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Review of literature of the parasites in *Gallus gallus domesticus*

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Abstract

Poultry meat and egg products are natural source to meet the emerging demand of consumers because of it low caloric value and high nutrient content. A poultry product meets the consumer's expectations whether or not depends upon the surrounding environment and conditionsin various stages of the development of bird from the fertilized egg through production and processing to consumption (Northcutt,2009). Chickens can carry ectoparasites; such as ticks, lice, mites, and endoparasites, such as protozoans, cestodes,nematodes and trematodes. It has been recorded that they considered a most important source of transmission of diseases and infection. The direct parasitic life cycle can be facilitated in birds which are kept in free range system, because they are in frequent contact with their excreta.(Wongrak*et al*.,2014). Reduction of weight gain (17 %) in growing chicken and reduction in egg production (12.5 %) in laying hens has resulted by parasitism in Bangladesh (Bhowmik*et al.,* 1982). The major challenge to poultry industry is the parasitic infections , leading to the nutritional and economic loss in poultry industry. The present study will focus on the review of parasitic infections in poultry fo*wl Gallus gallusdomesticus*.

Introduction-

The history of chickens (*Gallus domesticus*) is not clear and a bit of a puzzle. It is agreed by the scholars that they were first domesticated from a wild form called red junglefowl (*Gallus gallus*), a bird that still runs wild in most of southeast Asia, most likely hybridized with the gray junglefowl (*G. sonneratii*),that occurred probably about 8,000 years ago (Dodson *et al.,* 1982). Recent research suggests, however, there may have been multiple other domestication events in distinct areas of South and Southeast Asia, southern China, Thailand, Burma, and India. Since the wild progenitor of chickens is still living, many studies have been able to research the behaviours of wild and domestic animals. Domesticated chickens have less social interactions with other chickens,are less active, are less aggressive to would-be predators, expose to less stress, and are less chance for foreign food sources than their wild counterparts. Domesticated chickens have high adult body weight and simplified plumage; egg production in domesticated chickens starts earlier, with larger egg size and more frequent(Peters *et al.*, 2016).

The World Cancer Research Fund and others (Bingham, 2006) have suggested that the consumption of large amounts (more than 500 g/ week) of red meat may be unhealthy , especially processed meat, but not chicken meat. Poultry meat is an important source of the essential polyunsaturated fatty acids (PUFAs), especially the x-3 fatty acidsand especially from scavenging birds because of varied diet that they consume(Farrell, 2013).

Over the last few decades, there is substantial growth of extensively an intensively housed poultry because of increased demand for poultry products for human consumption (Permin and Hansen, 1998; Ola- Fadunsin*et al.*, 2019). That resulted in significant and increasing

poultry production contribution in making to the national economy of most countries (Dube*etal.*,2010; Adang*etal*., 2014; Ferdushy*et al.*, 2016). However, Due to various intestinal helminth parasites, the poultry production performance can be significantly reduced (Permin*etal.*, 1997; Ruff, 1999).

Amongst food animals, poultry ranks high in their ability to convert feed into high energy food products (meat and eggs) for human consumption. In the Indian subcontinent, this efficiency has been greatly exploited as a revenue provider and consequently, poultry has been one of the most intensively reared domesticated species. India has 498 million poultry population with an average growth rate of 8–10% per annum (Singh *et al.,* 2009). Despite above rosy popularity of poultry industry, traditional backyard poultry keeping with a flock size of 5–20 birds, with almost zero financial input is quite popular amongst rural population comprising of farm women, landless labours and marginal farmers. It contributes to nearly 30% of national egg production (Singh *et al*., 2009). Commercial or Organized sector of poultry accounts for almost 75 percent of the total production of meat and eggs, while the unorganized sector accounts for 25 percent. According to the Government of India's 20th Livestock Census reports the total poultry population is 851.81 million (including backyard poultry population of 317.07 million). During 2017-18, egg production in India was about 95.2 billion and per capita availability (PCA) was around 74 per annum.

Consumer demands are changed and conventional cages by European regulatory authorities has been banned to improve the welfare of laying hens, can be considered as major causesfor the re-emergence of infections of nematodes in Europe (European Commission, 1999; Wongrak*et al.,*2014). There are nearly 400 million laying hens, among which 15% are rearing in free ranges and 5% in organic holdings in the EU (EC, 2019). Worldwide this increase in free-range egg production can be seen. For example, in the USA, 12.5% eggs production are from free-range eggsandin the UK, 48% of the total egg production is from free range egg production, (Department for Environment, Food andRural Affairs, 2017; USDA, 2017). In Australia,production of free-range egg is rapidly increasing and in 2017 free range egg production increased by 10.2% with an estimated grocery market value share of 52% (Australian Eggs, 2017). In addition to it, egg consumption has increased from 183 eggs per person in 2007–08 to 231 in 2016–17 inAustralia(Australian Eggs, 2017). A prevalence rate of parasites of as high as 100% has been reported in chickens housed in backyard (Rabbi *et al.*, 2006) and free-range systems (Sherwin *et al.*, 2013).

Parasite is organism that live on or in another organism, referred to as the host, and gain an advantage at the expense of the host (AL-Hadith *et al.*, 1982), the internal and external parasites that infected hosts, possess physiological and morphological features for example lesser size, shape of the body, hook and tough body, add to their adaptation to the long life also presence of hordes, parasitic organisms are a major factor controlling of the poultry industry by affecting the rate of growth in the host, that lead to organ dysfunction and ultimately death (Soulsby, 1982). Parasitic infection or their concurrent infections also result in immunosuppression, especially in response to vaccines against some poultry diseases (Nandi & George, 2010). Chickens can carry ectoparasites; such as ticks, lice, mites, and endoparasites, such as protozoans, cestodes,nematodes and trematodes. It has been recorded that they considered a most important source of transmission of diseases and infection. Poultry has been accepted as one of the most important sources of animal protein for humans

in the world, as well as consumers have high preferences for poultry products particularly during festivals. Furthermore it that poultry product provides proteins of high biological value (Adang, 1999). There are many external parasites that attack poultry by either feathers or feeding on the skin or sucking blood, in small herds it is problematic to prevent contact with external environment.

Protozoan Parasites-

The most prevalent protozoan parasites encountered were *Eimeriatenella, E. brunetti, E. mitis, E. acervulina, E. necatrix, E. maxima and E. mivati*. while the species *Emeriamivati* parasites are minimum abundant, the most of the parasites belonging to protozoa observed the highest predominance during the wet period than the waterless period, indicating this warm environmental conditions and lower humidity favour the growth of this parasite. Clinical signs of parasitism are poor development, poor feed conversion and lack of growth, low egg production, and in severe infections even results death. The parasitism can make the herd becomes less resistant to disease and exacerbate existing of disease in herd (Anderson *et al.*, 1976; Abdu,1986; Luka &Ndams, 2007). Crypto sporidia parasites are protozoan that are classified in the class sporozoa and the subclass coccidian.They reside in the brush border of the small intestinal mucosa of a variety of mammalians (Meiseil, 1976). Cryptosporidia causes Cryptosporidosis disease or infection. This parasite is not only confined to the cryptosporidia of birds but can infect other animals, even mammals and chickens also. Cryptosporidia is spread from one animal to another on the feet of people, animals often and overland birds can be borne. Cryptosporidia is common, and have mild symptoms usually. Often the only symptom is pale skin in yellow skinned breeds. Cryptosporidiosis can be occured by inhalation that leads to more severe respiratory inflammation of the intestinal form. There are no drugs for this parasite of cryptosporidiosis. Protection from secondary and providing supportive treatment infection are the only workflows. Once recovered from this infection, the birds get immunity to future infections, Cryptosporidium species has great diversity and have recorded genotype from fish, amphibians, reptiles, birds and mammals (Fayer, 2010;Lapeta, 2009).Haemosporidians are intracellular protozoan parasites found within the blood cells and avian hosts tissues, and they are worldwide distributed and occur in a variety of avian species including domestic chicken, the avian haemosporidian parasites (Phylum Apicomplexa) are taxonomically diverse and distributed cosmopolitan, infecting most bird families (Pacheco *et al.,*2011). The recorded parasites in smears recorded most commonly, of peripheral blood, are unicellular eukaryotic parasites of the genera, Haemoproteus, Leucocytozoon and Plasmoduim. The most important groups of haemoparasites that infected chickens are Leucocytozoon, Haemoproteus and Plasmodium. The haemoparasites in chickens have been recorded in the different countries of the world such as Bolivia, Pakistan, Italy,Czechoslovakia, Nigeria, Tanzania , Kazakhstan, India and South and East-Southern Asia, (Permin*et al.*, 2002; Fatima &Maqboo, 2014).

Helminth parasites-

A-The cestode parasites

Chickens are highly susceptible to the contagion by a multiplicity of intestinal helminthes which results to severe commercial losses during meddling with fit development in the system of late growth chiefly the chickens, exposing adult chickens to secondary contagions,

that actually reduced chickens production (Borghare*et al.,* 2009). Parasitic worms are common in large-scale poultry, while intensive infections are common in heavily managed stocks that cause severe pain that affects the natural activities of birds that lead to death.The cestode parasites found were *Raillietinatetragona, R.echinobothrida, R.cesticillus, Choanotaenia infundibulum* and *Hymenolepiscarioca*, among which *R. cesticillus* was the least prevalent while the parasite belongs to species *Hymenolepis carioca* was the most prevalent, cestodes interfere with the metabolisms of certain compounds: they absorb amino acid, polypeptides and proteins and also absorb galactose , stored it as glycogen,the clinical signs include loss of appetite, increased mortality and decreased egg production, drooping wings,loss of ruffled feathers while with less pathogenic species, the signs will be poor growth, weight loss, paralysis, leg weakness, and a sudden raise in mean of mortality, Also stated that it is so often possible to talk if a chicken is infested by cestodes simply by observing at the droppings. Egg of Tapeworm is observable white pellets struck in its feces (Cheng 1973; Jordan, 1996).

B- The nematode parasites

The nematode parasites recovered included *Ascaridia galli* Shrank 1788, *Heterakis gallinarum* Shrank 1788, *Hartertia gallinarum* Theiler 1919, *Gongylone maingluvicola* Ransome 1904, *Syngamus trachea* Montagu 1811 out of which only *A. galli* and *H. gallinarum* were most prevalent and the remaining are rare prevalent.Fat is the most economic energy reserve in animals and the organs have major involvement in fatty acid metabolism: the adipose tissue, the skeletal muscle, and the liver (Frayn*et al.*, 2006). It has also been reported that *A. Galli* infection decreased the dietary metabolizable energy in chickens that might be because of reduced digestibility by the presence of parasites (Walker and Farrel, 1976). Similarly, Ascaris infection in humans also disrupts lipid metabolism of liver possibly due to break down in liver function and later on changes in hormone secretion(Bansal*et al.,* 2005). These studies suggest that *A. Galli* infection may affect stored energy reserves such as liver lipids in laying hens. It is recently demonstrated that hens infected with high *A.galli* burden had consistently lower lipid reserves compared to uninfected hens (Sharma *et al.,* 2018b), suggesting storedin the form of liver lipids, energy reserve are utilized by infected hens to maintain production in the time of infection. Impacts associated withnematode infections include reduced health, welfare, and production performance due to reduced feed conversion ratio, decreased weight loss or growth rate, decreased egg production and decreased egg quality, intestinal damage, and in severe cases results death (Ramadan and Znada, 1991; Das *et al.,* 2010, 2012; Dube*etal.*, 2010; Sreedevi*etal.*,2016; Rufai and Jato, 2017). These helminthes affect on the metabolism of the host, causing in slowutilization of feed thus slowing down. Nematode infections can have direct adverse effects on the host like resulting the breakdown of the gastrointestinal barrier, but indirect damage can also occur via increased susceptibility for secondary infectious diseases (Dahl *et al.*, 2002; Eigaard*etal.*, 2006; Permin*et al.*, 2006; Dube*et al.,* 2010; Sharma *et al.,* 2019) and leads to reduced host immune response (Nnadi and George, 2010; Hørning*et al.,* 2003; Pleidrup*et al.,* 2014; Dalgaarda*et al.*, 2015).

Ectoparasites-

Common ectoparasites of village chickens range from lice, mites, fleas and ticks (Bhowmik*et al.*, 1982). They may constitute a clinical problem and transmit a number of infectious

diseases and can also act as transport intermediate hosts of a range of helminth parasites (Arends 2003; Marques *et al.*, 2007; Mekuria & Gezahegn, 2010; Firaol, 2014). Some ectoparasites, particularly tick and mites, acts as vectors of poultry diseases such as Pastuerellosis, Fowl Pox, Newcastle disease and possibly chlamydia (Audi&Asmau, 2014; Moyo, 2015).

Keeping all the above facts in mind, this study is designed to review the prevalence and morphology of parasites of*Gallus gallus domesticus*.

Literature Review

The literature is reviewed keeping focus above mentioned.

Walker *et al.,* (1976) conducted a study on theeffects of *Ascaridiagalli* infection on the energy and nitrogen (N) metabolism were studied on groups of 5 cross bred cockerels aged about 5 weeks and given a diet deficient or adequate in vitamin A at two levels of feeding in respiration chambers. Metabolisability of dietary energy was 67% and N retention 33% in infected chickens compared with 71 and 41% respectively, in uninfected chickens. Maintenance energy requirement of vitamin A-deficient birds was 882 kJ/kgW d compared with 998 kJ/kgW d for normal birds. N balance of the deficient chickens was also less when compared at the same energy balance. Infection did not affect maintenance energy requirement nor N balance. Starvation heat production of infected chickens (619 kJ/kgW d) was higher than that of uninfected controls (586 kJ/kgW d). When infection treatments were combined, vitamin A-adequate chickens had a higher heat production (615 kJ/kg d) than the vitamin A-deficient (580 kJ/kgW d). Endogenous N excretion (mg/gW) was less in vitamin A-deficient than in adequate, starved birds. Deficient chickens had undetectable liver reserves of vitamin A and only very low plasma concentrations. There was a difference in the length of larvae (17 d after infection) associated with vitamin A status, and with level of feeding.

Culioli*et al.,* (2003) observed that the major components of raw poultry meat are proteins, lipids and minerals at proportions between 18.4 and 23.4%, 1.3 and 6.0%, 0.8 and 1.2% respectively

Rabbi (2006) studied on the prevalence of gastrointestinal helminth parasites and the gross pathological lesions produced by them in different types of poultry from March 2005 to March 2006, in the Department of Parasitology, Bangladesh Agricultural University, Mymensingh. In this study, 240 viscera of three types of poultry such as broiler, layer and backyard indigenous chickens were collected from local markets of Mymensingh district. During routine examination, total six species of helminth parasites were recorded. Results showed that the backyard poultry is at the high risk of helminth infection. However, layers are also vulnerable to parasitic infection. So regular deworming is essential both in backyard poultry and layer birds to obtain better production from them.

Luka (2007) Gastrointestinal parasites which invade the host possess morphological and physiological features such as small thread like cylindrical body, hooks, and hard body cuticle enhance their adaptation to long living and existence in their hosts. These parasites constitute a major factor limiting productivity of the poultry industry by affecting the growth rate of the host resulting in malfunctioning of organs and eventually death.

Yoriyo (2008) studied on the prevalence of helminthes infections in domestic fowls in Bauchi, providing information on their species composition and prevalence. Two hundred

chickens comprising of one hundred males and one hundred females were collected on a weekly basis for eight months and screened for helminthes parasites.

Mikail (2008) a survey of the gastro intestinal parasites of local chicken was carried out in sokoto metropolis between june and September 1998 one hundred and fifty alimentary tract were observed of which 139(92.6%) had helminths.

Eslami (2009) studied on the prevalence, intensity, and species of internal and external parasites of native fowls from Golestan Province, north of Iran.

Mukaratirwa (2009) surveyed on ectoparasites, cestodes and husbandry aspects of indigenous free-range chickens in selected districts from the highveld and lowveld of rural Zimbabwe. The survey recorded infection with 4 species from the order Phthiraptera (lice),1 species from the order Siphonaptera (fleas), 6 species from the order Acarina (ticks andmites) and 9 species of cestodes. The majority of households kept their birds extensively with barely any appropriate housing, and supplementary feeding was only occasionally practiced

Nnadi *et.al.,* (2010) conducted a study to identify and estimate the prevalence of ecto- and endoparasites of village chicken between April and July 2008 in three local councils of Enugu state, Nigeria. A total of 1038 chickens comprising of 468 chicks, 207 growers and 363adults were examined during the house to house survey for ectoparasites, gastrointestinal helminths and coccidia infections. Results showed that 41% were infected with ectoparasites with lice, fleas, and mites having prevalence rates of 62.2%, 35.7% and 2.1%, respectively. Helminths and coccidia had prevalence of 35.5% each. Among the helminthes*Ascaridiagalli* was the most dominant species (17.2%). Generally, there was a significantly higher helminth infestation relative to the ectoparasites ($P < .05$), high prevalence of mixed infections and absence of tick infestation. Parasitism could be big constraint to production in the study area and we recommend a sustainable control strategy.

Matur (2010) studied Five hundred (500) gastrointestinal tracts of local and exotic breeds of chickens slaughtered at the Gwagwalada Market (the FCT, Abuja) were collected and examined for helminth parasites. Formol-ether concentration technique was used to concentrate the gut content and analysis carried out. Six different gastrointestinal parasites were isolated andidentified. Of these parasites, *Ascaridiagalli*was found to be the most prevalent (51.60%) among the chickens. Other parasites encountered included; *Railleitinaechinobothrida* (19.60%), *R. tretragona* (22.20%), *Hymenolepsis carioca* (23.00%), *Hetarakisgallinarum*(31.00%) and *Syngamus trachea* (1.80%). There was significant difference ($x2=6.64$, $df= 1$; $P< 0.01$) in prevalence rate of infection between the local and exotic breeds of chickens.

Dube (2010) carried out a study to determine endo and ecto-parasites in Matebeleland North and Southfrom free range chickens (*Gallus domesticus*). The endo parasites encountered in the study were *Tetrameres americana, Acuariahamulosa ,Ascaridiagalli, Heterakisgallinarum, H. dispar, Allodapasuctoria, Capillaria annulate, Raillietinaechinobothrida and R. tetragona*. A commercially prepared insecticide constituted as follows (0.02% Tetamethrin, 0.03% pramethrin and 0.034% Imiprothrin) was applied for 2 seconds and feathers were then gentle unruffled so that ectoparasites could be counted and identified. Ecto parasites recorded in this study were *Menopongallinae, Menacanthusstramineus, Dermanyssusgallinae, Argas persicus, Ornithonyssus bursa, Cnemidocoptes mutans, Echidnophaga gallinacean, Gonocoitesgallinae and*

Gonocoitesholoqester. The birds under study showed slow growth, poor egg hatching. Parasites should have contributed substantially to this poor growth although not single handedly.

Waghmare (2010) investigated the quantitative estimation of carbohydrate metabolism i.e., total glycogen, pyruvate, lactic acid, lactate dehydrogenase, malate dehydrogenase, phosphatases activity in cestode species of *Gallus gallusdomesticus.* The significance of various amount of pyruvate in anaerobic intestinal parasites and various factors of its role was also discussed.

Marizvikuru (2011) stated that village chickens improve rural farmers nutritional and income status. Nonetheless, chicken productivity is chiefly hampered by gastro-intestinal parasites and there is dearth of information on the prevalence of these parasites in village chickens in South Africa. Point prevalent study was conducted in two villages of Centane district to determine the. Generally gastro-intestinal parasites were prevalent in village chickens of Center district. Sustainable ways of controlling these parasites need to be designed for improved village chicken production and ultimately rural livelihoods. Further studies on period prevalence of gastro-intestinal parasites in chickens in South Africa need to be conducted.

Bhure*et al.* (2011) studied onhaematological observations of Gallus *gallusdomesticus* infected with *Cotugniadigonopora.* Out of 43 *Gallusgallusdomesticus*, 28 were infected with cestode parasite. The significant increase in size of RBC and number of WBC; however reduction in the count of RBC, Hb, PCV, MCV in infected *Gallus gallusdomesticu*s as compaired with normal one. The haematological parameters of the infected bird *Gallusgallusdomesticus* shows high infection cause macrocytic anaemia, lymphocytosis due to difficiency of related factors.

Shahin (2011) studied on eight hundred and sixty chickens of different ages representing all types of production either morbund or freshly dead. Thirty-Seven birds out of 860 examined chickens, showed infestation with different types of cestode worms with percentage of 4.3%. The highest incidence was recorded in backyard chickens while no infestation was recoded in broilers.

Jinga (2012) investigated the intensity of ecto-parasites and endo-parasites of gastro-intestinal tract of chickens in winter and summer was conducted in Ward 28 of Murehwa District in Zimbabwe. Sixty chickens given to local farmers to rear under the free-range system were examined for parasites; 30 in summer of 2009 and the other 30 in winter of 2010. Chickens were generally parasitised in Murehwa District. There is need to intensify parasite prevention and control, but more specifically, the control of A. persicus, E. gallinacea, A. galliand C. infundibulum in summer.

Ogabaje (2012) conducted a survey to determine the prevalance of gastointestinalhelminthes in local chikens, broilers and layers slaughtered in Makuradimetropoils between september 2007 april 2008. A total of 440 samples were collected from male and female chickens. This study has highlighted the need for proper medication in flocks in makurdi.

Katoch *et al.,* (2012) conducted a study on necropsy of gastrointestinal tract of 125 free-range chickens from a subtropical and humid zone of northwestern India revealed four nematode spp. (*Ascaridiagalli, Heterakisgallinarum, Capillaria*spp. and*Cheilospirurahamulosa*) and four cestode spp. (*Raillietinacesticillus,*

Raillietinaechinobothrida, Raillietinatetragona and *Amoebotaenia cuneata*) The overall prevalence of the helminth parasites was 72.0%. Amongst various helminth species encountered in the region, *A. galli* emerged out as the most prevalent, followed by *H. gallinarum, R. cesticillus*and *R. echinobothrida*. The impact of helminthic infections on body weight gain in growing chickens was investigated.A strong negative correlation (r = -0.296) was observed between the weight gain and the total worm count in untreated group, whereas a weak negative correlation (r = -0.044) was noticed in treated group.

Heyradin (2012) conducted a cross sectional survey on gastrointestinal helminthes on 12 chikens raised under traditional management system in two selected districts namely ada and Admitula of eastern shewa zone, Ethiopia of the chickens,111(89.5%) were found to harbor one of the five different helminth parasites and 13(10.84%) were free of heleminths parasites. This study strongly suggested that helminthosis is very serious problem of backyard chickens in eastern shewa zone of oromia and appropriate control strategies need to devise.

Tesfaheywet (2012) carried out a study in three selected small scale commercial poultry farms in and around Haramaya woreda, Southeastern Ethiopia, from November 2011 to April 2012 with the aim of determining the prevalence and associated risk factors of helminthosis. For this purpose 384 chickens were randomly selected from different age groups of both sexes, kept under various management systems. Simple salt floatation technique was employed for coprological examination in the study. The study indicated that helminth parasites are highly prevalent in small scale poultry farms in the study area. Therefore, sustainable ways of controlling these parasites and further studies on period prevalence of helminth parasites in chickens need to be designed for improved intensive egg and poultry meat production

Shukla *et al.* (2012) worked on theseasonal variation of intestinal tapeworms in *Gallus gallusdomesticus* at Ahmednagar region. Prevalence of Raillietina parasite was higher in winter season followed by summer season and low in the rainy season. This type of results indicates that environmental factors and feeding habitats are influencing the seasonality of parasitic infection either directly or indirectly.

Farrell *et al.,* (2013) investigated that poultry meat, particularly from scavenging birds due to their varied diet, is an important provider of the essential polyunsaturated fatty acids (PUFAs), especially the x-3 fatty acids. The amounts of these important fatty acids, particularly long-chain polyunsaturated fatty acids (LC-PUFA), can be increased more easily in chicken meat than in other livestock meats, although negative effects on the oxidative stability may erupt.

Naphade. (2013) worked on the prevalence of Helminth infection in Desi poultry birds from Marathwada region of Maharashtra (India). After examined the intestine of the birds the overall prevalence found 239 (75.40%) during the study period. The percentage of prevalence of helminth infection related to a season was highest during summer (83.96%), followed by rainy (77.66%) and lowest during winter (64.81%). The average helminth infection of the cestode parasite was 72 (22.71%) and nematode was 114 (35.96%) found in the desi poultry birds, while the rest 53 (16.71%) were mixed infestations. It was found that the prevalence percentage of cestode (Summer: 26.38%, Rainy: 22.32%, Winter: 19.42%), nematode (Summer: 39.63%, Rainy: 37.87%, Winter: 30.61%) and mixed infection (Summer: 17.91%, Rainy: 17.5%, Winter: 14.79%) was highest during summer followed by rainy and lowest

during winter season. The major helminth infection of parasites includes Raillietina (21.01%) and Ascaridiaspp. (32.78%). This study shows that helminth infection is found more in desi poultry birds in the study area. Therefore, improved poultry management practices for controlling these parasites and further studies on control strategies of helminth infection in desi poultry birds need to be advised for improved poultry meat production.

Satish *et al.* (2013) studied the gastrointestinal helminths parasites of *Gallus gallusdomesticus* sample from Tribal areas of Madhya Pradesh. Two hundred (200) gastrointestinal tracts of local and exotic breeds of chickens collected from the tribal areas Including Seoni, Chhindwara, Dindori, Mandla, Jabalpur, of (M.P.). Six different gastrointestinal parasites were isolated and identified. Of these parasites, Ascaris *galli* was found to be the most prevalent (51.60%) among the chickens. Other parasites encountered included; Railleitina*echinobothrida*(21.60%), R. *tretragona* (22.0%), *Hymenolepsiscarioca* (23.00%), *Hetarakisgallinarum*(31.00%) and *Syngamustrachea* (1.50%). Parasite preference in respect to sex was also recorded. Females harbored more parasites than males. The significance and socio-economic implications of these parasites are also highlighted.

Medjouel*et al.* (2013) worked on cestode parasites of free-range chickens (*Gallus gallusdomesticus*) in the North-Eastern of Algeria. The overall prevalence rate was 88.19%, in the El-Tarf poultry. At least one species of cestodes was found on every chicken examined. Seven species of cestodes were identified in all; they had the following prevalences: *Raillietinaechinobothrida* (83.33%), *Raillietinatetragona* (68.75%), *Raillietinacesticillus* (29.16%), *Hymenolepiscarioca* (12.5%), *Choanotaeniainfundibulum* (11.8%), *Davaineaproglottina* (11.11%) and *Amoebotaeniacuneata* (4.16%). This study showed that there was no significant difference ($p>0.05$) between the prevalence of cestodes in relation to age and sex.

Sreedevi *et al.* (2014) studied the seasonal prevalence of gastrointestinal parasites in desi fowl (*Gallusgallusdomesticus*) for 1 year in and around Gannavaram, Andhra Pradesh. Screening of 492 samples comprising fecal samples and gastrointestinal tracts from freshly slaughtered desi birds revealed 63.21 % of gastrointestinal parasites. Fecal samples were examined by floatation technique using salt solution and samples positive for coccidian oocysts were sporulated in 2.5 % potassium dichromate solution for species identification. Adult worms were identified after routine processing and mounting. The species identified include *Davaineaproglottina*, *Raillietinacesticillus* and *Raillietinaechinobothrida* in cestodes (32.47 %), *Ascaridiagalli,Capillariaannulata*, *Heterakisgallinarum* in nematodes (39.87 %), *Eimeria tenella*, *Eimeria acervulina* and *Eimerianecatrix* in *Eimeria*spp. (39.87 %). *Ascaridiagalli* and *R.cesticillus* and *A.galli* and *Eimeria* spp. were common in mixed infection (12.86 %). *Ascaridiagalli* was the more prevalent species. No trematode parasite was identified during the study period. Significant ($p = 0.001$) relationship between the seasonality and prevalence of gastrointestinal parasites was observed ($\chi2 = 17.46$, $df = 2$). Data revealed high prevalence in the rainy season (43.41 %) followed by summer (38.91 %) and winter (17.68 %) seasons for all parasites except for *A. galli* and *C. annulata* infections which were higher in the summer season. Results indicated a high prevalence of

gastrointestinal parasites in desi fowl in study area emphasizing the need for improved management practices of backyard poultry.

Badreddine (2014) studied the prevalence of the gastrointestinal parasites of domestic chicken *Gallusdomesticus* Linnaeus, 1758 in Tunisia according to the agro-ecological zones. The aim of this work is to investigate various aspects of helminth infections. A significant difference ($p < 0.01$) was found between the prevalence rates of helminth parasites in the different agro-ecological zones. The highest prevalence was observed in lowland areas of northern Tunisia (Siliana district). This suggests that agro-ecology has a major influence on the distribution of helminth parasites. Recovered nematodes included *Heterakis*spp. *(*100 %), *Ascaridiagalli* (53.33 %) and *Acuariahamulosa* (37 %). The principal cestode species encountered were *Hymenolepis*spp. (73.33 %) and *Raillietina*spp. (33.33 %).

Junaidu*et al.* (2014) studied the prevalence of gastrointestinal helminth parasites of the domestic fowl (*Gallus gallusdomesticus*) slaughtered in Giwa market, Giwa local government area Kaduna State, Nigeria. A total of 163 birds were infected representing 81.5% of the study population. Six helminth parasites were (Gallus *gallusdomesticus)* encountered including *Raillietinatetragona* 48 (24.0%), *Raillietinaechinobothrida*22 (11.0%), *Raillietinacesticillus*7 (3.5%), *Hymenolepiscarioca* 79 (39.5%), *Ascaridiagalli*34 (17.0%) and *Heterakisgallinarum*41(20.5%). Hymenolepis carioca was the most abundant cestode parasite while *Heterakisgallinarum* was the most abundant nematode parasite recovered from the domestic chickens. Seventy nine (39.5%) of the birds had single infection, 68 (34.0%) had double infections, 14 (7.0%) had triple infections and 2(1.0%) harboured four parasites. No single trematode parasite was recorded. There was no statistically significant difference ($p<0.05$) in the infection rate between sexes.

Zubeda *et al.* (2014) studied on the prevalence of cestode parasites in the intestine of local chicken (*Gallus gallusdomesticus*) from Hyderabad, Sindh, Pakistan. A total of 200 chickens were dissected and examined. Over all prevalence of infection was (94.5%). Three species of cestode parasites were recovered from the intestine of infected chickens. The identified cestode species and their prevalence were *Cotugniadigonopora*(94.5%), *Choanotaenia infundibulum* (89.5%), and *Raillietinacesticillus* (83.5%). The results of present study revealed that sub-standard poultry farming is a major factor for arasitic infection in local chicken which ultimately causes heavy loss.

Sundar *et al.* (2015) worked on the prevalence and magnitude of helminth infections in organic laying hens (*Gallus gallusdomesticus*) across Europe. Worm counts were performed for 892 hens from 55 flocks and the number of ascarid (presumably primarily *A. galli*) eggs per g feces (EPG) for 881 hens from 54 flocks. The association between parasitological parameters (prevalence, worm burden, and EPG) and the management factors were analyzed by multivariate models. Results showed that *A. galli* was highly prevalent across Europe with an overall mean prevalence of 69.5% and mean worm burden of 10 worms per hen. The overall mean prevalence and worm burden for *Heterakis* spp. were 29.0% and 16 worms per hen, respectively, with a large variation between countries. On average, the hens excreted 576 ascarid EPG. The mean prevalence of *Raillietina spp*. was 13.6%. A positive correlation was found between mean *A. galli* worm burden and ascarid EPG.

Bashir *et al.* (2015) investigate the morphology and prevalence of some helminth parasites in *Gallus gallusdomesticus* from Guryez valley of Jammu and Kasmir, India. Total of 137 domesticus fowl was examined for helminth parasites from May 2013 to April 2015. A high rate of helminth infection (40.14%) was observed. One cestode *Raillitinatetragona* and two nematodes, *Ascaridiagalli* and *Heterakisgallinarum* were encountered during the present study. High prevalence of infection was observed during summer (41.86%) followed by autumn (34.21%), spring (33.33%) and winter (30.76%). Males (36.96%) were more infected than females (34.37%). The young ones were more infected than adults. Thus, seasonal dynamics and sex of the hosts significantly influenced the prevalence of GIH infection in domestics fowl. Nematodes were more prevalent than cestodes.

Ayisha *et al.* (2015) studied on helminth parasites of domestic fowl (*Gallusdomesticus*) in Doda district of Jammu & Kashmir state, India. Study revealed that 67.85 percent of the birds were infected with endoparasites. Different types of helminth parasites recovered included *Raillietinatetragona*, followed by *Heterakisgallinarum*and *Ascaridiagalli.* Occurrence of various helminth parasites calls for intervention measures like mass chemotherapy of fowl of district Doda.

Lawal *et al.* (2015) worked on the survey and prevalence of gastrointestinal nematodes in village chickens (*Gallusgallusdomesticus*) slaughtered in Gombe Metropolis poultry dressing slabs. A total of seven nematode species were identified in this present study with an overall prevalence of 20.1% in the Nothern markets and 19.5% in the Southern markets of the study area. Three nematode species recovered from the intestine were *Heterakisgallinarum* (365), *Ascaridiagalli* (267) and *Gongylonemaingluvicola* (21), *Subulurabrumpti* (123) was found in the caecum while *Dispharynxnasuta* (34) and *Cheilospirurahamulosa*(34) were found in the gizzard and *Syngamustrachea* (6) was recovered from trachea. There were no statistical significant association between the occurrence of the infection and the two zones of the study area ($p > 0.05$), except for *Syngamus trachea* having a statistical significant association ($p < 0.05$) between its occurrence and the two zones of the study area with the odd of occurrence having a value of 13.265 in the Northern zone. The study also indicated that female sex had a higher prevalence (70.1%) than the male (60.2%). There was a statistical significant association among the sex group and occurrence of the infection ($p < 0.05$). The odd of occurrence was about twice in the female than male.

Aziz (2016) studied on theprevalence of gastrointestinal helminths of *Gallus gallus domesticus* (Linnaeus, 1758) in free-range system at Upper Egypt. During 2016, chickens were slaughtered and their alimentary canals were opened longitudinally searching for the presence of helminths, the percent of infection was 84.4% (114/135). The percent of cestodes was 96.5%, but nematodes percent was 73.7%. Three nematodes spp, *Heterakis gallinarum* 56.14% (64/114), Ascaridia species were identified, *Raillietina tetragona* 39.47% (45/114). The overall prevalence may continue to the breeding system in Egypt.

Afolabi*et al*., (2016) conducted a survey of intestinal parasites of chickens in Akure, Ondo State, Nigeria from January to December, 2015. A total of 327 chickens of different breeds were examined for gastrointestinal infections. Fecal samples obtained from these chickens were prepared for microscopy using flotation technique. The results showed that 67 (20.5%) of the 327 chickens examined were infected with various gastrointestinal parasites. The

results showed that 67 (20.5%) of the 327 chickens examined were infected with various gastrointestinal parasites. Among the infected chickens, the layers were the most susceptible to gastrointestinal parasites with a prevalence of 88.4%, while broilers were the least susceptible with a prevalence of 7.2%. It was further observed that the highest prevalence of gastrointestinal infection (37.6%) was recorded among the chickens that were kept in an extensive management system, while the lowest prevalence (9.6%) was recorded among the chickens kept in an intensive management system. Laboratory screening of the fecal samples for parasites revealed three types of protozoa: *Eimeria* spp. (7.7%), *Histomonas meleagridis*(0.6%), and *Giardia lamblia* (0.3%); and five types of nematodes: *Ascaridiagalli*(7.0%), *Heterakis gallinarum*(1.8%), *Capillaria*spp. (0.9%), *Syngamus trachea* (0.6%), and *Trichostrongylus tenuis* (1.6%). Of all these parasites, *Eimeria* spp.was the most prevalent (7.7%), while *Gardia lamblia* was the least prevalent (0.3%).

Silva *et al.* (2016) worked on helminthic parasites of chickens (*Gallus domesticus*) in different regions of São Paulo State, Brazil. The following helminth species were diagnosed in chickens reared in 17 municipalities of the state of São Paulo: nematodes (Ascaridia *galli,* Capillaria*sp*., Cheilospirura *hamulosa*, Heterakis *gallinarum*, Oxyspirura *mansoni,* and Strongyloides*sp.),* cestodes (Amoebotaenia*c uneata*, Choanotaenia *infundibulum,* Hymenolepis*sp*., Raillietina *cesticillus*, Raillietina*e chinobothrida,* and Raillietina *tetragona)*, and trematodes (*Zygocotylelunata* and *Postharmostom umcommutatum*).

Suhail *et al.* (2017) worked on epidemiology of cestode parasites in domestic fowl (Gallus *gallusdomesticus*) of Kashmir valley with annual, seasonal, sex based, and weight based prevalence. During the study, 576 hosts were examined for cestode parasites and prevalence rate was found to be 61.63% (355 /576) with mean intensity load of 43.46 per infected host. The species found were *R. tetragona* (38.27%), *R.cesticellus*(20.82%), *R.echinobothrida*(28.07%), C. *infundibulum* (15.12%), *A.cuneata* (9.27%), *D.proglottina* (10.4%). The highest prevalence was found to be in summer (74.30%) followed by autumn (70.13%) followed by spring (54.86%) followed by winter (47.22%). The Prevalence rate was found to be higher in females (69.09%) than in males (53.81%). Infection was found more in growers (77.44%) than in adults (43.77%).

Female sex had a higher prevalence (70.1%) than the male (60.2%). There was a statistical significant association among the sex group and occurrence of the infection ($p < 0.05$).

Alasadiy*et al*., (2020) studied on the prevalence of parasites in poultry. Many species of ectoparasites and endoparasites were known to infect chickens; one of the actual problems that cause economic loss in animal farms and rural areas. External and internal parasites that infected hosts possess features such as small size, cylindrical body, hook and hard body, enhance their adaptation to the long life and effect on the poultry industry by affecting the growth rate of chickens, leading to little eggs production, and death in severe infections. Prevalence of helminthic infection (cestodes and nematodes infect by digestive tract) was highly in farms and rural areas chickens from the different studies in different sites in the world, followed by protozoa infection by blood, followed by arthropodic infection by skin and feathers and followed by prevalence of trematodes.

Jaiswal *et al.*, (2020) conducted a study on the prevalence of gastrointestinal helminth parasites in *Gallus gallusdomesticus* from January 2017 to December 2019 in the

parasitology laboratory of Zoology Department, Babasaheb Bhimrao Ambedkar University Lucknow. In this study, a total of 557 domestic fowls were examined to identify the different types of gastrointestinal helminth infections. During regular examination of helminth parasites, the highest prevalence was observed for *Ascaridiagalli*(41.7%), followed by *Cotugniadiagnopora*(17.6%), *Raillietinatetragona*(11%), *Heterakisgallinarum*(7.4%) and *Raillietinacesticillus*(6.64%). In the monsoon season, prevalence was found to be higher than the summer and winter. Females were found to be more infected than the males. There was no trematode infection detected during the study period. The gross pathological lesions were observed in case of *Heterakisgallinarum*infection. The results of this study suggest that both nematodes and cestodes are prevalent in domestic fowls in the study area.

Conclusion In view of above literature, it is observed in free range and backyard rearing ,prevalence of parasites is very common. .It leads to the weakening of immune system , secondary infection and weight loss so it is recommended that the farmers and poultry farmers are made aware about parasitic infection , its treatment and to maintain proper sanitation . Further study is required to find the impact of paraites on the nutritional quality of meat.

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