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Biochemical Studies of Nematode Parasite (*Heterakis gallinarum,* Schrunk: 1788) Redescribed from *Gallus gallus domesticus. (Linn)*

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ABSTRACT:
Given study was carried out the biochemical estimation of nematode parasite *Heterakis gallinarum* and its host tissue i.e. normal and infected intestinal tissue of *Gallus gallus domesticus*. Given parasites is redescribed on the basis of type material and newly collected specimens from *Gallus gallus domesticus* using scanning electron microscopy, Staining and camera Lucida. Biochemical estimation of protein, lipid and glycogen result show that the percentage of lipid is high in parasites as compared to protein and glycogen. Protein content in *Heterakis gallinarum* sp. is 3.45 ±0.44 mg/gm wet of tissue and Glycogen content is 3.28 ±0.33 mg/gm. wet of tissue. Lipid content in *Heterakis gallinarum* sp is 15.09 ± 0.56 mg/gm. wet of tissue. These parasites are absorbing most of biomolecules from host and damage and affect development of tissue

Keywords:
Biochemical parameter, *Gallus gallus domesticus*, Nematode.

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INTRODUCTION

The study of Parasitology, has developed into a multidimensional approach in helminth research such studies includes Physiological, biochemical, surgical,immunological, ecological, phylogenetic and chemotherapeutic aspects, histo-chemical etc. Host parasite relationship is a great importance in the study of Parasitology. (Cheng, 2011)

The parasitism is a natural way of life, among the large number of organisms and parasite diseases are the major problem leading to morbidity and mortality in the tropical countries and in India also, these problems leading not only in mammals but also in birds, reptiles and fishes. Poultry is bred in family run farms and commercial farm worldwide. (Anders and Jorgen, 1998) Chickens and eggs provide an important source of animal protein, minerals and carbohydrates for poor families and can give small cash income when sold at the market. (Poulsen *et.al,* 2000) Birds also supply both eggs and meats, which are the direct source of protein to humans, therefore seem to be important both commercially as well as from the public health point of view. Heavy helminthes infection in poultry causes direct economic losses through mortalities and a drop in egg-laying capacity. (Yamaguti, 1940) Birds are valuable and useful to humans for many reasons. A large proportion of normal food of the birds consists of insects including many that are injurious to man and his concerns.

Biological macromolecules, such as carbohydrates, proteins, lipids, DNA and RNA which gives structure to cells and carries out many biological functions connected with life Immunological status of the host is very important for helminth infections, because gastro-intestine is one of the largest immunological organs of the body and it serves as the first line of defense against orally administered antigens (e.g. feed protein or carbohydrates) and intestinal pathogens. It is very important interaction between helminth infection and nutrition. (Coop and Holmes, 1996)

The research on the complex interaction among host nutritional status and parasitic infection has mainly focused on the detrimental consequences of parasitic infections on host nutritional status and on mechanisms by which malnutrition impair immune-competence. (Scott and Koski, 2000)

The digestive tract is not only an organ for digestion, absorption and excretion,but also it is a dwelling site to many parasitic organisms. The regulation of helminthpopulation in the hosts, gastro-intestine is complex process, influenced by hostimmunological and nutritional status, age and breed of the animal. (Van Brand, 1979)

Nutritional deficiencies as a result of intestinal helminth infection have been the subject of several investigation. (Hadju *et.al,* 1996) (Lunn and Northrop, 1996) Intestinal helminthes may affect the nutritional status by causing increased nutrient loss, in addition to decreased food intake and nutrient absorption. (Edirisinghe and Tomkins, 1995) The influence of host nutrition on helminth population hasreceived relatively little attention and limited information is available only a few studies have examined the effects of nutrition on the parasitic response in the parasite host, and even fewer have considered the event occurring at the intestinal level, where absorption of nutrients occurs, intestinal parasites reside, and the gastrointestinalassociated tissues play role in directing both the local and the more systemic responses. (Bundy and Golden, 1987)

Proteins are essential for parasites and host it having many different biological functions provide rich environment for the nourishment of parasites. Proteins are absorbed by the parasites by diffusion and transmission. It is naturally available from the host tissue as there is no media to acquire proteins in parasites these protein are naturally available from the host tissue. These worms utilize different degree of protein for producing energy. Literature reveals that the parasite able to adapt them to the parasitic mode of life, only due to protein usually constitutes reported amongst these; helminth parasites assume tremendous economic importance as they are responsible for decreased weight gain of the host and egg. Proteins are digested at host parasites interface by activity of proteolysis enzymes and secreted by cestode teguments. Major end products of proteins are urea, uric acids and ammonia.

The carbohydrate, which include low molecular weight sugar and various cell wall and storage non-starch polysaccharides are the most important energy source for animal. (Bach Knudsen *et.al,* 1997) The main carbohydrate reserve in parasitic helminth is glycogen which is a typical energy reserve of helminth inhabiting biotopes with low oxygen tension. The main polysaccharide in cestode is glycogen, closely resembling mammalian glycogen. At the early work of demonstrated the occurrence of glycogen in helminth. (Foster, 1856)

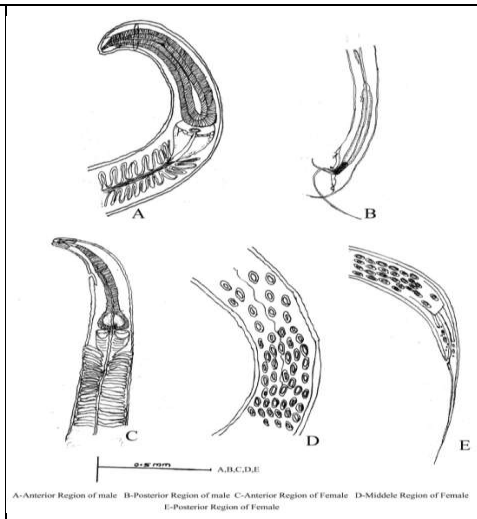
Lipids are heterogeneous group of compound with similar physical properties, being relatively insoluble in water but soluble in organic solvents. The total lipid content of helminth parasites is very variable in between 10-30 of the dry weight. Lipid has a variety of functions in tissues. There is considerable variation in lipids from species to species, the he degree of lipid content. Variation is also seen in the segments and region of the worms being experimented, thus total lipid to be somewhat meaning less, unless the degree of maturity is known. The lipid content of some species grown in different hosts may vary substantially. (Fairbairn *et.al,* 1961)

MATERIAL AND METHODS

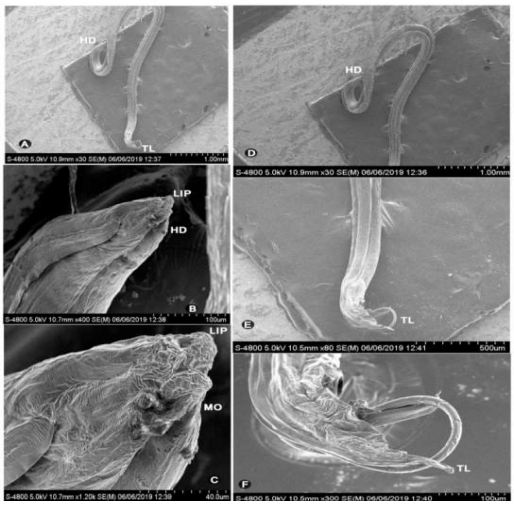
Fresh host *Gallus gallus domesticus (Linn.)* intestine were collected from At- Rajur, Tal- Akole, Dist- Ahmednagar, (M.S.), India, during the month of

June-2017 to May- 2019 and dissect in laboratory, about 8 intestines were dissected out of these 5 are that infected and 4 are non-infected. Eighty seven worms were found in infected intestine. For the taxonomical study nematode parasites preserved in 10% glycerin alcohol. The specimens were mounted in glycerin jelly for morphological studies and Photomicrography using light microscope with the help of camera, Scanning electron microscopy [9, 20] and all the drawing was made with the aid of Camera lucida. All measurements are in millimeters and identification of parasites with help of taxonomic key. For biochemical studies (David T Plummer, 2001), (John Barrette, 1982) after that host intestine and parasite are dry at 57 0^c and powder it, then 1 gm of powder dissolve in 5% TCA. The protein, glycogen and lipid contain of in the nematode parasites and host tissue were carried out by different (Lowry *et.al,* 1951), (Kemp and Kits, 1954), (Barnes and Bradstock, 1973) method.

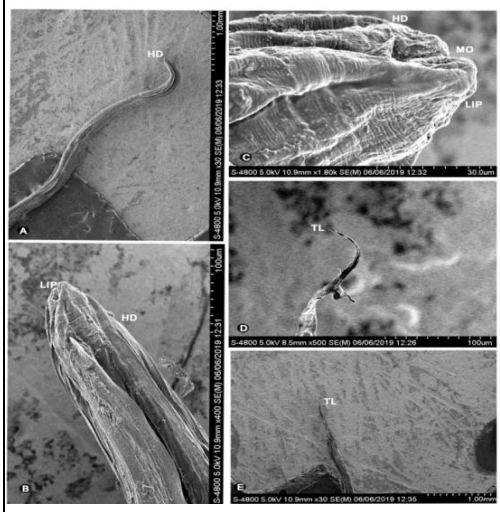
***Heterakis gallinarum* (Schrunk, 1788)**



Drawing of *Heterakis gallinarum*



SEM of *Heterakis gallinarum* (Male)



SEM of *Heterakis gallinarum* (Female)

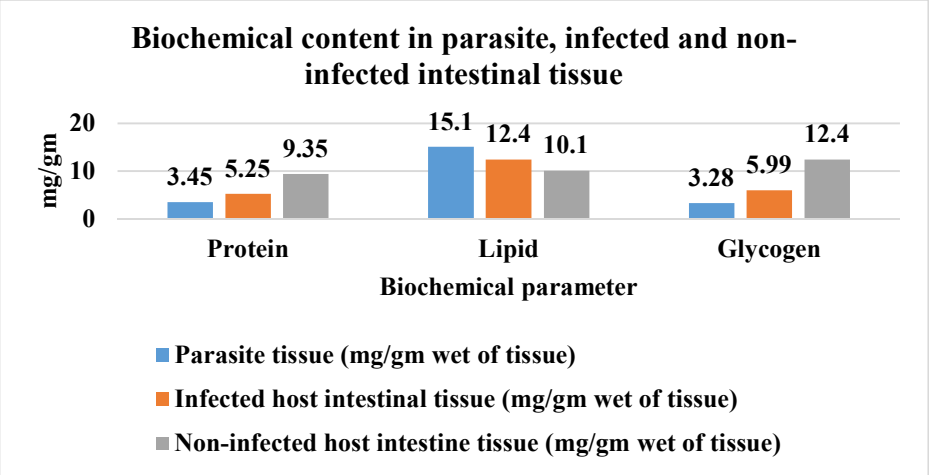
RESULTS AND DISCUSSION

Eighty seven worms were collected from the intestine of *Gallus gallus domesticus* for the taxonomical identification after going through the literature, the worm under discussion, identified as *Heterakis gallinarum*, (Schrunk, 1758). Redescribed on the basis of type material and newly collected specimens from *Gallus gallus domesticus*. (Linnaeus, 1758)

Estimation of protein, lipid and glycogen in nematode parasites. The Mean (±SD) values of protein, lipid and glycogen content (mg/gm wet of tissue) in *Heterakis gallinarum*, infected and non-infected intestinal tissue in the *Gallus gallus domestics* which is mention table 1 and graph 1.

Table 1: showing Biochemical content in nematode parasite, infected and non-infected intestinal tissue of the *Gallus gallus domesticus (Linn)*.

Biochemical parameter	Parasite tissue (mg/gm wet of tissue)	Infected host intestinal tissue (mg/gm wet of tissue)	Non-infected host intestine tissue (mg/gm wet of tissue)
Protein	3.45 ±0.44	5.25 ±0.89	9.35 ±0.44
Lipid	15.09 ± 0.56	12.38 ±0.27	10.10 ±0.62
Glycogen	3.28 ±0.33	5.99 ±0.75	12.40 ±0.72



Graph 1: Showing Biochemical content in parasite, infected and non-infected intestinal tissue of the *Gallus gallus domesticus (Linn)*.

In parasite protein contain level is lower than host infected and non-infected intestine the level of protein content in nematode parasite, host infected intestine due to parasitic infection and non-infected intestinal tissue respectively in (3.45 ±0.44, 5.25 ±0.89, 9.35 ±0.44 mg/gm wet of tissue), In few parasites developmental history changes the growth of parasites is rapid and then slows down even if the concentration is high as it was in the early stage. From the observations Heterakis *gallinarum* parasites could maintain a good balance in protein content with the host.

In parasite lipid contain level is higher than host infected and non-infected intestine the level of lipid content in helminth parasite, host infected

intestine due to parasitic infection and non-infected intestinal tissue respectively in *Heterakis gallinarum* (15.09 ± 0.56, 12.38 ±0.27, 10.10 ±0.62 mg/gm wet of tissue), From the above biochemical estimation of lipid itis concluded that the percentage of lipid is high in parasites as compared to their host These parasites absorbing most of nourishing on host and fulfilling its need and causing hindrance in the proper development of host.

In parasite glycogen contain level is lower than host infected and non-infected intestine the level of glycogen content in helminth parasite, host infected intestine due to parasitic infection and non-infected intestinal tissue respectively in *Heterakis gallinarum* (3.28 ±0.33, 5.99 ±0.75, 12.40 ±0.72 mg/gm wet of tissue), parasites could maintain a balance in glycogen content with the host, glycogen is said to be an important energy source for helminthes inhabiting the alimentary tract of vertebrates. It is generally believed that helminthes absorbed glucose from the intestine of host and use their endogenous carbohydrates only as an energy source when it required.

CONCLUSION

This study reveals that given parasites *Heterakis gallinarum*, (Schrunk, 1758) is redescribed on the basis of type material and newly collected specimens from *Gallus gallus domesticus.* After estimation of protein, lipid and glycogen in nematode parasites and host tissue these parasites are absorbing most of biomolecules from host and damage and affect development of tissue.

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