in ichthyofaunal diversity. identified & recorded carps & minnows were *Labeo rohita*, *Catla catla*, *Cirrhinus mrigala*, *Cyprinus carpio*, *Hypophthalmichthys molitrix* and *Ctenopharyngodon idella*. The details of identified fish species with its order & family is given in Table No.5. Similar to these fish diversity results were noticed by other researchers. B.Dhanlaxmi *et al.* (2015) recored that cyprinidae constituted the dominant group and *Labeo rohita*, *Catla catla*, *Cirrhinus mrigala*, *Cyprinus carpio*, and *Cyprinus carpio carpio* were recorded and Kharat *et al* (2012) Choube *et al* (2013) and Dharni T. *et al.* (2020) reported maxim species belongs to *Cyprinidae* family in Ukkadam lake water.



*Catla catla*(catla)



*Cyprinus carpio*(common carp)



*Labeo rohita* (rohu)

Typical Photographs of Identified Fishes

Table No.5 List of identified and recorded fish species from Kelgaon water reservoir.

Order	Family	Species	Common Name
Cypriniformes	Cyprinidae	1. <i>Labeo rohita</i>	Rohu
		2. <i>Catla catla</i>	Catla
		3. <i>Cirrhinus mrigala</i>	Mrigal
Indigenous Fishes		4. <i>Cyprinus carpio</i>	Common carp
		5. <i>Hypophthalmichthys molitrix</i>	Silver carp
		6. <i>Ctenopharyngodon idella</i>	Grass carp
Exotic Fishes			

### Conclusion

The main object of present research work is investigate seasonal plankton diversity by which to find out composite fish culture might be successful in Kelgaon water body. The results obtained from present work may be helpful for local fisherman and fish industry for enhancing fish culture. The results obtained from this research vital concludes that- Plankton population gradually increased from rainy season to summer season. all phytoplankton species composition was moderately high in winter season and highest in summer season. From fisheries point of view planktivores fish requires maximum food from winter to summer season. The seasonal plankton quantitative results suggest that Kelgaon water body can sustain fish diversity and composite fish culture is possible.

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**ESTIMATION OF BLOOD GLUCOSE LEVEL OF BACKYARD CHICKENS  
NATURALLY INFECTED WITH *Ascaridia galli*. TREATED WITH  
*Butea monosperma* And ALBENDAZOLE**

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**Abstract:** The present communication deals with the studies on the estimation of blood glucose level of backyard chickens naturally infected with *Ascaridia galli*. treated with Ayurveda formulation of Palas (*Butea monosperma*) seed powder and allopathic reference drug Albendazole. The study was conducted with special reference to serum biochemical parameter for example blood glucose level in mg/dl. For the study and experimental work on field level, forty five birds those are positive with *Ascaridia galli*. infection were procured from the different local farmers and divided in to three groups (group B, C, D) and reared under natural condition. Fifteen healthy birds were also procured from local farmers and kept under natural condition as a normal healthy control group of bird (group A). During the experimental period it was observed and found that the birds exposed to *Ascaridia galli*. infection showed the increase level of blood glucose than the normal healthy control group and the groups treated with Palas seed powder and Albendazole. On 1st day of experiment the decrease value of blood glucose level was observed as compare to group B, but the period of 15th to 45th day of experiment shown variable trend in the level of blood glucose values. The values of blood glucose level shows increase trends in group D throughout the experiment period. The values of blood glucose level for treated birds group C was shown decreased trend on 30th and 45th day of experiment as compared to the obtained value of blood glucose level in treated group B. From the above study and observations comparative efficacy of Albendazole allopathic reference drug and Ayurveda formulation of Palas (*Butea monosperma*) seed powder against the *Ascaridia galli*. infection shows more or less similar results in terms of blood glucose level among the backyard chickens. Other details were discussed at length in the text.

**Key Words:** Blood glucose level, Backyard chickens, *Ascaridia galli*, *Butea monosperma*, Albendazole.

**Introduction**

In India the poultry production enterprise started as the household type in the rural areas as a subsidiary occupation to obtain some additional income. From rural areas are essentially based upon the local fowls. Such units normally have a very limited number of birds varying from 20 to 100 and are seen as means to supplement the household income. Such smaller units are run by agricultural landless labour, the smaller and marginal dryland farmers etc. These units depends essentially upon local material, because the birds are generally reared in the rural areas and depends on the feed locally available in the rural areas. Small-scale poultry farmers are the main producers of the poultry in many developing countries. It provides food for deadily growing poor population. According to Indian history the first fowl was domesticated as early as 3200 B.C. Egyptian and Chinese records shows that fowls were laying eggs for man in 1400 B.C. The industry remains in backyard of houses for many years. Prior to 1960 when poultry in India were reared by traditional extensive methods, there occurred few diseases.

In India, a huge loss of birds due to diseases is being faced by farmers due to management related problems. Poultry carry heavy infection of varied types of parasites, i.e. Helminths, Protozoans, Viruses, Arthropods etc. Intestinal helminth infection have a serious impact on poultry health, productivity, quality and quantity of meat. The infection of helminth parasites are found in poultry, particularly backyard chickens or desi birds locally known as gavran e.g. nematodes, *Ascaridia* sp. causes Ascariidiosis, which reduces the food value of the chickens and increase the mortality. Which inturn affects on total production causing high economic loss to farmers as well as Nation too.

The Indian system of medicine, Ayurveda, was evolved as a system with a rational and logical foundation. That its basic concepts be not re-examined in the light of the greater understandings of the human environment, that for centuries its methods of treatment undergo little change, and that there has been no addition to its literature for a very long time, are charges made against the systems by its critics. The basics on which the Ayurvedic system of medicine is based are essentially true for all times and do not change from age to age. (V. Narayanaswamy 1981). For much of our past history, parts of plant or extracts have been used to combat worm infections, and in many parts of the world





natural products are still in use as herbal remedies. Plants are always a very good source of drugs; in fact, many of the currently available drugs were derived either directly or indirectly from various plants and their products. Medical companies are diverting their attention to find out the active principles from plants and developing ecofriendly Ayurveda formulation from such remedies tried as alternatives to the chemical drugs. The Ayurveda have no side effects and are easy to administer. Ayurveda equally efficient in the treatment of chicken's diseases. They are economical, easy to administer and safe. Intensive raising in commercial farms inevitably exposes the flock to various diseases which causes mortality and loss of farmers. Diseased birds can also be hazardous to the health of human. There may be possibilities of damage to the human body due to intake of diseased birds. The losses due to diseases in poultry can be minimized with Ayurvedic medicine prepared from plants and their products, and are commonly used in poultry diseases because of its low cost and safe. These medicines increase growth of the birds. The disease occurred due to *Ascaridia galli*. shows loss to the birds and the farmers.

Glucose is an important factor for the energy of citric acid cycle, also it is closely related to the source of energy supply for the physiological and biochemical activities occurred in the body of birds, (Klasing K.C. 2000). Blood glucose levels are studied in the field or in laboratories of disease diagnosis, the available information of glucose levels will be useful for the comparative study among the different birds, (Goodwin, M., *et al.* 1994). Glucose is a main circulating carbohydrate in the birds and its level in the blood is often used as a biometric indicator in clinical diagnosis and various studies (Kawasaki T, *et al.* 2020). Silky fowls shows greater blood glucose level recovery than broilers chickens particularly in the insulin resistance tests, (Ji, J., *et al.* 2020). The motivation regarding the feeding to the domestic chicks is directly related to blood glucose levels, (A. J. Richardson 1970). Many authors studied about the haematology of different birds, (Alfred M. Lucas 1974). Glucose content rich in broiler chickens compare to indigenous chickens due to diet rich in grains (Subhadarsini Mohanty, *et al.* 2020). Range of glucose level in Vanaraja birds vary from management related practices (Satyaranjan Barik, *et al.* 2018). The level of glucose decreases in *Ascaridia galli*. infected chickens reported by poultry world ([www.worldpoultry](http://www.worldpoultry)). In this light during the present study, Ayurvedic medicine prepared from plants and their products that is Palas seed powder was tried to compare the reference allopathy drugs Albendazole against the disease Ascariidiosis in backyard chickens and its effect was analyzed on different blood parameters. Ex. Blood glucose level in the present paper.

#### Materials and Methods:

**Experimental Groups:** Sixty backyard chickens a day old were obtained from different local farmers and hatchery for the study and experimental work on field level, out of them fifteen birds are procured healthy and kept under natural condition as a normal healthy control group of bird (group A), and remaining forty five birds those are naturally positive with *Ascaridia galli*. infection were divided in to three groups (group B, C, D) and reared under natural condition. Group A served as control, group B to D was naturally infected with *Ascaridia galli*. Group B was infected treated with Ayurvedic formulation of Palas seed powder and group C was infected and allopathic drug Albendazole treated. Group D was infected and untreated control.

**Collection of Plant Material and Preparation of seed extract:** Seed of Palas was collected from the agriculture farm in the form of (Pod) dried form, remove the seeds from that Pod and again dry it in sunlight for 2-3 days. When the seed became dry, collect it and grind it in grinder and made powder from the seed. Approximately 100 gm of powder collected and out of these only 10 gm powder was mixed in 50 ml methanol solution. Kept the solution for 2-3 days accompanying with occasional shaking and stirring. The whole mixture was filtrated by a piece of clean white cotton material. The extract was kept at room temperature for further use. The prepare extract was use as a trial line of the treatment (3 ml in drinking water) against the infection among backyard chickens.

**Collection of Blood Sample:** Approximately 3 ml of blood was collected from wing vein for the analysis of blood glucose level. 15 blood samples were collected randomly from naturally infected backyard chickens and 5 blood samples were collected randomly from normal healthy control group at the 1<sup>st</sup> day of experiment, after 15<sup>th</sup> days (1<sup>st</sup> day of treatment) of experiment and after treatment of the infectious backyard chickens (on 30<sup>th</sup> and 45<sup>th</sup> days). All the 20 blood samples were studied for biochemical alterations for example blood glucose level in the present paper. Serum glucose in mg/dl was estimated by GOD-POD method using kit of Robonik (India) Pvt. Ltd, Mahope, Navi Mumbai. Obtained values was statistically analyzed by SPSS software did one way ANOVA followed by LSD test.

#### Results and Discussion:

The results of blood biochemical parameter particularly blood glucose level in (mg/dl) studied in naturally infected, treated and healthy backyard chickens. The mean glucose level values at different intervals of the study period from the backyard chickens of all four groups are given in Table 1 and Fig. 1. The results of the present work shows the mean value of blood glucose levels of naturally infected backyard chickens with *Ascaridia galli*. in three groups and one healthy group studied at different intervals during the study period. It was found that the blood glucose levels were significantly increased in infected group as compare to normal healthy control group. The blood glucose value of naturally infected birds before the treatment at 1<sup>st</sup> day of experiment were for group B to D (310.13 ± 1.80), (306.88 ± 0.78) and (307.25 ± 2.01) respectively, showed the significant elevation as compare to normal healthy control group A.

was ( $203.39 \pm 0.93$ ), these values of glucose not similar to the values reported by (Elvia Hernawan, *et. al.* 2012). They observed average blood glucose level in chickens ranged from 166.46 to 173.32 mg/dl. According to the study of (Ritchie, B. W., *et. al.* 1994) glucose level of young chickens is lower than that of the mature chickens.

In second interval of study period, at day 15<sup>th</sup> the blood glucose values were significantly increased as compare to the normal healthy control group A. The value of blood glucose levels of groups B to D were ( $325.24 \pm 1.44$ ), ( $321.28 \pm 0.73$ ), and ( $330.25 \pm 2.02$ ) respectively and it was ( $217.82 \pm 0.91$ ) found in normal healthy control group A.

On 30<sup>th</sup> day the blood glucose value of naturally infected birds observed after the treatment in group B and C the blood glucose value was decreased and untreated group D blood glucose value was increased. The values in group B to D were ( $297.91 \pm 1.16$ ), ( $292.87 \pm 0.74$ ) and ( $355.25 \pm 2.02$ ) respectively and in normal healthy control group A it was shown ( $246.70 \pm 1.14$ ). The results of the present study are not agree with the report of (Albokhadaim Ibrahim, *et. al.* 2012) that they found overall mean values of glucose level is 500 mg/dl.

On 45<sup>th</sup> day the blood glucose value of naturally infected and treated birds observed in group B and C the blood glucose value was decreased and untreated group D blood glucose value was increased. The values in group B to D were ( $270.57 \pm 1.38$ ), ( $264.46 \pm 0.85$ ) and ( $383.25 \pm 2.01$ ) respectively and ( $261.13 \pm 1.35$ ) value obtained in normal healthy control group A, (Ali, *et. al.* 2011) reported that the pineapple treatment of the infected birds showed decrease in the glucose level up to 28<sup>th</sup> day and recovery in glucose level showed from 56<sup>th</sup> day. There is no significantly difference between the sexes of the Thai indigenous chicken's glucose level reported by (Suchint, *et. al.* 2005). The present observations shows that the value of blood glucose level being significantly ( $P < 0.05$ ) lower in normal, infected and treated than the infected untreated group. Infected group B and C that treated with ayurvedic and allopathic treatment respectively shows more or less similar blood glucose value as compared with group A normal healthy control group. The serum glucose levels of Thai indigenous chickens were not significantly different between sexes (Suchint *et. al.* 2005).

Groups	Day 1	Day 15	Day 30	Day 45
A	$203.39 \pm 0.93$	$217.82 \pm 0.91$	$246.70 \pm 1.14$	$261.13 \pm 1.35$
B	$310.13 \pm 1.80$	$325.24 \pm 1.44$	$297.91 \pm 1.16$	$270.57 \pm 1.38$
C	$306.88 \pm 0.78$	$321.28 \pm 0.73$	$292.87 \pm 0.74$	$264.46 \pm 0.85$
D	$307.25 \pm 2.01$	$330.25 \pm 2.02$	$355.25 \pm 2.02$	$383.25 \pm 2.01$

Table 1: Blood glucose level of backyard chickens from different groups.

#### Abbreviations:

- Group A- Normal Healthy Control.  
 Group B- Infected and Palas Seed Powder treated.  
 Group C- Infected and Albendazole treated.  
 Group D- Infected Untreated Control.

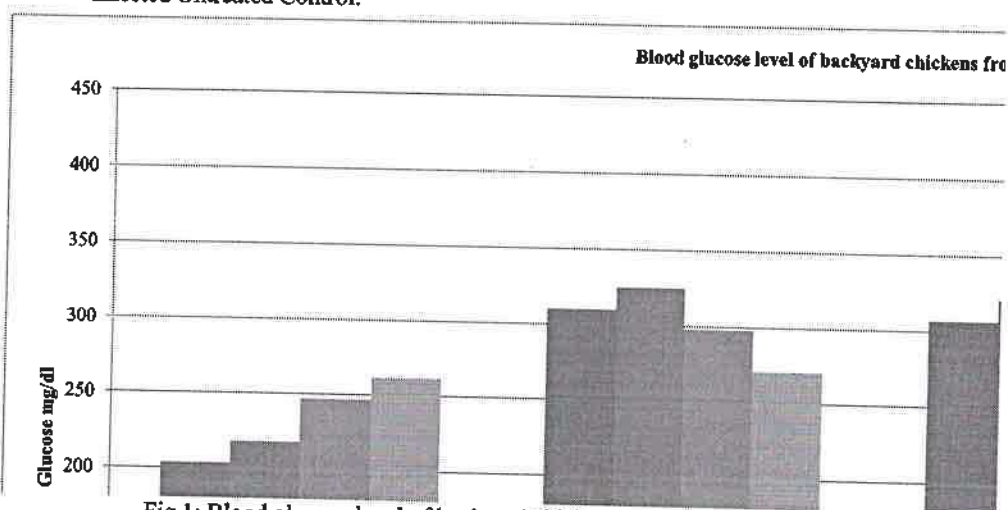


Fig 1: Blood glucose level of backyard chickens from different groups.

There is significant increase in glucose value of untreated group of birds D, (Braun E. J. and Sweazea K. L. 2008) reported that birds maintain the higher glucose concentration as compare to other vertebrate's animal, the values of glucose in the Saudi chickens were higher than the reference values recorded in other birds





reported by (Ibrahim Albokhadaim, et. al. 2012). In the present work he blood glucose levels were significantly increased in infected group as compare to normal healthy control group, but these finding not similar to the findings of (Peninah Wamboi, et. al. 2020) they reported blood glucose level decreased significantly in chickens with parasitic infection. (Bafundo, Ken, et. al. 2018) observed that coccidiosis infected broilers had no effect on blood glucose concentrations, although graded levels of administration of NIC tended to increase these values. The previous study showed the blood glucose lowering effect with the inclusion of *Muraya koenigii* in to the poultry diet, (S. P. Jayaweera, et. al. 2018). The glucose level in experimental group gradually decreased up to 21<sup>st</sup> day of post treatment thereafter, the level of glucose gradually increases (Wikipedia.org/wiki/ascaridia galli.). The present study indicate that the reduction in the value of blood glucose level was noted in the backyard chickens of groups A, B and C as compare to group D. The reduction in blood glucose level could be due to lowered feed intake might have also contributed in depressing the blood glucose level.

#### Conclusion:

Form the above observation it is clear that, the treatment with Palas seed powder had moderate effect in terms of blood glucose level compare to Albendazole. Blood glucose level of allopathic reference drug Albendazole and ayurvedic formulation of Palas seed powder treated group's shows more or less similar values of blood glucose level among the birds. Therefore it is apparent that the treatments of the allopathic reference drug Albendazole which is the unique and sole treatment against the *Ascaridia galli*. infection used everywhere now a days. In this work we use Ayurveda formulation Palas seed powder against backyard chickens those were naturally infected with *Ascaridia galli*. infection, this remedy had moderately contributed to maintain the blood glucose level among the infected backyard chickens.

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**AYURVEDIC FORMULATION AGAINST THE POULTRY DISEASE  
ASCARIDIOSIS: A REVIEW**

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## AYURVEDIC FORMULATION AGAINST THE POULTRY DISEASE ASCARIDIOSIS: A REVIEW

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**Abstract:** Present synthetic medicines are a useful remedy for the disease but also they have a number of side effects. Crude drugs are less effective with respect from side effects to cure the disease but are relatively free from side effects. Parasites have been related to the medical fields for centuries and helminthes considered causing big problems for human beings and animals. Most of the medicinal plants are claimed to possess anthelmintic property in the traditional system and are also utilized by tribal groups worldwide.

**Key Words:** Ayurvedic formulation, Poultry, Ascariidiosis, Review.

### Introduction

Infectious diseases are the main problem that hinders the poultry industry. In that parasitic diseases are very common and *Ascaridia galli* is the most frequent parasitic roundworms found in poultry. Haemorrhages, diarrhea and listlessness are signs of infection. Parasitic infections such as *Ascaridia galli* are treated with chemical anthelmintics (piperazine, albendazole, levamisole, Ivermectin, benzimidazoles, and fenbendazole). These synthetic chemicals can help the resistance, so there is a necessity for alternative ways to treat the disease. Ayurvedic plants have the potential to battle such parasitism and the development of anthelmintic resistance appears to be very slow against such treatment. This review covers the studies related to the screening of plant materials having in vitro and in vivo anthelmintic activities against *Ascaridia galli* throughout the world.

### History of Ayurveda:

Ayurvedic medicine is one of the oldest medical institutions in the world. It began in India and before thousands of years. Ayurveda is the medical system that evolved in India and has survived as a distinct entity from remote antiquity to the present day. It would be motivated to study the history of Ayurveda, trace its origin along with other Indian Systems of sciences and thoughts to assess its achievement and its place in the corpus of world medicine. The systematic study of the genesis and evolution of ideas in any sciences is always interesting and often instructive. But it is not just as an intellectual exercise that the study of Ayurveda is to be viewed. The Indian system of medicine, Ayurveda, was evolved as a system with a rational and logical foundation. That its basic concepts be not re-examined in the light of the greater understandings of the human environment, that for centuries its methods of treatment undergo little change, and that there has been no addition to its literature for a very long time, are charges made against the systems by its critics. It has to be admitted that after the 8th century A.D no book of outstanding merit was written and the literature from then on up to about the 16th Century consisted mainly of commentaries on the original texts. Bhava Prakash which was the last perhaps among the original books is about 400 years old. The basics on which the Ayurvedic system of medicine is based are essentially true for all times and do not change from age to age. (V. Narayanaswamy 1981).

For much of our past history, parts of plant or extracts have been used to combat worm infections, and in many parts of the world natural products are still in use as herbal remedies. Plants are always a very good source of drugs; in fact, many of the currently available drugs were derived either directly or indirectly from them. Helminthic infections prolong to be a major health hazard of people, especially those living in tropical developing countries. Helminthes harm the host by disrobes him of food causing blood loss, injury to organs, intestinal or lymphatic obstruction and by secreting toxins. In Vedic and Ayurvedic works of literature, the word krimi is a vague term used to symbolize tiny living beings. The word Krimi is originated from the root "Kramu" which means to step or to walk. Diverse meanings of krimi are those which move with the legs, one capable to break or injure the surroundings, the living organisms which are born from the vapor of faecal matter in the intestinal tract or such environment as well. In Ayurveda, the infections of parasites and helminthes are included under Krimi roga. Diverse varieties of Krimi are described in Ayurvedic literature. Anthelmintic treatments are described and these were broadly tried. Acharyas give





information about krimis in various Samhitas in detail and they also believed that krimi also act as an etiological factor in various disease e.g. krimija shiorroga, hridaroga, etc. So, at that time, the idea of the krimi as well as their relation to the development of disease was quite known. (V. Narayanaswamy 1981).

#### Ascariidiosis Disease in Poultry:

Ascariidiosis is the important helminthic disease of poultry which is most significant, dangerous and is related to managerial practices. It is one of the major diseases of poultry, mostly affecting the small aged birds. The parasites have many-fold effects on poultry production. The *Ascaridia galli* which causes Ascariidiosis in poultry and found in almost all the areas of the country among all the chickens; causing significant financial losses which are mainly due to a high percentage of morbidity and mortality, poor weight gain. This is one of the most prevalent consistent problems in poultry, particularly tropical countries like India.

In the present review, found that the Ayurvedic plants appear to have good anthelmintic activities in poultry and may substitute conventionally used synthetic drugs, and their use may moderate drug resistance in endemic pathogen populations and drug residues in poultry meat.

#### Review of the present study:

The poultry sector is one of the fastest-growing animal production activities. What ongoing as backyard- village poultry industries during the mid of the 20th century have presently evolved into skillful and organized agri-business in most of the countries (Shahadat *et al.* 2008). *Ascaridia galli* is one of the major causes of the reduction in egg production, the reduced growth rate in broilers and consequently responsible for economic losses to the poultry industry (Adang *et al.* 2010). In the present study, some plants were evaluated for their Anthelmintic activity against different stages of *Ascaridia galli*, *in vitro* and *in vivo* and the literature pertinent to these aspects has been reviewed as under. Asadullah and Sabir (1980) recorded the efficacy of aqueous extract of dried seeds of *Bassia latifolia* was more against adult *Ascaridia galli* *in vitro* than an alcoholic extract, and the extract of water was also more potent than piperazine hexahydrate. Javed *et al.*, (1994) used seed powder of *Caesalpinia crista* @50 mg/kg, to check its anthelmintic activity against *Ascaridia galli* in chicken. They used methanolic extract and piperazine (200 mg/kg) was equally effective in treating the ascaridia infection in poultry. They suggested the crude C. crista powder appeared to be potent and safer than its methanol extract on the basis of the side effects observed. Satrija *et al.*, (1994) studied the anthelmintic activity of papaya latex (*Carica papaya*) against naturally infected pigs by *Ascaris suum*. Animals were separated into three groups and were fed papaya latex per at dose levels of 2, 4, and 8 g of papaya latex per kg body weight, respectively. Results of post mortem worm count on day 7 post-treatment revealed worm count reductions of 39.5, 80.1 and 100% in three groups, respectively. Singh and Nagaich (2000) used different concentrations of the oil from bulbs of garlic (*Allium sativum*) and tested them for *in vitro* anthelmintic activity. 2%, 4% and 6% garlic oil caused mortality in *Ascaridia galli* after exposure for 12, 10 and 8 hours, respectively by reducing significantly the glucose uptake, glycogen content, oxygen consumption and relative activity of acid and alkaline phospho monoesterases in parasites. Costa *et al.*, (2002) studied the activity of hexane extracts and ethanolic extracts of *Mangifera indica* seeds against *Haemonchus contortus* using the egg hatch test. It was shown that the ethanolic extracts inhibited 95.66% of egg hatching at 50.0 mg/ml concentration in a dose-dependent manner. They concluded that the utilization of ethanolic extracts of M. indica may be useful in the control of gastrointestinal nematodes of sheep and goats. Adote *et al.*, (2005) the antiparasitic efficacy of *Carica papaya* seeds against gastrointestinal strongyles was tested in sheep. Animals were given sun-dried or oven-dried papaya seed powder at the doses of 100, 200 or 400 mg/kg live weight. The efficacy rate of papaya seeds on strongyles was highest (>80%) 10 days after treatment at the dose of 200 mg/kg live weight. Mali *et al.*, (2007) investigated the crude alcohol and aqueous extracts of the seeds of *Cleome viscosa* for their anthelmintic activity against *Pheretima posthuma* and *Ascaridia galli*. Various concentrations (10-100 mg/mL) of each extract were tested in the bioassay, which involved the determination of time of paralysis and time of death of the worms. The most major activity was observed at the highest concentration of 100 mg/mL against both types of worms. Siamba *et al.*, (2007) the efficacy of *Tephrosia vogelli* and *Vernonia amygdalina* leaf extracts as anthelmintic against *Ascaridia galli* was determined *in vitro* and *in vivo*. The extracts whose chemical constituents enclosed rotenoids, sesquiterpene lactones, glycosides, anthracenes, and tannins, had important ( $p < 0.05$ ) activity against *Ascaridia galli* both *in vitro* and *in vivo*. The larval migration inhibition of 1A.1% and 63.7 % was observed *in vitro* for *Tephrosia vogelli* and *Vernonia amygdalina* respectively. Faecal egg count reduction of 77.4% and 76.9% and reduced total worm counts at necropsy *in vivo* was exhibited by *Tephrosia vogelli* and *Vernonia amygdalina* extracts, respectively. K. R. Islam *et al.* (2008) studied the different five herbal treatment against the *Ascaridia galli* infected indigenous bird from July 2007 to May 2008, in that they examined that the trials, 4% of methanol extracts of papaya showed the highest efficacy (92.86%) followed by 4% ethanol extract of papaya (92%), Bishkatali (88.46% at 20% conc.) was the highest effective plant against the development of A. galli eggs. Adu *et al.*, (2009) conducted an experiment against artificial helminth infection, treated with oven-dried ground latex of *Carica papaya*. The research work was carried out with an experimental flock of One hundred and twenty cockerels divided into three treatments A, B, C of 4 replicates with 10 birds per replicate. Oven-dried ground latex of pawpaw was the medicament used in





treating the birds at 16 weeks following artificial helminth infestation. A week after treatment, faecal analysis/egg count showed 26.9% and 77.8% reduction in Egg per gram (Epg) in Treatment A (treated with 300mg/dose) and Treatment B, (treated with 400mg/dose) respectively while in Treatment C (the Control) the reduction percentage in Epg was-8.33%. From the results obtained. It was confirmed that the anthelmintic potential in *Carica papaya* latex used in the experimental flock was responsible for the varying helminth egg per gram at faecal analysis following medication. Successful reduction in worm-burden was witnessed at a dosage of 1200mg i.e. 400mg dose/day.

Brito *et al.*, (2009) checked the antihelminthic activity of *Morinda citrifolia* (noni) fruit in chicken naturally infected by *Ascaridia galli*, they used aqueous and ethanolic extracts of fruits. The anthelmintic activity, in vitro, was firm adult parasites. The anthelmintic activity in vitro was determined in adult parasites. The aqueous and ethanolic extracts were used in the following concentrations: 1.69; 3.37; 6.74; 13.48 e 26.96 mg/mL (-1) and 4.17; 8.34; 16.68; 33.36 and 66.72 mg/mL (-1), respectively. The anthelmintic activity in vivo was firm by the administration of ten cubic centimetre.kg (-1) of the liquid (50.1 mg.mL (-1)) and ethanolic (24.6 mg.mL (-1)) extracts throughout 3 consecutive days. Fernandes *et al.*, (2009) were investigating the anthelmintic activity of aqueous and ethanolic extracts of *Annona squamosa* leaves on *Ascaridia galli*, both in vitro and in vivo. In these investigations of vivo tests, the elimination percentage of parasite for aqueous extract was 39% and for ethanolic extract 20%. Kosalge *et al.*, (2009) investigated the aqueous extract of *Thespesia lampas* roots for anthelmintic activity on earthworms (*Pheretima posthuma*), tapeworms (*Raillietina spiralis*) and roundworms (*Ascaridia galli*) in vitro. Various concentrations (10-50 mg/ml) of plant extract were tested within the bioassay. Determination of paralysis time and death time of the worms were recorded. The extract exhibited significant anthelmintic activity at the highest concentration of 50 mg/ml. Lalchandama *et al.*, (2009) the nematocidal effect of *Acacia oxyphylla* upon *Ascaridia galli* was evaluated in comparison to that of piperazine, in vitro. In terms of mortality effect, concentration-dependent efficacy of both piperazine and the plant extract was recorded. The plant extract showed significant efficacy only at the concentrations of 5, 10, and 20 mg/ml. Agarwal *et al.*, (2010) planned a precious work to assess the paralytic effect of the chloroform, acetone, methanol and aqueous extracts of different parts of *Ajuga bracteosa*, *Ajuga macrosperma*, *Ajuga parviflora* and *Trichilia connaroides* of Indian Himalayan region on *Ascaridia galli*. The frequency and amplitude of spontaneous muscular contractions of *A. galli* were recorded on the physiograph through force transducer. There was inhibition in amplitude and frequency of the contracting activity as compared to regulate in dose-dependent manner by methanol extracts of seeds (IC<sub>50</sub> 3.93 ± 0.70), pericarps (IC<sub>50</sub> 0.9 ± 2.64), aqueous extract of roots (IC<sub>50</sub> 6.40 ± 4.74) of *T. connaroides*, methanol extracts of *A. parviflora* roots (IC<sub>50</sub> 16.79 ± 2.93) *A. macrosperma* roots (IC<sub>50</sub> 1.73 ± 0.02) and *A. bracteosa* aerial parts (IC<sub>50</sub> 4.49 ± 0.72). These observations indicated the paralytic effect of the extracts on *A. galli*. There was no inhibition contractile activity by chloroform extract of seeds, acetone extract of leaves of *T. connaroides* and methanol extract of *A. bracteosa* roots on auto rhythmicity of *A. galli*. Begum *et al.*, (2010) administered pineapple leaves to *Ascaridia galli* infected chickens at 1 gm/kg body weight and reported a reduction in EPG to 0 on 21-day post-treatment. Devi *et al.*, (2010) observed that chloroform and methanolic extract from the leaves of *Crotalaria pulchra*, when used in various concentrations (10-50mg/ltr), caused paralysis and death of the worms in vitro. The chloroform extract caused paralysis in 8 minutes, death in 35 min while methanolic extract caused paralysis in 7 minutes and death in 29 minutes respectively, at a higher concentration of 50mg/ml. Gautam Patra *et al.*, (2010) conducted a study on broiler chicken for comparative antihelminthic efficacy of neem and pineapple leaf powder with piperazine hydrate for treatment of experimental *Ascaridia galli* infection. They recorded the lower levels of Hb, PCV, Ca and P in affected birds. After treatment with neem and pineapple leaf powder, the profile was changed, this was comparable to that observed after treatment with piperazine hydrate. Neem and Pineapple leaf powder treatment caused cent percent evacuation of the worms on 28th and 56th-day post-treatment severally. Suharti *et al.*, (2010) reported that *Jatropha curcas* leaves extracted with water and methanol act as an anthelmintic agent for *Ascaridia galli*. Percentage of paralyzed *Ascaridia galli* was higher (P<0.01) in aqueous extract of *Jatropha* leaves. On the contrary, the dead body percentage was higher (P<0.05) in the methanolic extract than that in the control group. In vivo study showed that leaf meal significantly decreased (P<0.05) fecal worm egg count. Rabi and Subhasish (2011) investigated the aqueous extract of *Azadirachta Indica* leaves for its anthelmintic activity using earthworms (*Pheretima Posthuma*), tapeworms (*Raillietina spiralis*) and roundworms (*Ascaridia galli*). Determination of paralysis time and death time of the worms were recorded in vitro. It was found that the extract exhibited significant anthelmintic activity at the concentration of 40 mg/ml. Shirwaikar *et al.*, (2011). the alcoholic and aqueous extracts of *Thespesia populnea* were investigated for their in vitro anthelmintic activity against *Raillietina spiralis* and *Ascaridia galli*. Three concentrations (10, 25, 50 mg/ml) of each extract were evaluated for their activity. The study involved the determination of time of paralysis and the time of death of the worms. The result showed that the alcoholic and aqueous extracts possessed modest anthelmintic activity. Velkers *et al.*, (2011) conducted a study to determine the efficacy of a commercially available garlic product consisting of a high concentration of allicin (i.e., the main active component of garlic) against experimentally induced *Ascaridia galli* infection in chickens. They did not find any significant differences in worm counts of the allicin-treated groups compared with the infected, untreated group and concluded that allicin does not represent an alternative to flubendazole for the treatment of *A. galli* infection in chickens. Jacques *et al.*, (2012) recorded in an in vivo study, that the solution of papaya seeds (2.5g/L) significantly reduced the number





of EPG of *A. galli* as compared to the control group. The percent reduction remained lower than piperazine citrate (2.5g/L of the solution). They concluded that for the treatment of chickens infected with *Ascaridia galli*, papaya seeds can play an important role. Zia-ur-Rehman *et al.*, (2014) conducted a study for comparative therapeutic efficacy of Ivermectin and Piperazine citrate against *Ascaridia galli* in commercial layer birds and rural poultry. They conducted two experiments, each representing commercial layer birds and rural poultry, respectively. In each experiment consisted of 4 groups of 15 birds, named A, B, C, D, (Experiment-1) and W, X, Y and Z (Experiment-2). Firstly they dewormed all groups of birds by the dose of 14mg/kg. Then *Ascaridia galli* infection was inoculated @ dose rate of 2500 embryonated eggs/bird, using a crop tube in groups A, B, C, W, X, and Y. Ivermectin @ dose rate of 200µg/kg was given in birds of treatment groups A and W and Piperazine citrate, @ dose rate of 32 mg/100 kg, PO, in birds of treatment groups D and Z. five birds were euthanized from each group to detect the comparative therapeutic efficacy of anthelmintic used. Piperazine citrate presented better efficacy against *Ascaridia galli* as compared to Ivermectin. Fakhruddin Ali Ahmed *et al.*, (2015) Ethnomedicinal study on *Butea monosperma* (Lam.) Taub. Revealed that native people of Netrokona district extensively use flowers, bark, and leaves of the plant to treat different kinds of diseases. People of the studied area used the plant to treat goiter, diabetes, painful menstruation, body swellings, intestinal worms, urinary stone, leucorrhoea, and chronic fever. The application of root powder mixed with honey as an antidote for snakebite was recorded for the first time. Phytochemical screening of the methanolic extracts of flowers, leaves, and stem of this plant showed the presence of carbohydrate, flavonoid, glycosides, saponins, terpenoids and steroids. Through qualitative assessment, a flower was found to be rich in flavonoids compared to leaf and stem. Leaf extract of *B. monosperma* showed relatively higher cytotoxicity than flower and stem extracts. The highest free radical scavenging activity was observed in the flower sample (73.49%) and the lowest in leaf sample (48.17%). The results of the present study may be proof of a scientific basis for the use of *B. monosperma* in traditional medicine. S. Feroza *et al.*, (2017) worked on broiler chicken; the birds were then artificially infected with *Ascaridia galli* @ 2000 eggs/bird. They treated infected chickens with Ethanol extracts of papaya and neem. The fecal egg count (FEC) was conducted on a weekly basis. The FEC post-treatment values of infected chickens groups were significantly ( $P > 0.05$ ) decreased as compared to the control chickens. They found papaya extract more effective than neem.

#### Conclusion:

Ancient traditional literature and ethno medical study described the utilization of plants in a conventional system of medicines for the treatment of helminth infection. This traditional remedial knowledge is excellent proof of the clinical efficacy and safety of Ayurvedic plants. The present survey is showed that screening of crude plant extract in vitro and vivo anthelmintic studies. To conclude, in future studies, there is a need for phytochemical clinical and possible studies on the molecular mechanisms of action. At a similar moment, efforts should be made to standardize the plant extracts with good Anthelmintic formulate the best alternative herbal preparation to replace or complement the allopathic drugs which are now used.

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## COMPARATIVE STUDY OF MICRO ALGAE IN PRODUCTION OF BIODIESEL AT LABORATORY CONDITION

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### Abstracts:

Presently the world's energy needs are met through non-renewable resources such as petroleum, natural gas and coal. Since the demand and cost of petroleum based fuel is growing rapidly, and if the present pattern of consumption continues, these resources will be depleted in few years. Hence, efforts are being made to explore alternative source of energy. Biodiesel is biodegradable, less CO<sub>2</sub> and NO<sub>2</sub> emissions. Continuous use of petroleum sourced fuels is now widely known as unsustainable due to depleting supplies and therefore the contribution of those fuels to the buildup of CO<sub>2</sub> within the environment. Renewable, carbon neutral, transport fuels are necessary for environmental and economic sustainability. Algae have emerged together of the foremost promising sources for biodiesel production. It can be inferred that algae grown in CO<sub>2</sub> enriched air can be converted to oily substances. Such an approach can contribute to unravel major problems of pollution resulting from CO<sub>2</sub> evolution and future crisis thanks to a shortage of energy sources. This study was undertaken to understand the right transesterification, amount of biodiesel production (ester) and physical properties of biodiesel. In this study we used common species *Oedogonium* and *Spirogyra* to match the quantity of biodiesel production. Algal oil and biodiesel (ester) production was higher in *Spirogyra* sp than *Oedogonium*. However, biomass (after oil extraction) was higher in *Spirogyra* than *Oedogonium* sp. Sediments (glycerine, water and pigments) was higher in *Spirogyra* than *Oedogonium* sp. There was no difference of pH between *Spirogyra* and *Oedogonium* sp. These results indicate that biodiesel can be produced species is better source *Spirogyra* sp.

**Keywords:** Algal oil, biodiesel, transesterification, glycerine



### **Introduction:**

\* The necessity of energy is increasing constantly, due to increase in industrialization and population explosion. The Basic sources of energy are fossil fuels (petroleum, coal and natural gas), hydro and nuclear however, fossil sources are limited and will be exhausted by near future. Biodiesel may be a biofuel consisting of monoalkyl esters that are derived from organic oils, plant or animal, through the method of transesterification. It is also biodegradable, nontoxic and has low emission profile as compared to petroleum diesel. In fact algae are the very best yielding feedstock for biodiesel. It can produce 250 times quite the quantity of oil per acre as soybeans. In fact biodiesel from algae could also be the sole thanks to produce enough automobile fuels to exchange current gasoline usage. Algae produce 7 to 31 time greater oil than vegetable oil. The best algae for biodiesel would be microalgae. Microalgae have far more oil than macroalgae and it's much faster and easier to grow and harvest. The use of microalgae are often an appropriate alternative because algae are the foremost efficient biological producer of oil on the earth and a flexible biomass source and should soon be one among the Earth's most vital renewable fuel crops. Higher photosynthetic efficiency, higher biomass production, a faster growth rate than higher plants, highest CO<sub>2</sub> fixation and O<sub>2</sub> production, growing in liquid medium which can be handled easily make the algae to face high ahead of other oil seed crops. Their production isn't seasonal and may be harvested throughout the year. As a matter of fact, average oil yield from microalgae are often 10 to twenty times above the yield obtained from oleaginous seeds and/or vegetable oils. Different types of biofuel can be derived from microalgae. These include methane produced by microalgae oil and photo-biologically produced bio-hydrogen.

Bioenergy is one among the foremost important components to mitigate greenhouse emission emissions and Substitute of fossil fuels. The need of energy is increasing continuously, because of increases in industrialization and population. The basic sources of this energy are petroleum, natural gas, and coal, hydro and nuclear. The major disadvantage of using petroleum based fuels is atmospheric pollution created by the use of petroleum diesel. Petroleum diesel combustion is major source of greenhouse gas (GHG). Apart from these emissions, petroleum diesel is also major source of other air contaminants including NO<sub>2</sub>, SO<sub>2</sub>, CO<sub>2</sub>, particulate matter and volatile organic compounds. Biomass is one among the higher sources of energy. Large-scale introduction of biomass energy could contribute to sustainable development on several fronts, environmentally, socially and economic. Biodiesel (monoalkyl esters) is one among such alternative fuel, which is obtained by the transesterification of triglyceride oil with monohydric alcohols. It has been well-reported that biodiesel obtained from canola and soybean, palm,





sunflower-seed oil, algal oil as a diesel oil substitute. Biodiesel may be a nontoxic and biodegradable alternative fuel that's obtained from renewable sources. Biodiesel fuel are often prepared from waste vegetable oil, like palm, soybean, canola, rice bran, sunflower, coconut, corn oil, fish oil, chicken fat and algae which might partly decrease the dependency on petroleum-based fuel. The burning of an enormous amount of fossil fuel has increased global warming. Biomass has been focused on as an alternative energy source, since it is a renewable resource and it fixes  $\text{CO}_2$  in the atmosphere through its combustion has no impact on the  $\text{CO}_2$  balance in the atmosphere, because the  $\text{CO}_2$  emitted by the burning of biomass is offset by the  $\text{CO}_2$  fixed by photosynthesis.

#### Algae:

Algae are organisms that are like plant and vegetables. They are commonly found living within the sea, rivers, lakes or ponds. All algae make energy from the sun. There are two different types of algae and they are called "Macroalgae" and "Microalgae". Macroalgae is commonly known as "seaweed". The Word "macro" means big so you'll consider an enormous plant that lives within the sea. Microalgae are often called "phytoplankton". They are so small that you simply are going to be unable to ascertain them within the water together with your eyes. They are normally viewed under a microscope. Macroalgae (Seaweed) is a multicellular organism. This means that they contain many cells that let the macroalgae function. The main parts of the macroalgae are "the holdfast", "the blade", "the frond", "the stipe", "the thallus", "the mid-rib" and "the air-bladders". The blade is like the leaf of a tree and the stipe is like the stem of a flower, if present. This is Algae who will be giving us information on macroalgae. This is Mike who are going to be giving us information on microalgae. The stipe transports nutrients to the holdfast. A collection of blades are known as a frond. The body of the macroalgae is known as the thallus. Some macroalgae have air-bladders to assist them float. The air-bladders contain gas and help lift the macroalgae to the surface so that the organisms can get sun light. Other macroalgae that do not have air-bladders have long stipes to help them float to the surface. Some macro algae have midribs which are located in the centre of the fronds. Macroalgae are divided by their colour into brown, green and red macroalgae. The colors of the macroalgae are due to the different pigments within the organisms. There are brown, green and red pigments within the various macroalgae. All macroalgae have green pigments in order that they can make energy from the sun. Maerl is another type of marine alga. It has a red colour and forms a tough crust. Maerl is small in size and you could hold it in your hand. Unlike other macroalgae they are not attached by a holdfast but live on the sea bed with the sand. Microalgae are small floating organisms that contain one cell and so are called "Unicellular" organisms. The cell is surrounded



by a cell wall. Microalgae can make their own energy and store their energy in the cell. Microalgae are different in their size, shape and colour. They are very small size, usually one quarter of a millimeter. The colour of the microalgae cell depends on their pigments. They can either appear blue-green, yellow, brown or orange. The two main sorts of microalgae are "Diatoms" and "Dinoflagellates". Diatoms are a type of microalgae. They have different shapes. Some are shaped like spheres, elliptical (shaped like a rugby ball), triangles and other diatoms may be shaped like stars. They contain tiny amounts of oil within their cell. The oil helps them move within the water to seek out their food and nutrients. They are weak swimmers therefore the water currents help them to maneuver. A diatom cell is surrounded by a silica shell which makes the cell wall. The silica seems like glass and is employed to guard the cells. The cell membrane within the diatom is sort of a box with an overlapping lid. They cannot move themselves so they float free. The second sort of microalgae is named dinoflagellates. Most dinoflagellates have two "flagella" which appear as if short tails that help them move through the water. One flagellum is wrapped round the cell and therefore the other is visible and helps the microalgae move. They can also use the oil within their cell to sink or swim. Dinoflagellates are surrounded by shell although which they use for protection. Certain sorts of dinoflagellates glow within the dark in the dark when disturbed. Diatoms and dinoflagellates grow very quickly and enormous amounts are called algal bloom. Algal blooms can cause problems for the environment. Both of these microalgae have the ability to cause food poisoning. Shell fish may eat the microalgae as their food and if humans then eat the shellfish they'll get sick. Some algal blooms are very beneficial to the environment making huge amounts of food for fish. Macroalgae and microalgae produce oxygen. Macroalgae are large algae and they look like plants. They are multicellular as they contain many cells. They contain a "holdfast" which may be attached to sand, boats or rocks. They contain a "stipe" similar to a stem of plants. They contain "blades" similar to leaves of a plant and a collection of blades are called "fronds". Some macroalgae have "air-bladders" this helps them float to the surface to catch the sun. Other macroalgae haven't any "air-bladders" just long flexible stipes.

Microalgae are usually microscopic, prokaryotic or eukaryotic, and uni- or pluri-cellular organisms. Among the photosynthetic organisms, microalgae are the most efficient in the absorption of  $\text{CO}_2$  and their growth is directly related to the reduction of GHGs, since they require large quantities of  $\text{CO}_2$  as carbon source. Macroalgae are divided into brown, green and red macroalgae. The different colors are due to the pigments brown, green and red pigments within the macroalgae. There is another type of marine algae which is called "Maerl". These are



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very small and are unattached to rocks so they live on the sea bed. They have a hard calcium crust and are red or brown in colour. Whenever they die they lose their colour and turn grey. Microalgae are much smaller organisms. They can only be seen under a microscope. They are like floating plant and they are unattached. There are two common types of microalgae. Diatoms are one variety and that they have oil within their bodies. This helps them to float. Dinoflagellates are another sort of microalgae which have "flagella". The flagella help the dinoflagellates to swim. Certain sorts of dinoflagellates glow within the dark in the dark when disturbed, are unicellular which means they have only one cell.

#### ***Spirogyra*:**

It is a genus of filament green algae of the order, Zygnematales named for the helical or spiral arrangement of the chloroplasts that is diagnostic of the genus. It is commonly found in freshwater areas, and there are quite 400 species of *Spirogyra* within the world. *Spirogyra* measures approximately 10 to 100  $\mu\text{m}$  in breadth and should stretch centimeters long.

#### **General Characteristics:**

*Spirogyra* is unbranched with cells connected end to end in long male reproductive system filaments. This genus of green algae undergoes a haploid-dominant life cycle. The cell wall has two layers: the outer wall is composed of pectin that dissolves in water to make the filament slimy to touch while the inner wall is of cellulose. The cytoplasm forms a skinny lining between the cell membrane and therefore the large vacuole it surrounds. Chloroplasts are embedded within the peripheral cytoplasm; their numbers are variable (as few as one). The chloroplasts are ribbon shaped, serrated or scalloped, and spirally arranged, leading to the prominent and characteristic green spiral on each filament. Each chloroplast contains several pyrenoids centers for the production of starches, appearing as small round bodies. *Spirogyra* is very common in relatively clean eutrophic water, developing slimy filamentous green masses. In spring *Spirogyra* grows under water, but when there is enough sunlight and warmth they produce large amounts of oxygen, adhering as bubbles between the tangled filaments. The filamentous masses come to the surface and become visible as slimy green mats. Mougeotia and zygnema are often found tangled together.

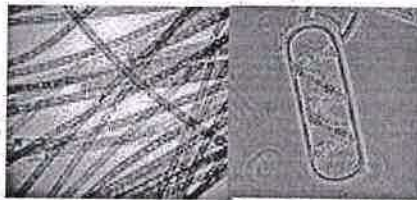
#### **Reproduction:**

*Spirogyra* can reproduce both sexually and rarely asexually. In vegetative reproduction, fragmentation takes place, and *Spirogyra* simply undergoes the intercalary mitosis to form new filaments.



### Sexual Reproduction is of two types:

1. Scalariform conjugation requires association of two different filaments lined side by side either partially or throughout their length. One cell each from opposite lined filaments emits tubular protuberances known as conjugation tubes, which elongate and fuse, to make a passage called the conjugation canal. The cytoplasm of the cell acting as the male travels through this tube and fuses with the female cytoplasm, and the gametes fuse to form a zygospore.
2. In lateral conjugation, gametes are formed in a single filament. Two adjoining cells near the common transverse wall give out protuberances referred to as conjugation tubes, which further form the conjugation canal upon contact. The male cytoplasm migrates through the conjugation canal, fusing with the feminine. The rest of the method proceeds as in scalariform conjugation. The essential difference is that scalariform conjugation occurs between two filaments and lateral conjugation occurs between two adjacent cells on the same filament.



### Nutrition:

*Spirogyra Longata* perform photosynthesis to receive its nutrients. This algae contains special cells called stomata that open and close so the organism can take in carbon dioxide and release oxygen during the chemical reaction in photosynthesis. It is through the chlorophyll within the chloroplasts that *Spirogyra Longata* absorbs light. Chlorophyll reflects all wavelengths of sunshine apart from green, which is why it appears green to us. When the organism absorbed light energy (carbon dioxide), chlorophyll causes the reaction to occur which makes ATP and NADPH. During this reaction water molecules get split, releasing oxygen into the air. In the case of this organism, a lot of it is released. Algae use this energy for numerous functions in its cells. It has also been found that algae also use physics to become efficient. *Spirogyra Longata* uses this process of photosynthesis to receive its nutrients. This organism can easily produce many oxygen and energy due to its constant submergence in water and readily available chloroplasts winding throughout its cells.

### *Oedogonium*:

It may be a genus of filamentous chlorophyte, with unbranched filaments that are one cell thick. *Oedogonium* can be free-floating, though it is usually attached to aquatic plants by a holdfast. It appears greenish and inhabits calm, water.





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### **Asexual Reproduction:**

*Oedogonium* can reproduce asexually by fragmentation of the filaments, through some other types of non-motile spores, and also through zoospores, which have many flagella. These develop in a zoosporangium cell, one zoospore per zoosporangium. After settling and losing its flagella, a zoospore grows into a filament.

### **Sexual Reproduction:**

The life cycle of *Oedogonium* is haplontic, i.e., meioses are zygotic. Antheridia which produce sperm, and oogonia which produce an egg, release the sperm and egg. The egg and sperm then fuse and form a zygote which is diploid ( $2n$ ). The zygote then produces the filamentous green alga which is haploid ( $1n$ ).

### **Species:**

Species of *Oedogonium* are divided into two major groups on the basis of the distribution of the sex organs:

**Macrandous Species:** In these species, antheridia are borne on filaments of normal size. This group is further subdivided into:

**Macrandous Monoecious:** In these species, antheridia and oogonia are found on an equivalent filament. E.g.: *O. nodulosum* and *O. fragile*.

**Macrandous Dioecious:** In these species, antheridia and oogonia are borne on different filaments. Although filaments bearing antheridia and oogonia are morphologically similar, they differ physiologically. E.g.: *O. crassum* and *O. aquaticum*.

**Nannandrous Species:** In nannandrous species, filaments bearing antheridia and oogonia show morphological distinction. The male filament, which is much smaller than the female filament, is called a dwarf male or nannandrium. Nannandrous species are always dioecious, i.e., antheridia and oogonia are borne on different filaments. The small male filaments are likely

### **Diesel:**

The word "diesel" is derived from the family name of German inventor Rudolf Diesel who in 1892 invented the compression-ignition Diesel engines are a type of. Internal combustion Rudolf Diesel originally designed the diesel engine to use coal dust as a fuel. He also experimented with various oils, including some vegetable oils, such as Peanut oil, which was used to power the engines which he exhibited at the 1900 Paris Exposition and the 1911 World's Fair in Paris. Petroleum diesel, also called petro diesel or fossil diesel is produced from the fractional distillation of Crude oil between  $200^{\circ}\text{C}$  and  $350^{\circ}\text{C}$  at atmospheric pressure, resulting in a mixture of carbon chains that typically contain between 8 and 21 carbon atoms per molecule.



### **Chemical composition:**

Diesel does not mix with water. Petroleum-derived diesel is composed about 75%, Saturated, hydrocarbons, (primarily, paraffins including, iso, and cycloparaffins), and 25% aromatic hydrocarbons (including naphthalene and alkyl benzenes). The average chemical formula for common diesel fuel is  $C_{12}H_{23}$ , ranging approximately from  $C_{10}H_{20}$  to  $C_{15}H_{28}$ .

### **Sources of biodiesel:**

Sources of biodiesel was categorically divided into four main classes thus, Edible sources, Non-edible Sources, Animals source and other sources such as Algae, Bacteria, Fungi

### **Difference between Diesel and Biodiesel:**

Today there are great debates going, on the possibility of replacing diesel with an environment friendly fuel called biodiesel. Biodiesel is obtained from vegetable oils through a process called as trans-esterification. It differs from diesel in many ways.

### **Manufacturing process:**

Diesel fuel is manufactured or made from crude oil through a process called as fractional distillation. Crude oil extracted from underneath the earth contains different hydrocarbon compounds each with different boiling point. Using the difference in boiling point hydrocarbon compounds is separated. When the distillation chamber reaches a temperature of 200 °C to 350 °C, diesel is separated from crude oil. The distilled substrate is then purified to what we use as fuel in our cars and trucks. Biodiesel on the other hand is obtained from vegetable oils like Soya, Jatropa, Rice bran etc. by chemically altering it through a process called as "transesterification". The process starts by heating the oil to a temperature of about 55°C and while stirring a titrated mixture of Methanol and potassium hydroxide is added to it. The mixture is allowed to cool. The fuel is separated, with fatty acids at the top and Biodiesel down at the bottom.

### **Properties:**

Biodiesel is more viscous than diesel and has a higher boiling point of 315°C to 400 °C. The flash point of diesel (60°C to 80°C) is less than that biodiesel which in the range of 100°C to 138°C, which make biodiesel easier and safe fuel to store.

### **Usage:**

Diesel can be directly used from gas stations to fill your tanks whereas biodiesel is not widely and when used are blended with diesel to make it work properly. There basically 6 different types of proportions B5, B10, B20, B40, B60, B80, where 'B' indicates biodiesel and the numeric indicated the percentage of biodiesel in the mixture. A B5 mixture would contain 5% Bio-diesel and the remaining is diesel.





#### **Advantages:**

Biodiesel provides lot advantages over diesel fuel. The main advantage is the impact on the environment; biodiesel uses vegetable oil or recycled oil for producing and biodiesel powered vehicle has less pollution thus reducing the emission of greenhouse gases. Another difference is that biodiesel production is scalable. Small and large scale business, private consumers and co-operatives have made biodiesel from the feed stock available locally and thus helping the local economy. Even though biodiesel is available in some retail outlets it has not lived up to the expectation of being the alternate fuel. The main reason could be attributed to the properties of the fuel and its adaptability in diesel engines.

#### **Transesterification and biodiesel production:**

The most common process of converting oil extracted from algae to biodiesel is Transesterification also called alcoholysis, this process convert oil in to biodiesel in the presence of catalyst. Trans-esterification (also called alcoholysis) is that the reaction of a fat or oil with an alcohol to make esters and glycerol,

#### **Biodiesel production:**

Biodiesel is a mixture of fatty acid alkyl esters obtained by transesterification (ester exchange reaction) of vegetable oils animal fats. These lipid feedstock are composed by 90–98% (Weight) of triglycerides and little amounts of mono and triglycerides, free fatty acids (1–5%), and residual amounts of phospholipids, phosphatides, carotenes, tocopherols, sulphur compounds, and traces of water. Transesterification may be a multiple step reaction, including three reversible steps serial, where triglycerides are converted to triglycerides, then triglycerides are converted to monoglycerides, and monoglycerides are then converted to esters (biodiesel) and glycerol (by-product). The overall transesterification reaction is that the radicals R1, R2, R3 represent long chain hydrocarbons, referred to as fatty acids. For the transesterification reaction oil or fat and a short chain alcohols (usually methanol) are used as reagents in the presence of a catalyst (usually NaOH). Although the alcohol: oil theoretical molar ratio is 3:1, the molar ratio of 6:1 is generally used to complete the reaction accurately. The relationship between the feedstock mass input and biodiesel mass output is about, which suggests that theoretically, 1 kg of oil leads to about 1 kg of biodiesel.

A homogeneous or heterogeneous, acid or basic catalyst are often wont to enhance the transesterification reaction rate, although for a few processes using supercritical fluids (methanol or ethanol) it's going to not be necessary to use a catalyst. The extracted oil was evaporated under vacuum to release the solvent mixture solutions using rotary evaporator at 40- 45 °C. Then, the oil produced from each algal species was mixed with a mix of catalyst (0.25g NaOH) and 24 ml



methanol, a process called transesterification with stirring properly for 20 min. The Mixture was kept for 3hrs in electric shaker at 3000 rpm. After shaking the solution was kept for 16 hrs to settle the biodiesel and the sediment layers clearly. The biodiesel layer was separated from sedimentation by flask separator carefully. Quantity of sediments (glycerin, pigments, etc) was measured. Biodiesel was washed by 5% water repeatedly until it becomes clear then Biodiesel was dried by using dryer and eventually kept under the running fan for 12 h. the produced biodiesel was measured (using measuring cylinder), pH was recorded and stored for analysis.

#### **Transesterification:**

The process of converting vegetable & plant oils into biodiesel fuel is called transesterification, and is fortunately much less complex than it sounds. Transesterification refers to a reaction between an ester of one alcohol and a second alcohol to form an ester of the second alcohol and an alcohol from the original ester, as that of methyl acetate and ethyl alcohol to form ethyl acetate and methyl alcohol see also interesterification. Chemically, transesterification means taking a triglyceride molecule or a posh carboxylic acid, neutralizing the free fatty acids, removing the glycerin and creating an alcohol ester. This is accomplished by mixing methanol with sodium hydroxide to make sodium methoxide. This liquid is then mixed into oil. The entire mixture then settles. Glycerin is left on rock bottom and methyl esters, or biodiesel, is left on top. The glycerin are often wont to make soap and therefore the methyl esters is washed and filtered. Transesterification is not a new process. Scientists E. Duy and J. Patrick conducted it as early as 1853. One of the first uses of transesterified vegetable oil was powering heavy-duty vehicles in South Africa before World War II. Transesterification of Algal Oil into Biodiesel: Transesterification of algal oil is normally done with Ethanol and sodium ethanolate serving as the catalyst. Sodium ethanolate are often produced by reacting ethanol with sodium. Thus, with sodium ethanolate as the catalyst, ethanol is reacted with the algal oil (the triglyceride) to produce bio-diesel and glycerol. The end products of this reaction are hence biodiesel, sodium ethanolate and glycerol.

This end-mixture is separated as follows: Ether and salt water are added to the mixture and mixed well. After sometime, the whole mixture would have separated into two layers, with rock bottom layer containing a mix of ether and biodiesel. This layer is separated. Biodiesel is in turn separated from ether by a vaporizer under a high vacuum. As the ether vaporizes first, the Biodiesel will remain.





### **Significance of algal biodiesel:**

There are many advantages to using algae-based biofuel. Algae-based fuel has a lot less of an impact on the environment. When the algae are growing, it actually requires less of a reactant to grow instead of the huge output of CO<sub>2</sub> produced by the burning of petroleum products, plus algae have the highest rate of consumption of CO<sub>2</sub> among the plants. It is easy to mention that growing more algae will have better impact to the environment because it will reduce the CO<sub>2</sub>. The algae growing facilities might be situated around power plants and the CO<sub>2</sub> that is being produced routed directly to the algae so that it can grow and produce oxygen. A coal power-plant flue gas, which contains about 10 to 30 times as much carbon dioxide as normal air, can be cleaned by this method.

### **Sample collection:**

Algae *Spirogyra* sp and *Oedogonium* sp 20.0 g were collected from the Panwadod River 'Jui'

### **Oil extraction:**

Separation of biodiesel from algae  
Extraction of oil: Harvest the algae from its growth medium and extract the oil out of it. Extraction can be broadly categorized into two thus; Mechanical and Chemical Methods:

#### **Mechanical methods:**

The simplest method of extracting oil from algae is mechanical crushing. Usually mechanical crushing is used in conjunction with chemicals.

#### **Chemical methods:**

Algal oil can be extracted using chemicals such as Benzene and Ether, algal oil can also be separated by hexane extraction, Hexane solvent extraction can be used in isolation or it is often used along side the oil press/expeller method. After the oil has been extracted using an expeller, the remaining pulp is often mixed with cyclohexane to extract the remaining oil content. The oil dissolves within the cyclohexane, and therefore the pulp is filtered out from the answer. The oil and cyclo-hexane are separated by means of distillation. These two stages (cold press and hexane solvent) together will be able to derive more than 95% of the total oil present in the algae.

### **Biomass collection:**

The biomass was collected after filtration and weighted.

### **Evaporation:**

The extracted oil was evaporated in vacuum to release hexane and ether solutions using rotary evaporator.



**Mixing of catalyst and methanol:**

0.25 g NaOH was mixed with 24 ml methanol and stirred properly for 20 min.

**Biodiesel production:**

The mixture of catalyst and methanol was poured into the algal oil in a conical flask.

**Transesterification:**

The conical flask containing solution was shaken for 3 h by electric shaker at 300rpm.

**Shetteling:**

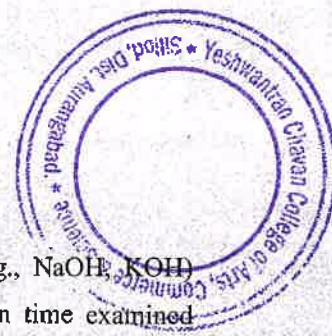
After shaking the answer was kept for 16 h to settle the biodiesel and sediment layers clearly.

**Results and Discussions:**

Comparison of *Oedogonium* sp. and *Spirogyra* sp. shows that *Spirogyra* sp. produce higher quantity of biodiesel than *Oedogonium* sp. and extracted oil in *Oedogonium* sp. was also higher than the *Spirogyra* sp. Biomass (after oil extraction) of *Spirogyra* sp., was higher than the comparing species whereas sediment quantity was greater in *Oedogonium* sp., No prominent difference of biodiesel pH was found between the algal specimens such as *Spirogyra* sp. and *Oedogonium* sp. Production of alternative fuel has attracted wide attention during the past few years, due to the diminishing petroleum reserves and environmental consequences of exhaust gases from fossil diesel. In this context, biodiesel which is characterized as a renewable, biodegradable, and Environment-friendly fuel is becoming a blooming area of high concern. Biodiesel can be produced from macroalgae because it contain considerable amount of lipid contents In addition in heterotrophic condition lipid content can be more in algae investigated that lipids of some macroalgae (seaweeds) was reported to be very high, up to 51% of total fatty acids.







The majority of biodiesel today is produced by alkali catalyzed (e.g., NaOH, KOH) transesterification with methanol, which results in a relatively short reaction time examined different biodiesel sources (edible and nonedible), virgin oil versus waste oil, algae-based biodiesel that is gaining increasing importance, role of different catalysts including enzyme catalysts, and the current state-of-the-art in biodiesel production. The biodiesel esters were characterized for their physical and fuel properties including density, viscosity, iodine value, acid value, cloud value, pure point, gross heat of combustion and volatility and fuel produces slightly lower power and torque, and higher fuel consumption than No. 2 diesel oil. Biodiesel is best than diesel oil in terms of sulfur content, flash point, aromatic content and biodegradability.

#### Conclusion:

Algae are an economical choice for biodiesel production, because of its availability and Environmental friendly properties. Considerable amount of biodiesel can be produced from macroalgae. Due to greater biomass and sediments *Spirogyra* sp. proves, a better choice for biodiesel production than *Oedogonium* sp. Biomass after oil extraction may be used for livestock, ethanol production and also in paper making.

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## Assessment of the Physicochemical Properties of Rajjalwadi Water Reservoir near Sillod Town in District Aurangabad

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*Research Paper - Zoology*

### ABSTRACT

Water is one of the most important and basic need in the life of all living organisms including human being also. The changes occurred in the physicochemical properties of water due to the environment is one of the most challenging issues in everywhere. In Maharashtra and other places of India certain work done on the physicochemical properties of water. Changing environment is one of the major issue due to that water body causes variation in the physicochemical properties of water. The biological wealth of a water body is mainly dependent on its water quality and it is of major issue of concern to mankind today. Rajalwadi water reservoir near Sillod town in Aurangabad District of Maharashtra, it is the main source of water for the people of nearby area for drinking and domestic purposes. No previous record about the physicochemical properties of the water reservoir was found after the drought period. For the present work during the period of June 2018 to May 2019 the water samples were collected at the interval of one month. From these water samples different physicochemical properties analyzed and observed that most of the value shows variation in the range of water properties but these results are within the permissible limit and suitable for biodiversity and domestic purposes.

**Keywords:** Physicochemical properties, Rajalwadi, Water reservoir, Sillod town.



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### **Introduction:**

The first life was originated in the water. Every living organism cannot survive without water, so water is most important in the life of living organisms. "Save Water Save Life" mostly this word used up by various advertisements through Government channel and social agencies. Because water is a universal solvent and essential to human health and food securing as well as ecosystem which contains food chain and food web. The occurrence of the living organisms influenced by water and the characteristics of water are changing due to environmental and other type of pollution. Human interference by the people in the study area are also responsible to disturb the properties and quality water. Water of the reservoir is used for different purpose like irrigation, home use and drinking for pet animals, Keeping in view the severity of the issues it is becoming necessary and important to analyzing the water properties periodically, that's why many workers from various places in India and abroad they engaged in this field and periodically analyzed the water samples from different sampling stations for its properties. Workers includes Anita Jadhav et. al. (2014) Ubarhande et al. (2017), Bade et. al. (2009), Medudhula et. al. (2012), Ajit Kalwale et. al. (2012), Pushpalata et. al. (2017), Umeshkumar Mishra (2016), Mudbe (2015), Sonia Sethi (2016), Chaudhari (2014), Dhugana (2019). Rajalwadi water reservoir is the source of water for Sillod town for drinking and domestic purposes. But after draught period no one carried out the work on this aspect so selected this water reservoir for the analysis of water properties.

### **Materials and Methods:**

For the investigation of water properties in the changing environment the present work is done on the water reservoir Rajalwadi after the drought period. It is located near the Sillod town in District Aurangabad Marathwada region of Maharashtra. For the present study, during the period of June 2018 to May 2019 water sample were collected with the interval of one month from selected sampling stations in 2-liter capacity of plastic containers. These water samples were subjected to analyze the physicochemical properties including pH, Temperature, Turbidity are recorded on the spot at the sampling station because these properties are liable to change during the transportation, for the analysis of other properties like dissolve of oxygen, free  $\text{CO}_2$ , Alkalinity, Hardness, TDS etc. samples of water brought to the laboratory within two hours of sample collection from the sampling site and analyzed. For





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the analysis of pH recorded by using pH pen meter and for the analysis of the remaining physicochemical properties of water samples standard methods were used (APHA 1985, Kodarkar 1998).

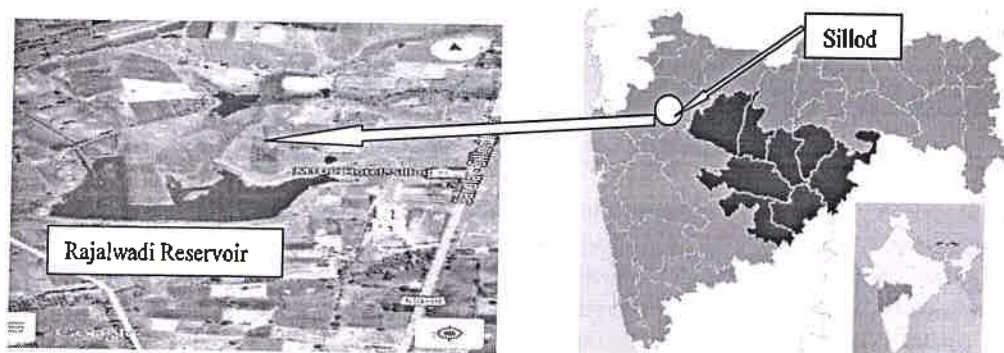


Fig.1: Map showing water reservoir Rajalwadinear Sillod town.

#### Results and Discussion:

The results of the present study i.e. range of obtained values of the collected water samples have been shown in the Table 1. These data values obtained range indicated that the variation occurs in the physicochemical properties of water samples from the Rajalwadi reservoir are due to the differences or changing environmental conditions.

Table.1. Table showing range of obtained values of physicochemical properties of water during the study period.

Sr. No.	Physicochemical properties	Range of the obtained values
01	pH (mg/lit)	6.9 - 7.5
02	Temperature (0C)	20 - 31.5
03	Turbidity (NTU)	8 - 26
04	Dissolve Oxygen (mg/lit)	3.8 - 5.7
05	Free $CO_2$ (mg/lit)	0.9 - 1.5
06	Alkalinity (mg/lit)	79 - 147
07	Hardness (ppm)	31 - 67
08	T D S (mg/lit)	45 - 131

#### pH:

It is the valuable and most important physical properties of water. It plays very important role to determine the stability and suitability of the water. During the study period



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the obtained range of pH of the water found 6.9 - 7.5 mg/lit, in that the obtained minimum value of pH of the water is recorded during the month of April and obtained maximum value of pH of the water is recorded during the month of December. The results of the present study are more or less similar to the results of earlier study reported by (Ubarhande et. al. 2017) in their study minimum value of pH 7.0, 7.1 value observed by (Bade et. al. 2009), 6.99 value of pH reported by (Medudhula et. al. 2012), 7.0 to 8.1 values of pH obtained in their study to (AjitKalwale et. al. 2012)

#### **Temperature:**

It is also most important physical properties of water. This property of water generally depends upon the atmospheric condition of the sampling station at the time sample collection. During the study period the obtained range of the temperature of water from 20 - 31.5 °C, in that the obtained minimum value of water temperature recorded during middle of January month and obtained maximum value of water temperature recorded during middle period of the month of May. This variable range of temperature of water usually depends on the climatic factors or condition of particular location at the time of sampling. Such type of results is obtained to the workers like (Pushpalata J. K. et. al. 2017) values are 20.2, 20.5 at different sampling station, (Umeshkumar Mishra et. al. 2016) and (AjitKalwale et. al. 2012) also reported similar findings to the present results and the obtained values range from 19-28.

#### **Turbidity:**

It is important chemical properties of water. This property of water generally causes due to the presence of suspended matter in the water collected water sample. During the study period the obtained range of the turbidity of water from 8 - 26 NTU, in that the obtained minimum value of turbidity recorded at the end of January month and the obtained maximum value of turbidity of water recorded at the end of the month of June (Mudbe P. K. 2015) reported the range of minimum 7.0 and maximum 24.0 turbidity value these results are similar to the obtained value of the present study.

#### **Dissolved oxygen:**

It is most essential property of water with the help of this property those living organism live in the water i. e. aquatic animals, necessity of DO is for well survival of these aquatic animals. The obtained range of Dissolve oxygen in the water from 3.8 - 5.7 mg/lit during the





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study period. The minimum obtained value of Dissolve oxygen in the water recorded during the month of May and maximum obtained value recorded during the month of December.

#### **Free $\text{CO}_2$ :**

During the study period the obtained range of free carbon dioxide in the water from 0.9 - 1.5 mg/lit during the study period. The minimum obtained value of free carbon dioxide in the water recorded during the month of December and maximum obtained value recorded during the month of May. (Mudbe P. K. 2015) reported 2.0 the free  $\text{CO}_2$  value in the water sample, this value also more or less supported to obtained maximum value of the present study.

#### **Alkalinity:**

Alkalinity of natural waters is due to primarily to the salts of weak acids, although weak or strong bases may also contribute. Bicarbonate represents the major form of alkalinity. During the study period the obtained range of the alkalinity of water from 79 - 147 mg/lit., in that the obtained minimum value of total alkalinity recorded during the month of October whereas the obtained maximum value of total alkalinity of water recorded in the month of December. The results of total alkalinity in the present study are correlated to the month wise findings reported by (Mudbe P. K. 2015)

#### **Total hardness:**

Hardness of water mostly increases due to the mixing of domestic waste in that water reservoir. During the study period the obtained range of the total hardness of water from 37 - 67 ppm, in that the obtained minimum value of total hardness recorded during the month of April whereas the obtained maximum value of total hardness of water recorded in the month of December. Similar finding of the total hardness i. e. 67 reported in the month of October 2013 by (Umeshkumar Mishra et. al. 2016). Minimum value of total hardness 35 reported by (Mudbe P. K. 2015), and similar finding also reported by (Chaudhari U. E. 2014) in Satnoor Dam, all these findings reported by these workers are supported to the value obtained in the present study.

#### **Total dissolved solid:**

During the study period the obtained range of total dissolved solid in the water from 45 - 131 mg/lit. The minimum obtained value of total dissolved solid in the water recorded



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during the month of August and maximum obtained value recorded during the month of December. Maximum value of TDS 130 reported by (Umeshkumar Mishra et. al. 2016) these values similar to the maximum value obtained in the present study.

Variation in the values of physicochemical parameters was observed according to the season in various months reported by (Anita Jadhav et. al. 2014) these findings are supported to obtained value of physicochemical properties of the present study. (Manjare S. A. et. al. 2010) reported that all parameters were within permissible limits according to the values obtained in their study, similarly physicochemical properties of water and obtained values are more or less correlate to the present study.

#### **Conclusion:**

Assessment of this water sample indicates that the value of physicochemical properties of water shows variation in the Rajalwadi water reservoir but these results are within the permissible limit and suitable for biodiversity and domestic purposes. This also indicates that it is non-hazardous to biotic and abiotic components of an ecosystem.

#### **Acknowledgements:**

Authors are thankful to the Principal, Yeshwantrao Chavan Arts, Commerce and Science College, Sillod, Dist. Aurangabad (M.S.) India, and Head Department of Zoology, for providing laboratory and library facilities for the present work.

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Department of Zoology R.S.S.P. Mandal's Nanasaheb Y. N. Chavan Arts, Science and Commerce College Chalisgaon,  
Dist. Jalgaon (M.S.) India.

**Effect Of Abiotic Components On Fish Farming Near Sillod Town; District  
Aurangabad From Marathwada Region Of Maharashtra State.**

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**Abstract:** The present investigation deals with the effect of some abiotic factors on fish farming in Sillod tehsil from Aurangabad district of Marathwada region. Freshwater reservoirs in and around Sillod tehsil were used by the farmers for the purpose of fish farming as allied agricultural business. For this study small scale fish farming were selected randomly for collection of relevant information about the abiotic factors like temperature, light, humidity etc. and its effects on freshwater reservoir fish farming. From the above study it revealed that most of the fish farmers are aware about variation occurred in the abiotic factors, fish farmers of the study area agreed that fluctuation occurred in temperature, increased in light intensity and humidity has a negative effects on fish farming, some of the fish farmers agreed that changes in abiotic factors has also affect the food material available in the study area, ultimately it affects the growth performance of fish. General economy of fish farming in the study area also affected due to the high temperature. Farmers agreed that abiotic factor moisture or humidity encouraged the distribution and development of diseases in fishes. From the above observations it is recommended that there is need to create the awareness among the fish farmers about the effects of abiotic factors on fish farming and improving the production of fish farming and the economic status of fish farmers in the study area.

**Key words:** Abiotic Components, Fish Farming, Aurangabad, Marathwada.

**1. INTRODUCTION:**

Fishes have been pursued by man from the times immortal. It has currently become very popular because the fish have been found to be excellent food and fisheries can be considerably contribute to the solution of our national problems such as self-sufficiency in food and unemployment. Fish resources from the natural water are limited. There is a need for protected water to conserve the fish wealth. Fisheries suffered a setback in a middle of the 19<sup>th</sup> century due to rapid progress in agriculture with application of science. However, fishery was put back on the rails by application of science to it in the present century. It has made a tremendous progress in the last few decades. India is the second-largest producer of fish in the world, contributing to 5.43% of global fish production. Apart from nutritional security, Indian fisheries also provide livelihood support to over 14 million (1.4 crores) people, Kapil Kajal (2020). Fisheries primarily started as capture fisheries in natural water, seas, rivers and lakes. Fish culture is the recent additional to fisheries, but it has acquired a great significance on account of the great prospectus it holds. Fisheries helps to national economy as well as helping as food resources of all over the countries. Fisheries is fast emerging as an important industry with immense job potentials. Freshwater reservoir small-scale fish farmers are the main producers of the fishery industry in many developing countries. The fish farming provides employment at the village level. It provides protein rich food for deadly growing poor population. It has higher nutritive and biological value, it contains only 1-2% fat, it does not contains carbohydrates, it carries good deal of vitamins as A, D, B, C, E and K that are necessary for good health.

Maharashtra has the largest number of manmade water bodies in the country and is geared up to expand its fisheries and aquaculture. The systematic structuring of policies and rigid implementation of the regulations for sustainable utilization of the available water resources for fisheries and aquaculture development should be given more attention to achieve the exemplary growth similar to Chhattisgarh State, Bhendarkar, *et al.*, (2020). The major environmental impacts on fisheries are due to change in land use pattern, transformation in river flow regime, riparian habitat loss, invasion of exotic species, over fishing and agricultural expansion, Mohite S. A. *et al.*, (2013). Freshwater aquaculture related environmental issues are analyze for formulating guidelines for the development of the fishery



sector, S. Ayyapan *et al.* (1999). Different stress factors such as inadequate physicochemical and microbial quality of culture water, poor nutritional status and high stocking density can cause infection by opportunistic pathogens, Mishra S. S. *et al.*, (2017). Primary fish production in ponds is affected by the influence of environmental factors and management practices. Seasonal variations in the environmental factors have to be matched with effective management practices for optimum fish production, Sonia Bajaj (2017). Inland fishery productivity will also be affected by increased water temperatures, variability in water availability, eutrophication, stratification, and toxicity of pollutants. In addition, reduced habitat quality and availability of dissolved oxygen will affect productivity and the nutritional value of aquatic products, FAO (2014). The effects related to climate change involving freshwater ecosystems, are bound to affect fisheries and habitats together with the composition and location of production and will have major impacts on aquaculture productivity and livelihood security of fishers. In freshwater systems, ecosystem health and productivity is linked to water quality, NABARD (2018). The growth of mariculture is dependent on the availability of suitable farming areas for new facilities, particularly for open farming practices that rely on the natural oceanic environmental parameters such as temperature, oxygen, chlorophyll etc. Oyinlola M. A, *et al.*, (2018). Changes in fish population and ecosystem from climate change are likely to have resulting impacts on fisheries sector and national economics. Climate change may also directly affect fishing operations and fishing communities independently of impacts on fish and ecosystem, Sandhya Kupekar *et al.*, (2013). Fish farming has seriously influenced the aquatic environment, fish farming impacts phosphorus dynamics in lake sediments and important mechanisms for phosphorus immobilisation with low fish farming activities, Binyang Jia, *et al.*, (2015). Comparison of abiotic and biotic components of an aquaculture showed better DO and average salinity and gave better fish yielding, Virkar *et al.*, (2004). Due to the changes in abiotic variables its effects on the composition and structure of fish assemblages. The composition and structure of fish assemblages showed significant differences, Abiotic variables, such as total phosphorus, dissolved oxygen, and conductivity, determined the distribution of fish assemblages, low species richness, species loss and diversity reduction, Daga, Vanessa Salete, *et al.* (2012). Role of major abiotic factors such as water pH and hardness on the biological processes of fish like growth, survival, reproductive performance, pH as well as hardness plays an important role on the physiological as well as reproductive behaviour of the fish, Sambid Swain *et al.* (2020). Fish production in reservoir is directly or indirectly dependent on the abundance of planktons, Makode, P. M. *et al.* (2010). The high value of dissolved oxygen coupled with low biochemical oxygen demand and other nutrient levels indicate that the water body is moderately oligotrophic in nature, these factors responsible for declining population of fish species, Thirumala. S, *et al.*, (2011).

Fish farming plays an important socio-economic and nutritional role in the livelihood of rural households in many developing countries. The fish farming can provide an alternate income source to the farmers in this region. It intends to create an opportunity for small farmers specially in the weaken sections of the society. Fishes are efficient converters of feed to meat within a short period of time. Fish farming provide source of income and employment to people compared to other allied agribusiness. The aim of the study was to analyze the variation in abiotic factors in the study area and its effects on fish farming in Sillod tehsil from district Aurangabad of Marathwada region. The main objective of the study includes level of awareness among the fish farmers about abiotic factors and obstacles occurred in fish farming due to the abiotic factors.

## 2. MATERIALS AND METHODS:

The study was conducted in Sillod tehsil from Aurangabad district of Marathwada region. The climatic condition of the study area has broadly classified in to three main seasons summer, winter and rainy season. Summer season starts from February to May, winter season between the month of October to January and rainy season during the month of June to September. Most of the people in the study area are the land farmers as India is the agricultural country. The environmental condition in the study area is favorable for certain agricultural activities and rearing of domestic animals, such as small scale fish farming, poultry farming and dairy. The small scale fish farming were randomly selected as sample for this study. To collect the relevant information, a semi-structured questionnaire was prepared. The information of variation in the abiotic factors and its effects on fish farming is also collected from selected fish farming through personal interview at the farming sites during the study period at different intervals. Information was obtained about variation in abiotic factors and its effects on fish farming, to evaluate the knowledge level about abiotic factors among the fish farmers. The detailed studies were undertaken with a view to find out the changeable condition in the form of abiotic factors and its effects on fish farming and awareness among the fish farmers and fisherman's.

## 3. RESULTS AND DISCUSSION:

During the study period it was observed and found that most of the farmers have ability to adequate knowledge about keep the record and make observation about variation in abiotic factors and it influences their fish farming, Fish farmers with sufficient educational background are most likely to have better ability to keep records and make observation on effects of abiotic factors on their fish farming than the poor educational background. Majority of fish farmer have good years of farming experience and this may influence their level of performance and observation of





abiotic factors and its effects on fish farming. This indicates that the majority of the fish farmers in the study area agreed that they are aware of climate change in the form of abiotic factors and have noticed the effect and the rate of survival and performance of their fish farming.

During the study period it was observed that farmers agreed that high temperature and low rainfall have resulted to obstacles in availability of food. Majority of the farmers agreed that the food material are usually high during winter followed by rainy season as compare to the summer season which may significantly influence the cost production as well as the number of fishes reared by the farmer in his farming. From the data and information by the different sources majority of the fish farmers reported that occurrence of fish diseases only due to the variation occurred in the abiotic factors, particularly humidity and moisture. From the above observation it reveals that majority of the fish farmers agreed that moist climatic conditions encouraged the distribution and development of diseases in fishes in the study area. The abiotic factors affecting the performance and health productivity of fishes that include temperature, relative humidity, light, sunshine prevailing at a given time, These findings are more or less correlated to the findings of Sambid Swain *et al.* (2020). During this study they also reported that high rainfall and relative humidity leads the infection of parasites that causes outbreak of diseases which invariably reduces fish production. They further reported that increase temperature reduces the feed intake capacity of fishes because more energy is needed to conserve the heat caused by high temperature, hence, a decreased in the rate of feed intake. Variations in the abiotic factors alters global disease distribution, affects feed intake, encourage outbreak of diseases which invariably affects fish production ultimately on the economy of fish farming, such type of findings are reported by Mishra S. S. *et al.* (2017). Temperature fluctuation and increased sunshine intensity has negative consequence on fish production resulting low production of fish farming, these reports are more or less correlated to the report of FAO (2014).

#### 4. CONCLUSION:

From the above study and observations it can be concluded that most of the fish farmers are aware about variation occurred in abiotic factors and hence, most of the farmers observed how it effect on fish farming. The study further revealed that variation in the abiotic factors influence the emergence of new health disorders in fishes and increased its distribution. There is need to intensify awareness among the fish farmers about how to tolerate such type of effects of these abiotic factors on the fish farming. Fishery development agencies need to create the awareness among fish farmers and more about the effects on fish farming due to variation in abiotic factors. It also helpful to improve the status of fish farming as well as health status of fish and improve the socioeconomic status of the farmers of fish farming practices in the study area.

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## Diversity Assessment of Fishes from Khelna Reservoir in Aurangabad District of Maharashtra.

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**Abstract:** The present study deals with the diversity assessment of fishes from Khelna reservoir in Sillod tehsil, Aurangabad district of Maharashtra, India. Khelna reservoir is a medium project built across the Khelna river basin. It is used for the purpose of irrigation, drinking and for fish production. During the study period it was found and observed that it having the diversity of fish fauna. It included six species of fishes, all the species were found in this water reservoir and recorded throughout the year. During the assessment it was also revealed that these species are having economic importance. Conservation of these species is also necessary for the balancing of the freshwater ecosystem.

**Key Words:** Fish diversity, Khelna reservoir, Aurangabad, Maharashtra.

### Introduction:

Freshwater reservoir small-scale fish farmers are the main producers of the fishery industry in many developing countries. The fish farming provides employment at the village level. It provides protein rich food for deadily growing poor population. It has higher nutritive and biological value, it contains only 1-2% fat, it does not contain carbohydrates, it carries good deal of vitamins as A, D, B, C, E and K that are necessary for good health. Fish farming plays an important socio-economic and nutritional role in the livelihood of rural households in many developing countries. The fish farming can provide an alternate income source to the farmers in this region. It intends to create an opportunity for small farmers specially in the weaken sections of the society.

Freshwater ecosystem in the form of standing and running water bodies like pond, lake, reservoir, stream, river etc. included aquatic biodiversity<sup>(1)</sup>. About 21730 species of fishes have been recorded in the world (Nelson 2006). Water reservoir conserve a variety of fish species which leads and support for the commercial fisheries<sup>(2)</sup>. There is a rich diversity of fish in Maharashtra, fish fauna and distribution is useful for designing and implementing conservation strategies<sup>(3)</sup>. India has prolonged inland fisheries resources with different aquatic water bodies such as tributaries and distributaries of river system and interconnection of canals crisscrossing of the country, it included natural lakes and large number of reservoirs<sup>(4)</sup>. The Indian reservoirs harbors a variety of fish species and primarily express the fish faunal diversity, fishes are rich in proteins, vitamins, nutrients and thus are the chief source of food<sup>(5)</sup>. India is endowed with vast resource of reservoirs with more than 3.0 million hectares of water spread area. The fish species diversity which is currently recognized worldwide, and shows 25000 species are found in freshwater ecosystem and about 11.7% are found in Indian waters. Thus, freshwater fish discovery can save a platform of livelihood and biodiversity of conservation value<sup>(6)</sup> ([www.fishbase.org/search.php](http://www.fishbase.org/search.php)). Biodiversity in inland waters is important to sustain health of the ecosystem as well as the prosperity of our society. It is also significant for its economic value as a habitat for commercially important species and plays an important role in food and nutritional security of people, specially in the rural areas<sup>(7)</sup>. Among the fish culturing countries in the globe, India took a major share of large diversity of fish fauna and more number of threatened fish<sup>(7)</sup>. Fishes are efficient converters of feed to meat within a short period of time. Fish farming provide source of income and employment to people compared to other allied agribusiness. The aim of the study was to assessment and documents of the diversity of fishes from Khelna reservoir from Sillod tehsil in Aurangabad district, Maharashtra, India.

### Materials and Methods:

Khelna reservoir located in Sillod tehsil near Palod town was selected for the assessment of diversity of fishes. This reservoir is spread is a hectares area and fed from local run off water from





agriculture fields and seasonal rainfall. It has been used for fish production. For the assessment of fish diversity sampling was done at different intervals from each season of the annual cycle during June 2016 to May 2017. During the study period fishes were collected personally and collected with the help of skillful fisherman. Collected samples of different fishes preserved in 5% formalin solution and brought to the laboratory for further study. On the basis of standard methods and by referring standard literature of various taxonomic keys are used for identification of collected fishes (8, 9, 10, 11, 12).

## Results and Discussion:

Khelna reservoir is one of the major waterbody in Sillod tehsil of Aurangabad district in terms of area and water holding capacity compare to the other reservoir in the study area. For this study selection of this reservoir is due to the poor attention has been paid towards the development of fisheries and systematic assessment of fish diversity. The present study focused on the fish diversity of the reservoir and there is a need to generate the data and information about the diversity.

The present assessment was undertaken to prepare a primary checklist of fishes from Khelna reservoir and it is the first efforts in this direction. During the study period it was observed that a total of six species were recorded from the Khelna reservoir. Details of these fishes along with their economic value are listed in the table 1.

Table 1. Fish species and economic status during the annual cycle 2016-17.

Sr. No.	Name of the species	Economic status
1	<i>Catla catla</i>	High
2	<i>Mastacembulus armatus</i>	Less
3	<i>Labeo rohita</i>	High
4	<i>Glossogobius giuris</i>	High
5	<i>Cyprinus carpio</i>	High
6	<i>Channa striata</i>	High

Species diversity of fishes in the reservoir is very less as compared to other reservoirs in the district Aurangabad and in Maharashtra, Hiware and Pawar<sup>(13)</sup> reported 43 species of fishes in Nathasagar reservoir, 21 fish species reported by Sakhare and Joshi<sup>(14)</sup> in Bori reservoir, 9 species are reported by Keshave and Landge<sup>(15)</sup> from Isapur dam in Maharashtra.

From the above observation and results of the study it can be concluded that the diversity of fishes from Khelna reservoir is less but according to their economic status there is possibility to increase the fish diversity in future. For that the awareness among the fisherman and proper management strategies of the reservoir according to the aquatic life of the reservoir should plan in future.

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# The COVID-19 pandemic: Impact Assessment on Poultry Farming in Aurangabad District of Marathwada region.

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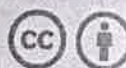
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## ABSTRACT

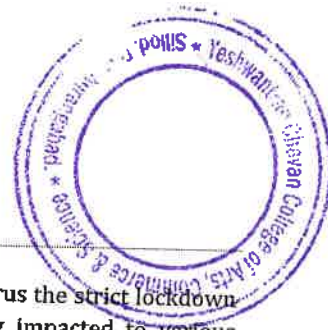
The COVID-19 is a major and wide global issue concern to the health of human being, it can lead to various severe problems created adverse impact on various agro-based sectors including poultry farming. Researchers from different fields have studied about the issues and have addressed the possible impacts of COVID-19 on variety of complex issues and problems associated with the poultry farming. Therefore, the present study aimed at to assessed the condition and challenges of COVID-19 by linking its impact on poultry farming with dependent peoples. The pandemic and lockdown impacted the overall poultry production system. This creates a results in drastic reduced value of consumption of poultry products. The study was conducted based on primary data collection, during the same period and its connection with poultry farming, its production, demand and supply was analyzed. Due to the situation of COVID-19 farmers faced various issues related to their need like low income, labor issues, starting of production, transportation problems, low demand of consumers, financial issues were identified. The present study shows that the impact of COVID-19 and its overall scenario on three different selected poultry farms in Aurangabad district. To assessing the impact on these farming a systematic study carried out with the help of collection of primary data from the study area, which provides the information about the impact on different parameters in the poultry farming.

**Keywords:** COVID-19, Poultry Farming, Aurangabad, Marathwada.

## INTRODUCTION

In the year 2019, December 31<sup>st</sup>, in Wuhan, Hubei Province, China, reported the first cases of infection of a new corona virus (2019-nCoV) by (WHO, 2020), which generate and spread the disease known as COVID-19 (Wang, 2020). The disease occurred by corona virus, COVID-19, is a newly infectious disease caused by severe acute respiratory syndromes (SARS-2) i.e. corona virus 2 and it is the member of coronaviridae known to infect particularly the human beings, (Anderson et al., 2020). After some period the disease spread over in majority countries in the world.





The World Health Organization (WHO) has officially declared the corona virus a global pandemic, as of 21 May 2020, there had been more than 6,86 million corona virus cases and 398483 deaths worldwide (World meters 2020). Now, due to COVID-19 creates global health problem and it also affecting the normal development of the various sectors of the society. The pandemic situation disturbing all components of the life including humanity. Many people are staying at their home to minimize the transmission and spreading of the corona virus in the worldwide. Most of the countries are adopting some preventive measures against the pandemic situation, like compulsory lockdowns, restriction in travel, social distancing, work from home, online works wherever possible. During the COVID-19 pandemic period the agricultural related production is affected. The economic status of the various country is mostly dependent on agriculture activities, poultry sector is one of the major activity run in the country. Now not only the world but also all parts of the country is struggling to combat impact of Covid-19 by disrupting industries and agricultural fields including poultry farming along with the dependent peoples. Poultry plays an important role in the diet of the people in various community due to easily available and economical for deadly growing poor population. Poultry sector is not only playing an important role in maintaining nutritional demand but also it help to improve the socioeconomic status of the farmers.

The poultry farming takes several diversified forms and productivity depends upon land, human resources and skill, infrastructure and capital. The socio-economic and political situation also plays a significant role in development and existence of the poultry industry. I almost all over the world, poultry industry production is becoming increasingly organized, specialized and shaping in to an industry of national economical importance. The poultry farming can provide an alternate to the farmers in the region reeling under repeated drought spell. Maharashtra is amongst the leading states for commercial layer farming and broiler farming. Sources indicated that government of India has focused on promoting "desi" poultry along with bio-secure environment. It intends to create an opportunity for small farmers specially in the weaken sections of the society. The government has taken decision to promote poultry farming in tribal and backward regions of north Maharashtra and Marathwada. (Khapre, 2015).

Due to over spreading of Corona virus the strict lockdown applicable in India. It has directly impacted to various agriculture activities including poultry farming. Major population in India is depends on the agricultural activities and thus found the impact of this situation on the agriculture activities. It shows variation in different part of the country. The lockdown also has severely impacted to the rural population particularly farmers have been impacted due to lockdown on their livestock rearing, (Kelkar Bhakti 2020). In India rural areas constitutes maximum poultry production whereas urban area constitutes maximum consumption (NAPEP, 2017). Transportation of poultry production has become completely compromised as a results of lockdown, (Kolluri et al. 2020). National smallholder poultry development trust, the largest poultry enterprises fir dalit and tribal women of the country was severely compromised and losses in their turnover due to covid situation, (Kanitkar and Tushir 2020). India at present, is the fourth largest poultry production in terms of volume, (Shukla, 2020), the incidence of COVID-19 pandemic at the beginning of the year brought an unpredictable impact on the poultry sector, (Biswal, 2020). Considering the fact of COVID-19 the aim of the present study is to analyze the direct or indirect impact of COVID-19 on the selected poultry farming in Aurangabad district of Marathwada region.

## MATERIAL AND METHODS

The present study was conducted among the three different selected poultry farms in Aurangabad district of Marathwada region, under the administrative division of Aurangabad. The poultry farms in district Aurangabad were selected and categorized as small, medium and large poultry farms depending on the bird rearing capacity. The three poultry farms were randomly selected as sample for this study. The whole area of the Aurangabad division is fully locked due to spreading of COVID-19. Considering the severity and spread of disease in the study area, it was not possible to do extensive fieldwork, with a wider and a larger samples. Thus in the form of three different poultry farms were chosen as a sample for the study. For collecting the information and data the study was conducted based on primary data sources collected by applying a tools such as telephonic interview. Use of telephonic interview to conduct the study during such





lockdown period and helped to collect the data quickly. The data were collected by the survey methods including a semi-structured questionnaire. The questionnaire focused the questions on impact on poultry farming, poultry transportation, status of market and consumer demand. Individual interviews and telephonic interviews with poultry farming dependent communities were conducted in these three different poultry farms from the district Aurangabad of Marathwada region. Information was obtained about the problems faced by the farmers during the pandemic situation. The detailed studies were undertaken with a view to find out the issues and pandemic associated problems among the poultry farmers.

## RESULTS AND DISCUSSION

Three different category of poultry farm according to the rearing capacity of birds were selected in this study area. Those were small, medium and large poultry farms. In this study the farmers and dependent peoples were involved from small, medium and large poultry farming. COVID-19 Scenarios in the study area by observing through the media and many experts from the government bodies mention that detection of the infected persons due to the lack of monitoring and schedule of insufficient test. During the study period the increase trends of positive cases in the study area was found. Many people from the study area did not follow the suggested quarantine and found to meet friends and family and travel here and there. To control the situation the government shut down all educational institutions, government also banned all political, social, cultural, and religious gatherings in the country. Response of the poultry farmers and dependent communities on COVID-19 People who were solely dependent on poultry farming i.e. rearing of poultry, poultry selling and poultry farming were facing difficulties to combat emerging COVID-19 situation. During the study and according to

obtained data it was observed that large poultry farmer could not go out for their necessary demand regarding the poultry due to COVID restriction while medium and small poultry farmers mentioned COVID put adverse impact on their poultry production due to scarcity of input and service provider. All the farmers reported that COVID-19 would negatively affect resource of poultry dependents income due to restrictions placed on them.

Due to COVID-19 the poultry production system and dependent in the study area is facing a crisis. In addition to affecting the public health sector, COVID-19 has covered the country's economy, business activities, transportation, food supply, food security and more. The lockdown situation has made the food supply worse respectively. Supply of poultry resources that play an important role in the diet and nutrition of the people is also become disrupted. The study found that COVID-19 was affecting the poultry production system in two significant aspects, the supply and demand for food. These two aspects were directly related to food of the people. Its adverse impact on consumer demand and consumption. The findings also agreed with global situation where 820 million people were more vulnerable with incurable starvation and less access to consume nutritious diet (Siche 2020). Poultry farmers prohibited from working on their fields and unable to collect necessary essentials by selling their products in the market, ultimately low income families faced more problems. Impact on poultry farmers and hatcheries COVID-19 directly and indirectly hampered poultry food production system drastically. Marginal poultry farmers use the birds mainly to meet home consumption demand and sold the remaining production that added money to their family income. Poultry farmer and the entrepreneurs indicated that transportation of poultry, feed and other necessary inputs was the main problem.

**Table 1:** Obtained information about the impact of COVID-19 on poultry farming from Aurangabad district.

Category of Poultry Farm	Impact of COVID-19 on different parameters of poultry farming							
	Panic	Illness	Labor	Consumers	Production	Transportation	Financial	Income
Small	++	++	++	+++	++	++	+++	+++
Medium	+++	++	+++	+++	+++	+++	+++	+++
Large	+++	++	+++	+++	+++	+++	+++	+++

(+: Minimum Impact, ++: Moderate Impact, +++: Maximum Impact)



Large poultry farmers also reported that they couldn't sell mature birds due to transportation complexity and low market demand but the farmers spent extra money to feed the birds that ultimately reduced family income and increase expenditure as well. All Poultry Farmers reported that they could not start new farming cycle due to unsold birds that also declining the selling price of poultry and adverse impact in the poultry farming. Farmers reported that gradual weight loss due to inadequate food supply day after day, due to lack of medicine, necessary ingredients and improper management of the farming were getting abnormal growth of the birds. Because of these problems, farmers, workers, hatchery owners and related members were facing losses which ultimately could have a long term impact on poultry economy. During the pandemic period their life and life of the people associated with them became more difficult than before. Poultry farmers and allied peoples faced major problems to lockdown periods like low rate of poultry, low income, lack of alternative income generating activities, low consumer demand, meanwhile a majority of the labor engaged in processing and marketing were unemployed. Poultry farmers faced problems related to illness and unemployment were the main issues. They become stay at their home due to the situation and stop their source income.

## CONCLUSIONS

The pandemic known as deadly COVID-19 disease has significant impacts on human and agriculture activities, with poultry farming. Farmers compromised due to movement restrictions, reduced in demand of poultry products its impact on the poultry farmers and associated people. So it is necessary to take the action against the issues occurred due to corona virus particularly to the poultry farmers and associated people from the rural area. This paper will contribute to the scenario of current COVID-19 pandemic and its impact on poultry farming in the study area.

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**Conflicts of interest:** The authors stated that no conflicts of interest.

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## PREVALENCE AND SEASONAL STUDY OF GASTROINTESTINAL AND SOME PROTOZOAN PARASITES FROM SMALL RUMINANT IN AN AROUND SILLOD TAHSIL FROM AURANGABADDISTRICT

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### ABSTRACT:

Rearing of small ruminants are the important for farmer to improving the economy of our country. New breed majorly used in rural areas to obtain high productivity. If ignore Proper management and health care then parasites infects the animals and cause less productivity. Helminthes and Protozoan parasites are the major gastrointestinal parasites which cause hazardous effect on small ruminants such as sheep and goat in rural areas, which create highly economical loss of farmer. If ignore these infection cause higher mortality rate. The present study carried out to investigate prevalence of gastrointestinal and some protozoan parasites, their rate of infection seasonally and risk factor in sheep and goat from Sillod tahsil, from Aurangabad district in Maharashtra. Fecal sample were collected from different sites of geographical location around Sillod tahsil. Overall study period was since June 2018 to May 2019. During this period 410 samples from sheep and 530 from goat as total 940 samples were collected seasonally. Out of them 296 positive (72%) in sheep and 327 positive (61%) in goat gastrointestinal parasites. Overall 643 samples positives out of total 940 samples. High infection rate found in monsoon season 83% in sheep while 73% in goat. During winter 71% in sheep and 60% in goat, 61% in sheep and 50% in goat during summer respectively. Age and sex wise infection higher in less the one year animal 80% while sheep shows more infection rate than goat. Infected animal shows loss of weight, birth rate and difficulty during feeding. Other Protozoan parasites *Coccidia*, *Balantidium* and *Entamoeba* species also found in higher rate. Coccidiosis is more Zoonotic agent found 69.45% during study period.

**Keywords:** Prevalence, Seasonal, Helminthes, Protozoan, Sheep, Goat, Sillod.

### INTRODUCTION:

Rearing of small ruminants are the major sources for rural communities in India. Among the livestock large diversity of sheep and goat gives 0.5-5% of total output, (Singh, 1995). On the base grazing flocks of sheep and goat in the form either migratory during season to season. In Maharashtra rearing mostly occupied by dhangar community. The dhangar stay in the village during monsoon with their flocks of small animals and feed to millets. Later on migration towards grazing lands on natural land across the state and hilly area.

Sheep flocks from Solapur districts migrate towards Marathwada region in search of fodder and water. Flocks from Aurangabad, Jalna migrate towards forest areas of Dhule and Jalgaon districts. This migration continues up to the May end, after which flocks return to their native villages, (Dept. of animal husbandry, Govt. of Maharashtra). Older and Poor people's family rare goats in their farm or side of village boundary.

Different product obtained from sheep and goat such as milk, wools and good price at market yard as well as skin is used for making



different leather product. Different communities of people consumed meat (flesh) of sheep and goat. Grazing of these animals in natural habitats always interaction with parasitism which infect serious health problem. Still around rural areas people not able to maintain their animals for diagnosis of illness medication perfectly. If no proper precaution and medication greatly loss productivity. Animal disease such as parasitism, viruses and bacterial infection majorly causes health of goat and productivity (Nansen, 1991; kushiluka, et. al, 1998).

Intensive rising of small ruminants farms inevitably exposes the flock to various diseases which causes economic loss of farmers. Parasitic disease animal can also be hazardous to the health of human. There may be possibilities of damage to the human body due to intake of the diseased animal. In India, particularly in rural area health status of the small ruminants due to diseases is being faced by farmers. The health status of sheep and goat mostly fluctuates by parasitic infection. Generally two broad categories parasites cause hazardous effects as ectoparasites and endoparasites. The ectoparasites are ticks, lice, keds and mites while endoparasites of gastrointestinal nematode, cestodes, trematode and protozoa respectively. This parasitic infection has a serious impact on health, productivity, quality and quantity of meat. It also reduces the food value of small ruminants. Which intern affects on total production causing high economic loss to farmers as well as the country too.

Considerable knowledge pertaining to parasites was known in ancient India (Hoeppli, 1956) the credit for laying the scientific foundation of parasitology in general and of veterinary and medical parasitology particular,

in India goes to a few enthusiastic officers of the veterinary and medical services in the second half of the 19<sup>th</sup> century, the history of parasitology in India can be followed in successive phases. Knowledge in this area has come to light only during the beginning of the twentieth century (Cheng, 1964) at the time of second phase in India. Parasitological research was incepted in different universities in the country. Recently in the field of life science particularly Zoology many workers who made extensive work about morphology, biology and population of parasites. Helminthes required period of maturation in the soil to become infectious, other require the involvement of an intermediate host reported by Arcari et al. (2000). The most favorable sites for intestinal parasites are the duodenum, ileum, cecum and large intestine reported by Cuomo et al. (2000). To survive or reproduce in the gastrointestinal tract the parasites have to adapt to continuous physiological changes relative to the feeding habitats of the host reported by Lyons et al. (1914), Leonard (1987), Cuomo et al. (2000).

#### MATERIALS AND METHODS:

The study of prevalence rate helminthes and Protozoan parasites has been done at Sillod tehsil during June 2018 to May 2019. Sillod is fastest growing tehsil under Aurangabad district. Rearing of sheep and goat is the most demanded occupation in rural parts of Sillod tehsil. Sillod city is the huge increasing population in district Aurangabad. Many other immigrates here for search of employment, job and business. Population up to 70thousands and coordinates is 20.3N 75.65E. So there is great demand for meat, milk and their product, this gives better options for rearing small ruminants in Sillod tehsil and around part. The survey of annual tehsil estimated





that 100-150 animals used in slaughter house per day for meat selling. The government also launches various schemes for poor farmer loan scheme on sheep and goat rearing. The detail study taken to find out parasitic infection rate during season to season.

#### **Study Design**

Randomly section of flock and differentiate each flock into age and sex wise animals. 50 Different sampling stations completed fecal samples were collected from different sites of geographical location around Sillod tehsil. Overall study period was since June 2018 to May 2019. During this period total 940 samples were collected. All the data recorded with collection site, date and number of positive and negative sampling. The data has been tabulated with the help of Microsoft office Excel, Tables, Charts and graphs.

#### **Fecal sampling**

The fecal samples were collected randomly from farm yard and migratory flock of animals respectively. Farm animal gets ready foods provided by owners while migratory goats grazing on natural land habitat of grasses and small bushes. Fecal samples were collected carefully and skillfully handling of goat animals. Sample also collected from slaughter house under veterinarian professional. The plastic (polythene) gloves are used to collection fresh samples from rectum of each goat. Samples also collected from ground when freshly excreted by animal during supervision. Sample was stored in 3% formalin containing test tube. Immediately tightly packed with labeling. Finally samples were stored in ice box and bring it to the laboratory for further examination.

#### **Fecal Examination**

Examination takes place under light microscope. Use of stains to better detection of parasites.

#### **A) Direct smear Method examination**

Direct observation of helminthes parasites by placing of small quantities of sample at two different sides by dropper on same clean and dry slide. Out of one sample added by iodine solution and direct examine parasites under microscope.

#### **B) Flotation Method Examination**

The small quantities of samples take in test tube and filled it with water up to top, place the cover slip horizontal. Finally cover slip placed on slide and direct observation under microscope.

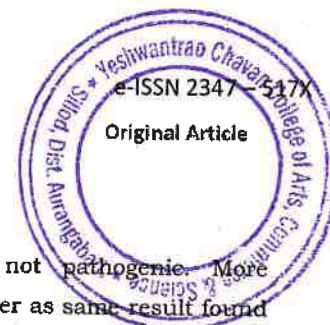
#### **C) Sedimentation Method Examination**

Samples were centrifuge and small amount of sample collect from bottom of test tube for examination.

Above B and C method by MAFF (1986). Parasites detection by temporary mount slide, later on permanent slide constructed.

#### **RESULTS AND DISCUSSION:**

During these period 410 samples from sheep and 530 from goat as total 940 samples were collected seasonally, out of them 296 positive (72%) in sheep and 327 positive (61%) in goat gastrointestinal parasites. Overall 643 samples positive out of total 940 samples. High infection rate found in monsoon season 83% in sheep while 73% in goat. During winter 71% and 60% while 61% and 50% in summer respectively. Near about same result reported by A. Vardharajan and R. Vijayalakshmi (2015). Age and sex wise infection higher in less the 1 year animal 80% while female goat shows more infection rate



than male. Infected animal shows loss of weight, birth rate and difficulty during feeding. Species wise prevalence infection rate recorded in table 1 and expressed in pie charts. Gastro intestinal parasites such as *Haemonchus* species (39.63 %) *Trichuris* species (25.09%) *Strongyloides* species (19.63%) *Fasciola* species (10.09%) *Moniezia* species (9.81%) *Amphistomes* species (7.27%) and mixed infection belongs to protozoan parasites.

The rate of *Haemonchus* species infection higher in all seasons, also recorded by A.U.Sutar (2010), Patanaik et.al (1973). The seasonal occurrence and variable prevalence rate (39.34–92.4%) of these parasitic infections have been reported from different states of India as Chhattisgarh Pathak and Pal (2008), Haryana Gupta et al. (1987), Jammu and Kashmir Mir et al. (2008); Tariq et al. (2010); Khajuria et al. (2006); Lone et al. (2012), Karnataka Murleedharan (2005), Maharashtra Maske et al. (1990); Chavhan et al. (2008); Sutar et al. (2010).

The gastrointestinal parasitic infection commonly found during monsoon and post monsoon season in India and their prevalence shows variation as per environmental conditions. Yadav and khajuriya (2012) reported from Jammu district examined fecal sample of small ruminants and find out 83.07% gastro intestinal parasites, they found that it was highest during rainy season after summer and winter. Parasitic infection negatively affecting the health and huge economic losses owing to both clinical and chronic sub clinical infection reported by Singh et al., (2011). Coccidian shows highest rate 69.45% just near the results as A. K. Dixit, G. Das, R.P.S. Baghel (2017). Alok Kumar Dixit (2017) and Singh A (2015) but

some coccidian are not pathogenic. More infection found in winter as same result found by A. K. Dixit, G. Das, R. P. S. Baghel (2017). *Balantidium* species infection rate 10.00% as same result found from Rajasthan in cattle Choubisa SL Jaroli VJ, and Ying-Na Jian, Ge-Ging Wang, Li Qing Ma.

### CONCLUSION:

The present study revealed that the helminthic infection commonly found in small ruminants (sheep and goat) in an around Sillod tehsil in Marathwada region. The higher rate of infection found in rainy season than winter while lowest rate of infection found in summer season. *Haemonchus* species are most prevalent species followed by *Trichuris* and, *Strongyloides* species respectively. Apart from these Protozoan parasites also found in same selected ruminants. Among them Coccidian species more in percentage. This study indicated that helminth and protozoan infection in these selected small ruminants is highly prevalent in this region. If ignore them ultimately loss the health of animal and also due to the higher infection causes mortality in the animals. Therefore it is necessary to create awareness among the people and farmers in this area about the spread of such kind of infection in the small ruminants. So it can be concluded that further studies on the appropriate control measures of the parasitic infection in small ruminants need to be design for improvement the health status of these animals and productivity, it will be helpful to minimize the loss of the farmers ultimately increase their economic status.

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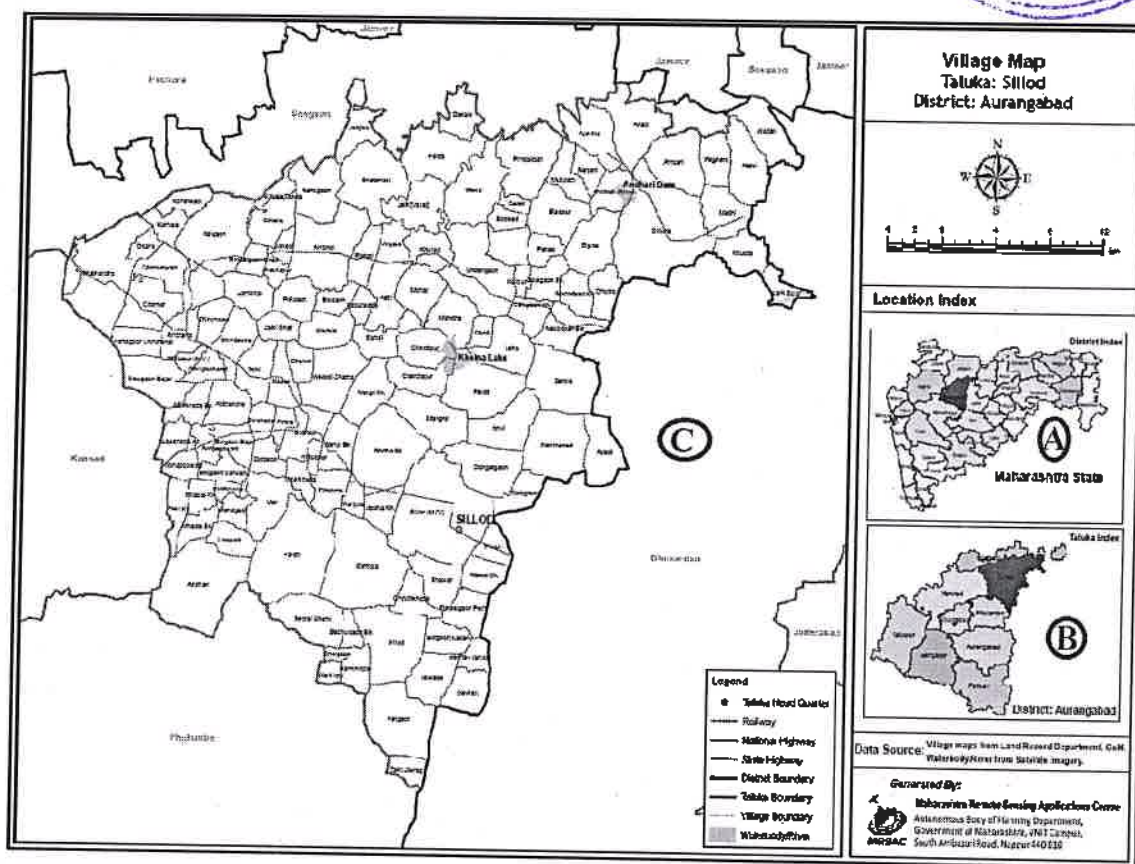


Fig.No.1: Map showing A-Maharashtra (State), B-Aurangabad (District), C- Sillod (Tehsil).

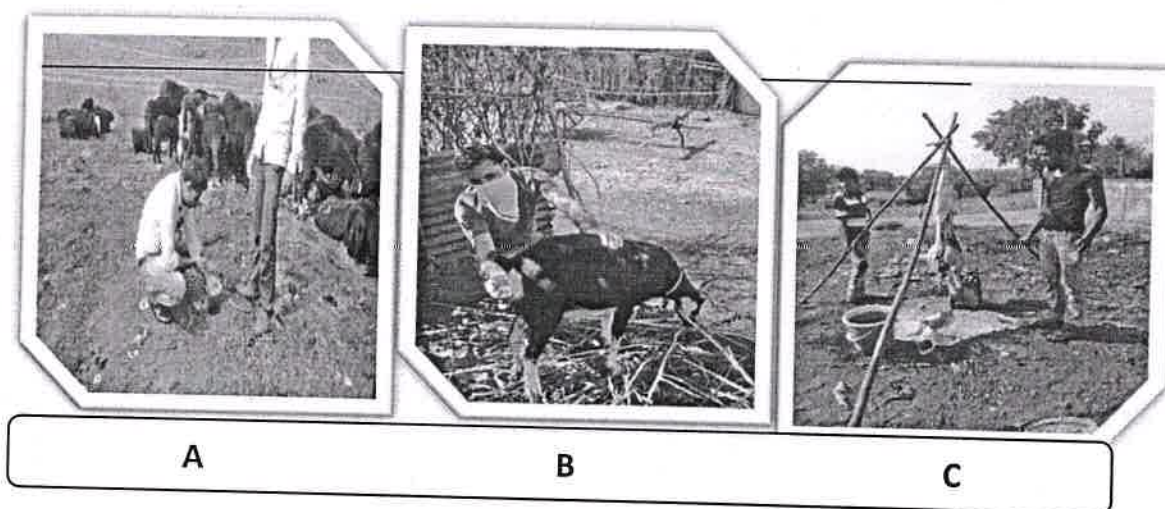
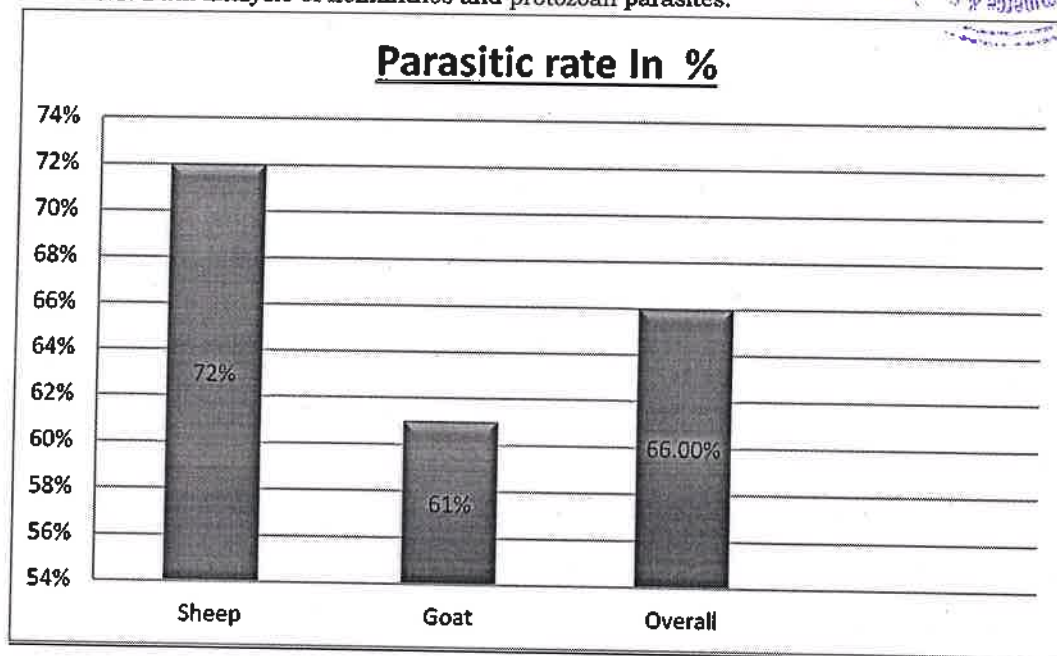


Fig. No. 2: Sample collection at  
Different sites during the study (A,B,C).

Table No.1: Data analysis of helminthes and protozoan parasites.

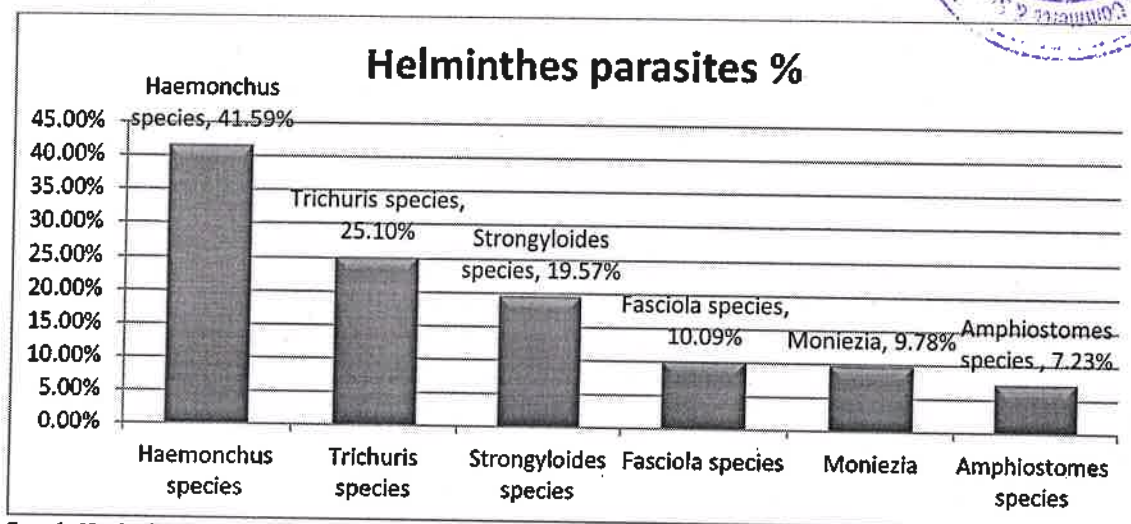


Graph No. 1: Graph showing data analysis of helminthes and protozoan parasites.

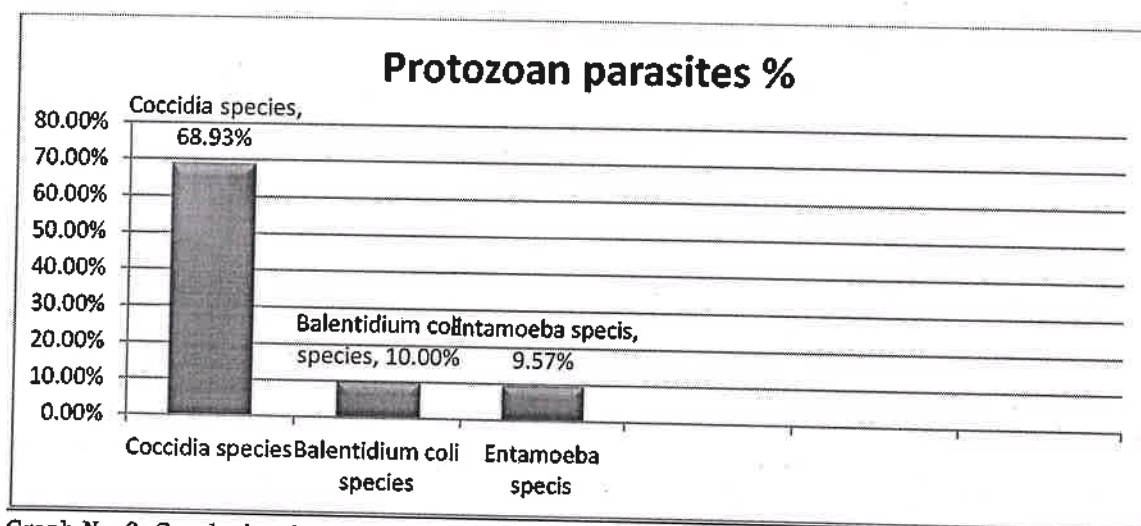
Table No. 02: Species wise results of Helminthes and Protozoan parasites from sheep and goat.

Sr.No	Parasites Diagnosed	Total number of samples	Total number of Positive samples	Equivalent Percentage
<b>Helminthes parasites</b>				
01	<i>Haemonchus species</i>	940	391	41.59%
02	<i>Trichuris species</i>	940	236	25.10%
03	<i>Strongyloides species</i>	940	184	19.57%
04	<i>Fasciola species</i>	940	092	10.09%
05	<i>Moniezia species</i>	940	068	9.78%
06	<i>Amphiostomes species</i>	940	094	07.23%
<b>Protozoan parasites</b>				
07	<i>Coccidia species</i>	940	648	68.93%
08	<i>Balantidium coli species</i>	940	094	10.00%
09	<i>Entamoeba species</i>	940	090	09.57%





Graph No.2: Graph showing species wise results of Helminthes parasites from sheep and goat.

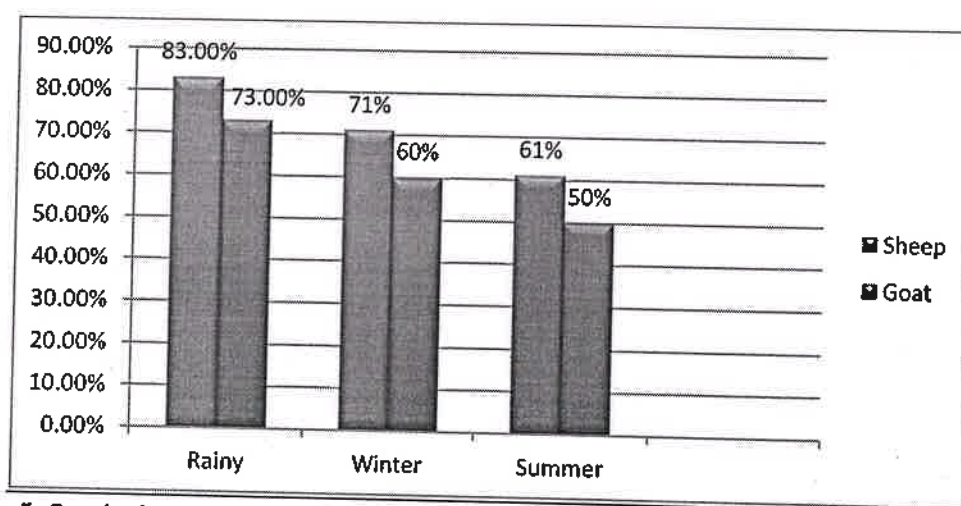


Graph No. 3: Graph showing species wise results of Protozoan parasites from sheep and goat.

Animal	Number of samples collected	Number of samples positive for parasites	Infection in%
Sheep	410	296	72%
Goat	530	327	61%
Total	940	623	66%

Seasonal Variation	Sheep			Goat		
	Total Sample	Positive Sample	Rate of Infection	Total Sample	Positive Sample	Rate of Infection
<b>Rainy</b>	136	114	83%	176	130	73%
<b>Winter</b>	136	97	71%	176	107	60%
<b>Summer</b>	138	85	61%	178	090	50. %
<b>Mean %</b>			72%			61%

Table No.3: Seasonal Variation results of Helminthes parasites infection from sheep and goat.



Graph No.5: Graph showing seasonal Variation results of Helminthes parasites infection from sheep and goat.



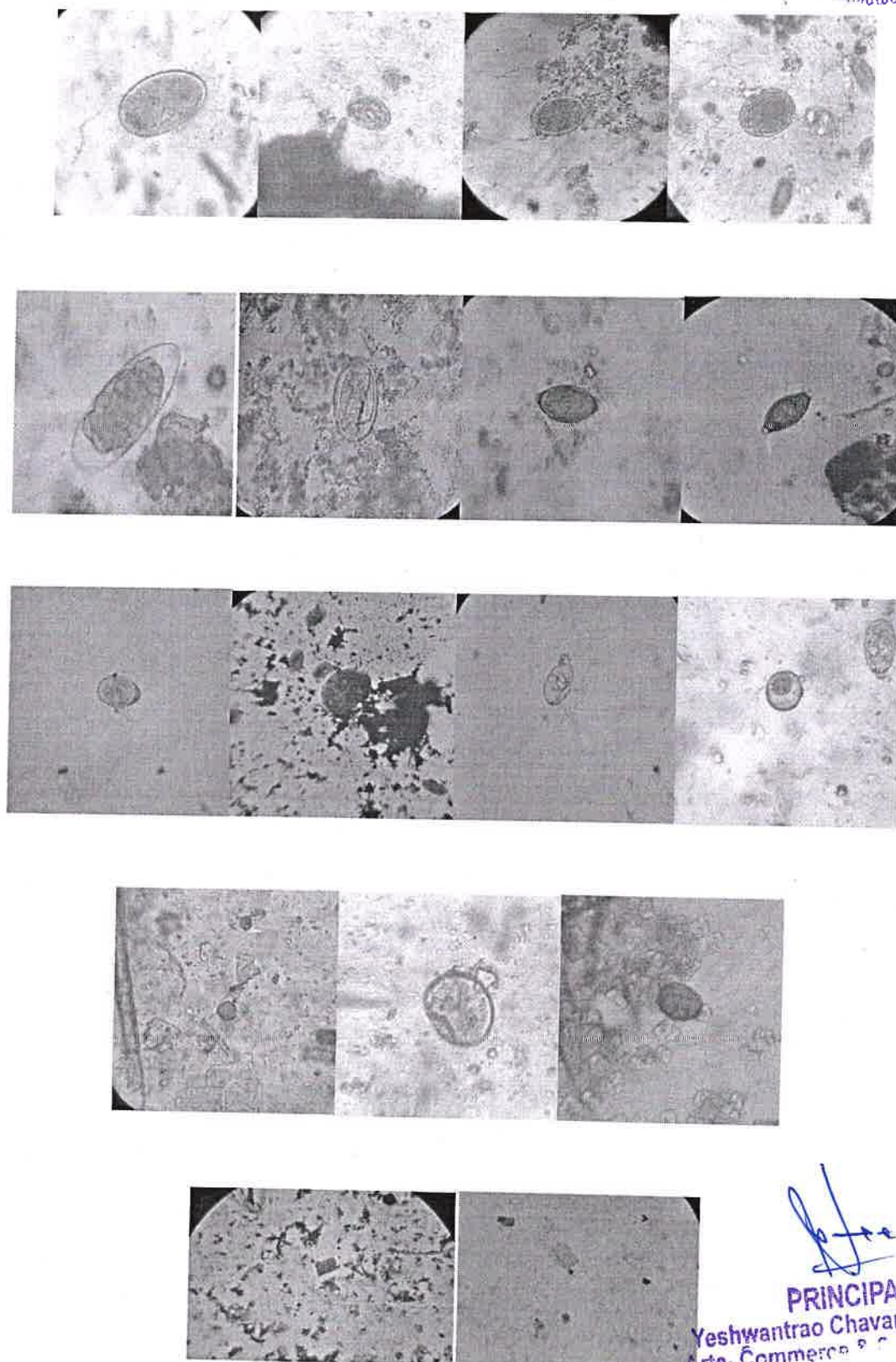


Fig. No. 3: Microscopic images of Helminthes and some Protozoan species.

*[Signature]*  
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# Study of Smart Management System in Poultry Farming

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**Abstract:** Poultry farming is an important agricultural based business industry. Poultry farming is becoming increasingly organized, specialized and shaping in to an industry of national economic importance. In the current scenario productivity of the poultry farming has shown gradually increase in trends because of smart management practices among the poultry farming. Smart management practices by using various technological based methods for the automation in the farming play an important role in poultry production. The present study focuses on the smart management system in poultry farming through the recent techniques. The study was conducted to compare management practices in three different poultry farms. The work is carried out from the three different poultry farms situated in Aurangabad district according to the management practices that is manual management system, semi-automation management system and smart management system. During the study period it was revealed and analyze that the smart management system of poultry farming provides automated poultry production, reduced human efforts and increase the healthy poultry production followed by semi-automation management system and manual management system. It is concluded that the better health performance of poultry birds found in the smart management system of poultry farming as compare to the semi-automation management system and manual management system in the study area. This paper is highlighted the recent technology through personal computer or smart phone device using internet facilities for the monitoring of poultry farming. Other related aspects will discuss in the text.

**Index Terms:** Aurangabad, Poultry birds, Poultry farming, Management practices, Smart management.

## I. INTRODUCTION

According to the Indian history the first fowl was domesticated as early as 3200 before Christ. Egyptian and Chinese records shows that fowls were laying eggs for man in

1400 before Christ. The industry remains in backyard of houses for many years. Policy adapted for poultry development by India has comparatively helped to achieve sustained high poultry growth in last 2-3 decades, mainly under the semi intensive and intensive systems. However, problems like high feed costs, disease mortality, lack of development or rural markets and seasonal fluctuations in eggs and meat prices changes in Government policies time to time continue to hamper the livelihood of more than 1.6 million farmers.

In India, the first broiler production took place in Hyderabad during 1959, by importing 4500 white rock chicks from Israel, under United State of America. The programme, under the technical guidance of Dr. Earl Moore, during 1962, some more white rock chicks were received from Italy and United State of America. In 1966, about one million broiler were produced in India. During the eighties, the broiler farming in India has emerged as the fastest growing segment of animal husbandry and the production of poultry has been increased by hundred times. Between (1985-95), India recorded the fastest growth rate in poultry meat production, with a growth rate of about 18% per annum which perhaps no other country or agro industry in the world has recorded during that period. At present millions of broiler chicks are produced annually for broiler meat and egg production. The growth rate of poultry production in India is nearly higher than other sectors like crop husbandry, livestock production, gross domestic products etc. Broiler industry had started before three decades in India. Poultry farming provides employment to the educated unemployed people at the rural area and additional income source to the farmers. Poultry birds are provide protein rich food for deadly growing poor population.

## II. LITERATURE SURVEY

The Cloud computing technique is employed and sensors has been developed and found to be an efficient and intelligent method of remote control for the farmers, which highly reduces cost, time and man power. This in turn provides improved productivity and profit for the farmers, (S. Arunkumaret. al. 2018). The development of an automatic chicken feeding machine can be very useful to the growth of the poultry industry, (Shubham Mitkari et. al.2019). Smart control system for poultry farm with their factors and the drawbacks of the previous techniques that are used in the smart control systems, (Mohammad R. Ahmadi, et. al.2018). Wireless sensors and general pocket radio service network system provides an efficient automated poultry farm monitoring system to monitor the healthy atmosphere for chickens in poultry farm without human interference, (Geetanjali A. Choukidaret. al.2017). Automation of poultry farm by using wireless sensor network and mobile communication provides automated poultry, reduces man power and increases production of healthy chicken, (Ayyappan. V et. al.2017). Automated system initiates the action automatically to control the environmental parameters such as humidity, temperature, ammonia gas and will decrease the environmental diseases affecting chicken and increase the productivity and eliminate a lot of manpower, (Eric Hitimana et. al.2018). Field programmable gate array system by using internet of thing will automatically initiate the action to verify the environmental parameters in case of sudden climatic changes. In addition, the control of the water level and the food control mechanism are controlled and controlled with the help of the sensor. This system provides an efficient automated system for monitoring poultry farms to monitor the healthy atmosphere of chickens in poultry farming without human interference, (Ramgirwar S.S. et. al.2018). Using the better system a farmer will management remotely his poultry farms through time period observation with a private laptop and cell phone, (Junho Bang et. al.2014). Wireless sensors and mobile system network to control and remotely monitor environmental parameters in a poultry farm, the system provides an efficient automated agriculture monitoring system, (K. Sravanth Goud et. al.2015). Internet of issue based mostly sensible poultry farm can provides a trouble free and higher observation expertise to the user of the poultry farm. This method can create use of the sensors and microcontroller unit to perform the same operations of feeding, water system and temperature- humidness observation that area unit the most causes for any reasonably epidemic or diseases for poultry birds, (Sakshi Mishra et. al.2019). Technology based solution for low cost, asset saving, quality oriented and productive management of chicken framing, by utilizing an intelligent system which used an embedded framework and smart phone for watching farm to regulate environmental parameters victimization good devices and technologies, (Rupali B. Mahale et. al.2016). Use of an intelligent system which used

an embedded framework and a wise Phone for monitoring farm to manage environmental parameters using smart devices and technologies, (B. Balasaheb Phalke et. al.2020). Automation of poultry farm using internet of thing technology to perform various management related things. T The environmental factors that have an effect on the health of chicken like temperature, humidity, light and ammonia gas square measure monitored and also the manual jobs like food feeding, installation system, cleanliness square measure managed, (Shruthi B Gowda et. al.2020). The management and monitoring of the farm can also be done through a web based system. Which keeps track of the management of poultry farm from anywhere and at any time, (K. A. Sitaram et. al.2018). Automated environment controlled poultry management system performs many operations for the usage of the farm efficiently, it monitors the temperature and humidity continuously and also monitors the food level in the container and indicate the owner using a mobile application by the help of a wifi module, this system reduces the human effort and also increases the poultry production, (R. Sekar et. al.2019). Poultry birds are generally reared in the litter system so it requires adequate space and related equipment facilities for the proper management of the flock. Modern poultry houses are fully automated with fans linked to sensors to maintain the required environment (Glatz and Pym, 2006). Automation of poultry farms help to reduce the labour cost, increase farm efficiency, improve the productivity, and production rate of meat and egg (Cajethan Uche Ugwuoke et. al. 2017).

## III. PROPOSED APPROACH

The traditional way of poultry farming being replaced with the smart and intelligent techniques using embedded system based innovative application. It helps the farmers in real time monitoring and control of environmental parameters. Therefore necessity of the present work to study and understand the application of smart management system of poultry farming for the overall performance of poultry productivity. Hence the present study was conducted to analyze and highlighted the recent technology use through personal computer or smart phone device using internet facilities for the monitoring of poultry farming. Also observed the advantages of the smart management poultry farming as compare to other management system from three different poultry farming in Aurangabad district of Marathwada region.

## IV. MATERIALS AND METHODS

To study the advantages of smart management system of poultry farming the birds reared under three different selected management practices, namely smart management system, semi-automation management system and manual management system of poultry farming. The three poultry farms were every which way designated as sample for this study. The present





study was conducted during the rearing period of the poultry birds. The data of management system used in poultry farming and its advantages and disadvantages is observed and collected from all the selected poultry farms during the study period by personal visit and by observing the management system used at the farm sites during the study period at different intervals. Information and data was obtained about use of management practices, to evaluate the advantages and disadvantages among the selected poultry farming. The detailed studies were undertaken with a view to find out the management practices among the poultry farming and advantages and disadvantages of the using practices in these farms during the rearing period in the study area.

## V. RESULTS AND DISCUSSION

For the study three different categories of poultry farms according to the management practices were selected in this study area. Those were smart management system, semi-automation management system and manual management system of poultry farming. The work is carried out from the three different poultry farms situated in Aurangabad district of Marathwada region. During the study period it was recorded that major advantages was found in smart management system of poultry farm followed by semi-automation management system and manual management system of poultry farming. It also showed that the major obstacles faced by the poultry birds in the manual management system of poultry farm because the birds are reared under manual management system. The major advantages regarding the health performance of poultry birds occurred in the smart management system of poultry farm because of the fully automation facilities as compare to the semi-automation management system and manual management system of poultry farming in the study area. The poultry birds and farmer of the manual management system of poultry farms shows major obstacles due to the limitations in use of automated management of poultry farming, while poultry birds and farmer of semi automation management system of poultry farms shows minimum obstacles as compare to manual management system of poultry farm. The poultry birds and farmer of smart management system of poultry farms shows more advantages regarding the healthy performance and production of the poultry birds, no disease occurrence due to cleanliness and also shows that reduced wastage of food material, water, reduced the labour cost etc. and increase the quality and quantity of poultry production particularly meat and eggs.

Due to the use of manual management system in the poultry farm the birds of these farms shows poor health performance, poor disease control and also shows the wastage of food material, water, maximum labour cost etc. and poor production of meat and eggs as compare to the semi-automated

and smart management practices in the poultry farm. (Shubham Mitkari et. al.2019) reported that the event of associate automatic chicken feeding machine is mostly helpful to the expansion of the poultry farming. Advantages regarding the poultry birds and the farmers of poultry farming the management of the poultry farms requires necessity of automated and smart management practice within the poultry farms. It is beneficial for the health of the poultry birds and farmers of the poultry farming. During this study it was observed that the advantages of smart management practices in the poultry farming shows the beneficial effect regarding the health performance and production of the birds, no disease occurrence due to cleanliness and also shows that reduced the wastage of food material, water, reduced the labour cost etc. and ultimately increase the production of meat and eggs with quality, (Sakshi Mishra et. al. 2019) reported that smart poultry farm will give a better experience to the user of the poultry farm and perform the operations of feeding, water supply and temperature- humidity observation which are the main causes for any kind of epidemic or diseases for poultry birds. (Ayyappan. V et. al.2017) reported that automation of poultry farm by using wireless sensor network and mobile communication provides automated poultry, reduces man power and increases production of healthy chicken.

## CONCLUSION

From the above study and observations, it can be concluded that the birds reared under manual management practices faced major obstacles as compare to the semi-automated and smart management practices in the poultry farming. While the advantages of smart and semi-automated management practices shows proper health performance and production of poultry birds as compare to the manual management system of poultry farms in the study area. For the beneficial of poultry farming it is necessary to implement the smart management system within the poultry farming to reduced obstacles related to the poultry farming. This smart management system helpful to improve the quality and quantity of the poultry production.

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# Impact on body weight gain in broiler chicks due to electronic devices.

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## Abstract

The present work deals with the studies of impact on weight gain in early-age broiler chicks through electronic devices. World wise more use of various electronic devices by the people in various sector concern to this study. Particularly in poultry industry the more use of electronic devices creates a serious health related problem in the early age broiler chicks. Broiler chicks provide protein rich food and a good source of animal protein for the human being. It also provide additional income source to the farmers to improve their economic condition, for that it is necessary to maintain the proper health condition particularly weight of the broiler chicks. In the developing field of technology and by using modern techniques it is necessary to manufacture many electronic devices those are popularly used by the peoples. Cell phone is one of the most popular and widely used electronic devices. The radiation emitted from the media of electronic devices in the environment causes various hazardous effect on the health of living organisms. Considering the environment of the poultry farming during the rearing period of early age broiler chicks, this study indicates that the continuous use of cell phones emits Electro-Magnetic Radiation (EMR) in the poultry environment, ultimately affects the health of chicks. For this study the experiment of three different groups was conducted to investigate the effect of electro-magnetic radiation on the body weight of early age broiler chicks. Group I was kept as a control and groups II and III were subjected both short and long duration of exposure of electromagnetic radiation respectively. From the above analysis it was found that long-term radiation exposure showed a reduction in average body weight compare to short-term radiation duration. Other details discussed in the text.

**Keywords:** Body weight, Broiler chicks, Electronic devices.

## Introduction

Poultry industry is an important business based on agriculture and also having economic importance. The growth rate of poultry production in India is nearly higher than other sectors like crop husbandry, livestock production, gross domestic products etc. In this allied agricultural industry annual output of eggs was eight times more in the 1995 than early seventies. Poultry raised for meat production is called broiler. Broiler industry had started before three decades in India. Its negligible output of 4 million in 1971 reached to 190 million in 1990 and there is tremendous growth as well as have high potential to develop to higher extent as there is full scope and prospectus to the industry. Broiler chicks provide the deadly growing people with high protein-rich food and a good source of animal protein. It provides farmers with an additional source of income and helps to improve their economic status. Biological and economical point of view conservation and proper health condition of the broiler chicks in poultry farming is a very important task.

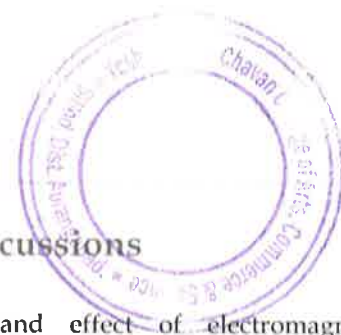
In this digital world, the electronic technology is developing faster and faster, many electronic products appear with advanced functions to facilitate, improve and even change the life of the whole society. Among all these electronic products, the computer and smartphone are thought to be most common because of a lot of benefits brought by them and seem to become the necessity in daily life, [1]. Electronics having various electrical circuit and including number of electronic components. Through the interconnections of these electronic components, the technique develops a device commonly known as electronic device. Recently various types of electronic devices used by the peoples in various sector. Technological innovations in the electronic devices change the results in between the benefit and harm, such as cell phone, iPad, laptop etc. Mobile communication technology increases the speed of communication and contact within poultry farming, making services delivery more efficient, [2].

Beneficial use of these electronic devices also hazardous effect to the life of living organism. Most of the electronic devices emit various range of electromagnetic radiation in the environment. Electromagnetic radiation produced by the electronic devices such as cell phone in the environment of poultry farming effects the weight of early-age broiler chicks. It has been observed in every position since the late 1990s. Considering the environment and weight gain of early age broiler chicks, this study reveals that the continuous use of mobiles cell phones by people from various industries. Electro-Magnetic Radiation (EMR) was emitted in the environment due to the excessive use of cell phones. High frequency electromagnetic field can be responsible for bringing alterations in growth and development in ovo amniotic vertebrates, [3]. Different hazardous effects of electro-magnetic radiation (EMR) observed on the health of living organisms. Similarly hazardous effects of Electro Magnetic Field (EMF) are also developed on chick embryo health [4]. Electromagnetic radiation from Cell phone and cell tower affects the birds, animals, plants and environment, [5]. Various factors like light intensity, radiation frequency and duration of exposure affects the poultry environment. Exposure to radiation increased the mortality in chick embryos, [6]. Exposure of chick embryos to a 2G cell phone caused structural changes in different types of cells, [7]. Growth rate in the form of weight gain in early age broiler chicks is one of the most important factors influenced by radiation from the cell phone. Due to the exposure of various range of electromagnetic radiation some changes in behavioral and physical activity of the early age broiler chicks.

## Methodology

Ninety, day old broiler chicks were procured from commercial hatchery and kept separately under house with normal environmental condition and these chicks reared by adopting deep litter system. The birds were fed with starter mash up to three weeks of age during the experimental period. These early age broiler chicks were randomly divided in to three groups. Each groups containing 30 numbers of early age broiler chicks and





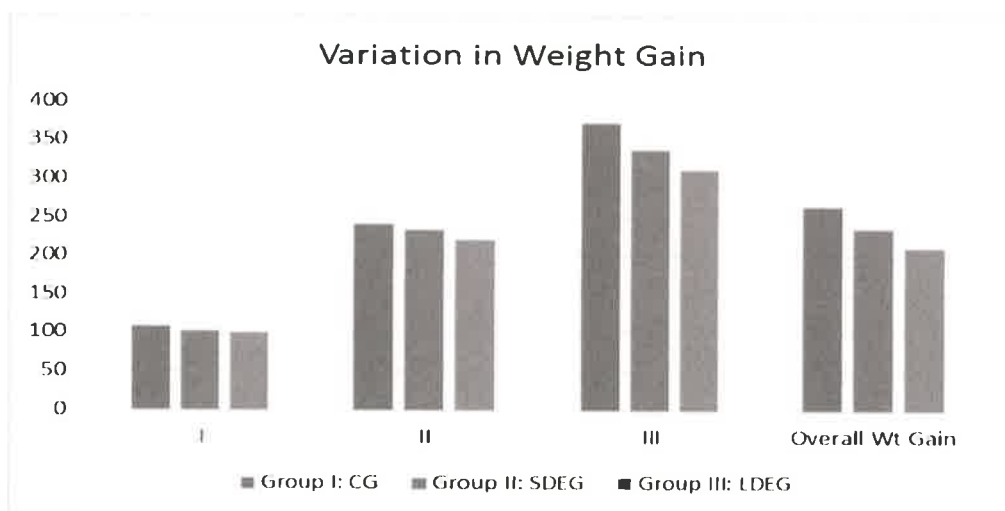
named groups I, II and III. Group I Control Group (CG) was kept as a control and was not exposed to any electromagnetic radiation, and the remaining groups II Short Duration Exposure Group (SDEG) and III Long Duration Exposure Group (LDEG) were subjected to use of cell phone handset for electromagnetic radiation of both short and long duration exposure respectively. Daily exposure of short duration is three hours and long duration is six hours. Comparative study and effect of electromagnetic radiation with short and long duration exposure was evaluated on the basis of average body weight, overall body weight gain of the early age broiler chicks in different groups. The body weight of all the early age broiler chicks was recorded and average body weight and overall body weight gain was calculated for each group recorded at weekly intervals up to three weeks.

## Results and Discussions

Comparative study and effect of electromagnetic radiation with short and long duration exposure was evaluated on the basis of average body weight, overall body weight gain of the early age broiler chicks in different groups. The body weight of all the early age broiler chicks was recorded and average body weight and overall body weight gain was calculated for each group recorded at weekly intervals up to three weeks. From the table 1 it is evident that the group II (SDEG) and group III (LDEG) shows variation in the values of weight gain as compare to group I (CG), The mean body weights in all the groups varied from (100.21 to 108.43 Gm) during first week, (221.47 to 241.56 Gm) in second week, and (311.74 to 372.38 Gm) at the end third week.

**Table 1: Comparative effect on body weight gain of broiler chicks in different groups.**

Experimental Groups	Average body weight (Gm) per weeks			Overall body weight gain (Gm)
	I	II	III	
Group I: CG	108.43	241.56	372.38	263.95
Group II: SDEG	102.64	233.85	338.27	235.63
Group III: LDEG	100.21	221.47	311.74	211.53



**Figure 1 : Graph showing the body weight gain of broiler chicks in different groups.**



These values show differences in the weights between different groups during the experimental period and at the end of third weeks of early age broiler chicks. During the first week the early age broiler chicks of group I (CG) shows higher body weights (108.43 Gm) than the other group II (SDEG) and group III (LDEG), the values of body weight of these groups shows (102.64 Gm and 100.21 Gm) respectively. During the second week the early age broiler chicks of group I (CG) shows higher body weights (241.56 Gm) than the other group II (SDEG) and group III (LDEG), the values of body weight of these groups shows (233.85 Gm and 221.47 Gm) respectively.

During the last week of the experiment that is at the end of third week the early age broiler chicks of group I (CG) shows higher body weight (372.38 Gm) than the other group II (SDEG) and group III (LDEG), the values of body weight of these groups shows (338.27 Gm and 311.74 Gm) respectively, these results are not correlate to the results of [8], he reported that no radiation effect on the body weight at hatching or at 7 days of age was detected.

From the data of body weights in different groups, it is evident that the overall gain in body weight among the group I (CG) of broiler chicks was highest (263.95 Gm) for those are the group II (SDEG) and group III (LDEG), the values of overall gain in body weight among these groups shows (235.63 Gm and 211.53 Gm) respectively. From the data it is also apparent that early age broiler chicks among the group II (SDEG) had better gain in body weight (235.63 Gm), than the chicks among the group III (LDEG) and values shows lower weight gain (211.53 Gm), these finding more or less similar to the findings reported by Shafey, T. M., *et. al.* [9], chickens exposed to different MF treatment had lower weight gain than those of the non-exposed treatment of MF at 39 days of age.

## Conclusion

In conclusion this study has shown that the early age broiler chicks expose to long-term duration of electromagnetic radiation showed a reduction in average body weight compare to the chicks expose to short-term duration of electromagnetic radiation. Ultimately the overall gain in body weight of early age broiler chicks shows decrease values in group II (SDEG) followed by group III (LDEG). It may be due to the increase physical activity of the early age broiler chicks exposed to short and long duration of electromagnetic radiation, which in turns effects on the weight gain of the chicks.

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