

*Original Research***A Cross-Sectional Study on Gastrointestinal Parasites in Backyard Poultry in Krishna District, Andhra Pradesh, India****B. Anupama\*, P. Malakondaiah, C. Sreedevi, P. Ravi Kumar<sup>1</sup> and K. Satheesh<sup>2</sup>**

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<b>Rec. Date:</b>	Aug 05, 2019 12:03
<b>Accept Date:</b>	Jan 25, 2020 15:15
<b>DOI</b>	<a href="https://doi.org/10.5455/ijlr.20190805120338">10.5455/ijlr.20190805120338</a>

**Abstract**

A total of 1447 desi birds' samples (faeces, gastrointestinal tracts) collected from various villages in Krishna district, Andhra Pradesh were examined from July 2015 to June 2016 to determine the prevalence of gastrointestinal (GI) parasites. The overall prevalence was 74.22 per cent. Mixed infection was more frequent (70.39 %) and cestodes were the common parasites in all infected birds. No trematode parasite was identified. The species identified includes *Amoebotaenia sphenoides*, *Cotugnia digonopora*, *Davainea proglottina*, *Hymenolepis carioaca*, *Raillietina cesticillus*, *R. echinobothridia* and *R. tetragona* in cestodes, *Ascaridia galli*, *Capillaria* spp., *Heterakis gallinarum*, *Strongyloides avium*, *Subulura brumpti*, *Tetrameres mohtedai* and *Dispharynx spiralis* in nematodes and *Eimeria* spp. in protozoa. The prevalence of infection was increased with advance in age. Statistically there was no significant relationship between the prevalence of infection and age, sex and seasons ( $P>0.05$ ). *Cotugnia digonopora* was the highest prevalent parasite. *Dispharynx spiralis* was exclusively found in chicks and in summer. *Tetrameres mohtedai* was exclusively identified in female bird.

**Key words:** Age Wise, Desi Birds, Gastrointestinal Parasites, Prevalence, Sex Wise and Season Wise**How to cite:** Bandi, A., Pattipati, M., Chennuru, S., Pentela, R., & Kokila, S. (2020). A cross-sectional study on gastrointestinal parasites in backyard poultry in Krishna district, Andhra Pradesh, India. International Journal of Livestock Research, 10(2), 46-60. doi: 10.5455/ijlr.20190805120338**Introduction**

Poultry farming is one of the rapidly growing profitable animal production enterprises (Obiora, 1992). India is the third-largest egg producer and the fourth largest chicken-producer (Kotaiah, 2016). Poultry farming under backyard system is as old as its civilization and contributes nearly 30.0 per cent of Indian egg production (Singh *et al.*, 2009). Investments in backyard poultry farming can stimulate the growth of the

economy as their eggs and meat fetches a much higher price than that from commercial poultry hence, the government of India included it in its eleventh five-year plan (2007-2012) (Pica-Ciamarra and Dhawan, 2009). Backyard poultry rearing had a significant impact towards socio-economic development of the rural women folk in generating more income for leading their families happy (Rayala Reddy *et al.*, 2017). The rural women are primarily agricultural labourers keeping small size backyard poultry flock as secondary occupation with marginal land holding, low annual family income, low annual income from backyard poultry (21.10% of annual family income) (Bharti *et al.*, 2018).

However, due to their scavenging habits backyard poultry are more prone to variety of infectious diseases and parasitic infections are among the one that are considered as major constraint to the economy of farming through reduced egg production and weight gain. Hence, there is a need for systematic observation and documentation of the occurrence of parasites in different regions in different age groups, sex and seasons to formulate and undertake appropriate control strategies. Globally, the prevalence of GI parasites in desi birds has been reported from different countries (Percy *et al.*, 2012) including India (Puttalakshamma *et al.*, 2008; Katoch *et al.*, 2012). Yet, it is crucial to carry out up-to-date epidemiological studies considering the dynamics of parasitic infections. However, reports on prevalence of endoparasites in backyard desi fowl of Andhra Pradesh are scanty and is restricted to one particular region (Sreedevi *et al.*, 2016). In view of this, the present study is aimed to record the prevalence of GI parasites in backyard poultry in Krishna district, Andhra Pradesh, India.

## Materials and Methods

### Study Area

The study area Krishna district occupies an area of approximately 8727 km<sup>2</sup>. It is located at an altitude of 97-100 meters above sea level. Its latitude is 16.1 and longitude is 81.1. The climatic conditions of the district are extremely hot summer and moderately hot winter and may be classified as tropical. The annual rainfall in the region is about 1028 mm and is contributed to by the Southwest monsoon. The mean annual minimum and maximum temperature is 18.7 °C and 39.8 °C respectively. The majority of the people in urban areas of Krishna district are engaged in trade and commerce.

### Sample Collection

A total of 1447 desi birds' samples (745 faecal samples and 702 Gastrointestinal tracts (GITs) were collected from Kesarapalli, Gannavaram, Bapulapadu, Srinarsannapalem, Bathulavarigudem, Unguturu, Ravicherla and Indupalli villages in Krishna district, Andhra Pradesh for a period of one year from July 2015 to June 2016 to know the prevalence of gastrointestinal parasites. GITs were collected from freshly slaughtered birds at local poultry shops of the said villages. The birds were randomly sampled per household with consideration of age, sex and season. The birds were divided in to three groups as chicks (up to 8 wk),

growers (9 to 16 wk) and adults (above 16 wk). Depending on climatic conditions prevailing in Andhra Pradesh the whole year was divided in to three seasons viz. summer (March to June), monsoon or rainy (Jun to October) and winter (November to February). A cross sectional survey was done to pertain the information regarding the dynamics of flock size, number of eggs laid, percentage hatch, number successfully brooded, number that attained adulthood among different age group. The average size of flocks in different villages was 5-15 birds.

### Processing of Samples

Faecal samples were examined by direct smear and concentration by floatation with 33.3 per cent zinc sulphate solution and sedimentation methods. Samples that were positive for coccidian oocysts were kept in 2.5 per cent potassium dichromate solution for specific identification. Each GIT was incised longitudinally and was immersed in luke warm water for the release of worms that were embedded in intestinal mucosa. Intestinal scrapings were also examined for the presence of tape worm heads, small tape worm and developmental stages of coccidian parasites. Any visible worms were collected and were fixed in fixatives like 10% formalin (round worms) and Boun's fluid (cestodes) for further species-specific processing as per the standard procedure. The intestinal contents were washed into separate petri dishes and were centrifuged and examined for the presence of eggs, oocysts and larval stages of parasites. The identification of eggs, cysts and adult parasites was carried out as per the description of Soulsby (1982) and Saif *et al.* (2008). Oocysts of *Eimeria* spp. were identified based on sporulation time and micrometry.

### Statistical Analysis

Data obtained was classified according to age, sex and season and was analyzed as per standard statistical techniques (Petrie and Watson, 2013). Chi-square test of association was used to establish association between the infection status and variables such as age, sex and season of the desi bird.

### Results and Discussion

A cross sectional survey on backyard poultry revealed that hens lay between 10-16 eggs prior to natural incubation out of which hatchability varies from 70.0 to 100 per cent based on the number successfully brooded. Depending on season between 60.0 to 80.0 per cent of the hatchlings were successfully brooded.

### Overall Prevalence and Species Wise Prevalence of GI Parasites

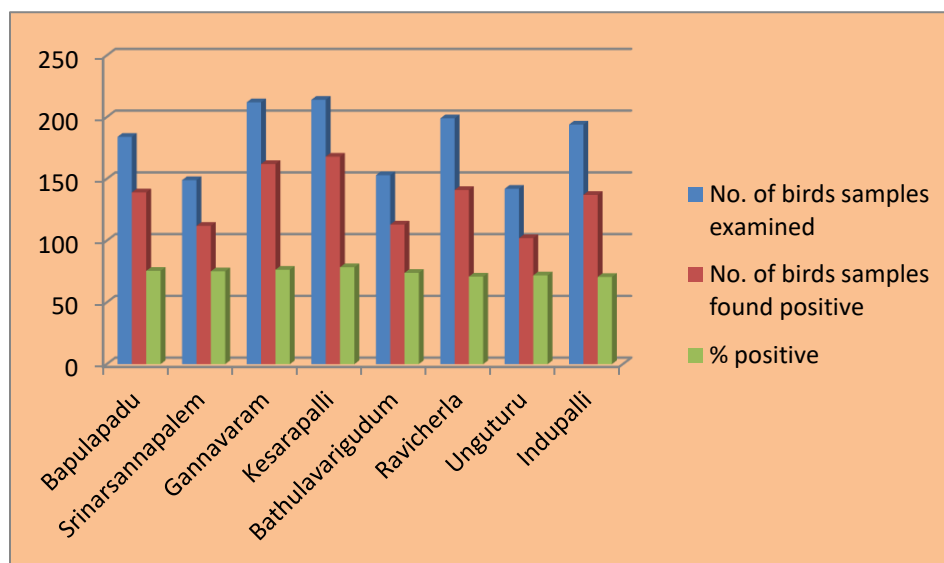
Out of 1447 birds examined, on faeces and GIT examination, 1074 birds revealed different helminth and protozoa infections giving an overall prevalence of 74.2 per cent of GI parasites in the study area. Examination of GIT of birds revealed presence of parasites in all samples (100%). Examination of intestinal scrapings revealed presence of schizonts of coccidia, *Amoebotaenia sphenoides* and *Davainea proglottina*. The infection was more prevalent in Kesarapalli (78.50%) village compared to that of Gannavaram

(76.41%), Bapulapadu (75.54%), Srinarsannapalem (75.16%), Bathulavarigudem (73.85%), Unguturu (71.83%), Ravicherla (70.85%) and Indupalli (70.61 %) villages of Krishna district. It was noticed that there was an increase in prevalence over the past 5 years in Gannavaram region wherein the prevalence was 63.21 per cent in 2014 (Sreedevi *et al.*, 2016) warranting control measures on parasitic infections. Similarly, Puttalakshamma *et al.* (2008), Katoch *et al.* (2012) and Sonune *et al.* (2012) reported 71.0, 72.0 and 72.0 per cent of infection in desi birds in Bangalore, Jammu and Maharashtra respectively. Higher prevalence than in the present study was reported in other Asian country, Bangladesh (91.88%) by Alam *et al.* (2014). However, lower prevalence of 58.75 per cent was noticed by Hembram *et al.* (2015) in Odisha. The difference in the prevalence of parasitic infection could be due to the difference in climatic conditions of region, socio-economic conditions of the people, availability of intermediate hosts or adaptability of managerial practices (Percy *et al.*, 2012; Sreedevi *et al.*, 2016).

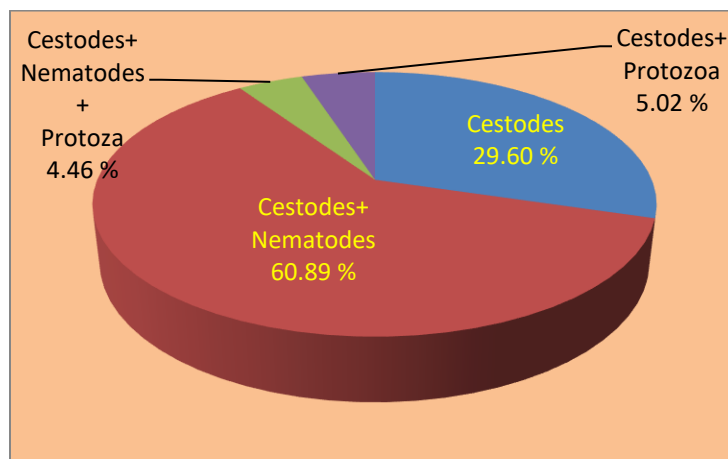
Out of 1047 infected birds, 29.61 per cent were found to be positive exclusively for cestodes, 60.89 per cent for cestodes and nematodes, 4.46 per cent for cestodes, nematodes and *Eimeria* spp. and 5.02 percent for cestodes and *Eimeria* spp. Mixed infection (70.39%) was more common than single infection (29.61%) and cestodes were the common parasites in all infected birds (100%). Similarly, Eshetu *et al.* (2001) also reported 73.78 per cent prevalence of mixed infection in Ethiopia. A similar pattern of higher prevalence of cestodes over nematodes has also been reported by Puttalakshamma *et al.* (2008) in Bangalore (52.2 %) and Sonune *et al.* (2012) in Maharashtra (52.77%). Contrary to the present finding Katoch *et al.* (2012) in Jammu (56.66 %), Naphade and Chaudhari (2013) in Maharashtra (40%) and Solanki *et al.* (2015) in South Gujarath (40.87%) reported high prevalence of nematodes over cestodes. The higher prevalence of cestodes in the present study could be due to frequent exposure of the backyard poultry to intermediate hosts of cestodes and less accessibility to infective stages of nematodes in the environment in addition to immunological and nutritional status of the individuals in a particular geographical area. The per cent prevalence of different parasites identified in the present study was presented in Table 1 and Fig. 1&2. There was a significant ( $P < 0.05$ ) difference in prevalence between species of parasites of infected birds in accordance to the findings of Momin *et al.* (2014).

**Table1:** Prevalence of endoparasites in desi birds in different villages of Krishna district, Andhra Pradesh

S. No.	Name of the Mandal	Name of the Village	No. of bird's samples examined	No. of bird's samples found positive	% positive
1	Bapulapadu	Bapulapadu	184	139	75.54
		Srinarsannapalem	149	112	75.16
2	Gannavaram	Gannavaram	212	162	76.41
		Kesarapalli	214	168	78.5
3	Nuzvid	Bathulavarigudum	153	113	73.85
		Ravicherla	199	141	70.85
4	Unguturu	Unguturu	142	102	71.83
		Indupalli	194	137	70.61
<b>Total</b>			<b>1447</b>	<b>1074</b>	<b>74.22</b>



**Fig.1:** Prevalence of endoparasites in desi birds in different villages of Krishna district, Andhra Pradesh



**Fig. 2:** Type of endoparasites in desi birds of Krishna district, Andhra Pradesh

Among all cestode parasites identified *Cotugnia digonopora* was the highest prevalent parasite (36.8%) which is in agreement with the findings of Butt *et al.* (2014) who recorded highest (94.5%) prevalence of *C. digonopora* in Pakistan and *H. carioca* was the lowest. However, Bhat *et al.* (2014) reported lowest (3.3%) prevalence of *C. digonopora* in North India. In contrast, *R. echinobothridia* and *R. tetragona* were the common parasite in Faisalabad (Shah *et al.*, 1999) and in Bengaluru region (Puttalakshamma *et al.*, 2008).

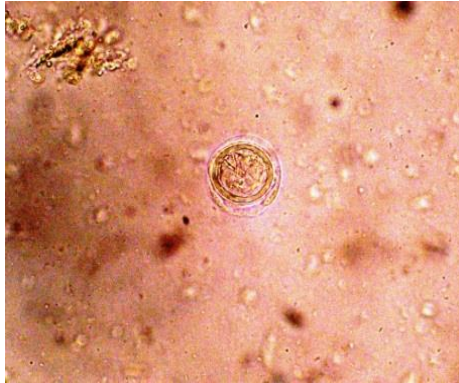
Among all nematode parasites identified *A. galli* (30.9 %) was the frequent parasite (Puttalakshamma *et al.*, 2008; Katoch *et al.*, 2012) in the studied area. However, mortality from *A. galli* is insignificant, may lead to death of infected bird due to intestinal obstruction. Compared to *A. galli* infection the prevalence of *H. gallinarum* (24.5%) was lower, yet its significance lies in its role as a carrier of protozoan parasite *Histomonas meleagridis* which cause fatal disease in birds. Contrary to our findings *H. gallinarum* was the highly prevalent nematode in Bhubaneswar (Manaswini, 2007). No trematode parasites were noticed during this study which might be due to lack of accessibility to snails infected with larval stages of trematodes. Present findings were in accordance with previous reports in India (Puttalakshamma *et al.*, 2008; Sreedevi *et al.*, 2016). Out of four *Eimeria* spp. identified *E. tenella* was the most prevalent species. The present results are in accordance with the findings of Sreedevi *et al.* (2016) who reported *E. tenella* as prevalent species in desi birds in Gannavaram, one of the study areas.



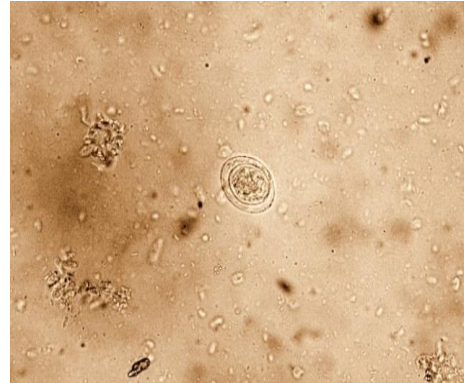
**A.** *Amoebotaenia sphenoides* (egg with distinctive granular layer x 400)



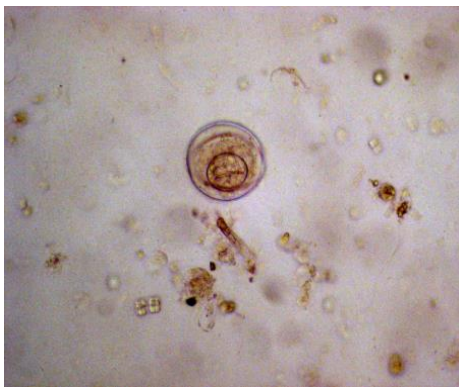
**B.** *Davainea proglottina* (single egg with hexacanth embryo and without egg capsule x 400)



C. *Cotugnia digonopora* (egg capsule containing single egg x 400)



D. *Hymenolepis carioca* (football shaped embryophore with granular accumulations at the poles x 400)



E. *Raillietina cesticillus* (single egg with egg capsule x 400)



F. *Raillietina echinobothridia* (egg capsule with more than 12 eggs x 400)



G. *Ascaridia galli* (oval shaped egg with smooth shell and unembryonic mass x 100)



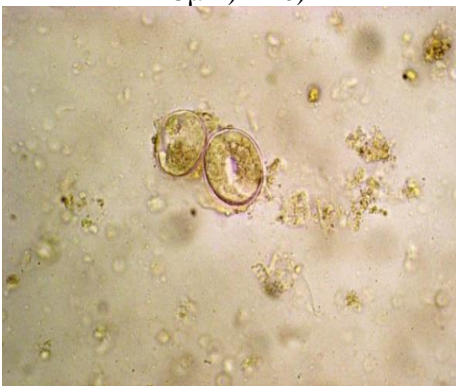
H. *Capillaria* spp. (operculum at both ends x 100)



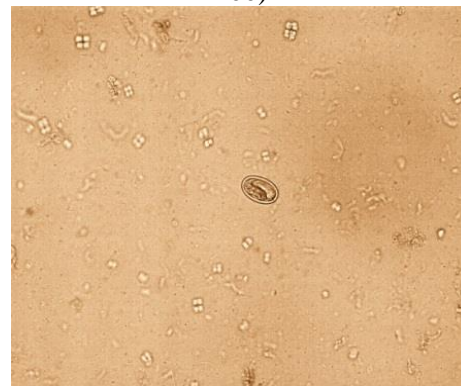
I. *Heterakis gallinarum* (oval shaped egg with smooth shell and embryonic mass (68-72µm/37-43µm) x 10)



J. *Strongyloides avium* (fully developed embryo inside the oval shaped egg (51-53µm/31-34µm) x 100)



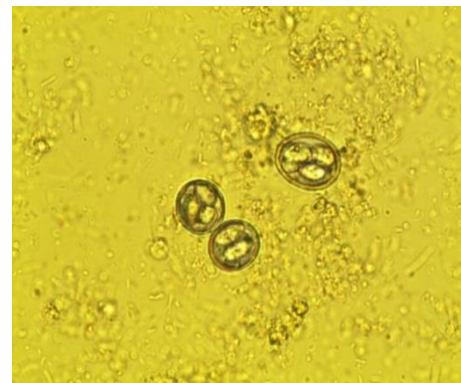
K. *Subulura brumpti* (fully developed embryo inside the oval shaped egg (58-61µm/42-47µm) x 100)



L. *Dispharynx spiralis* (thick shelled embryonated egg (33-36µm/18-20µm) x 100)

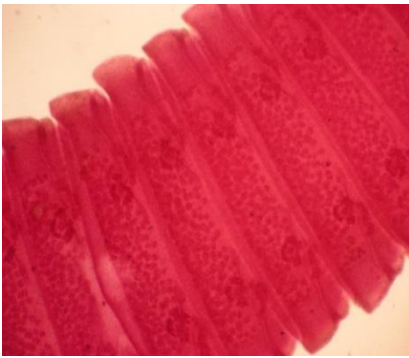


M. Sporulated oocyst of *Eimeria necatrix* (oval shaped oocyst (26-27µm/19-20µm) x 400)

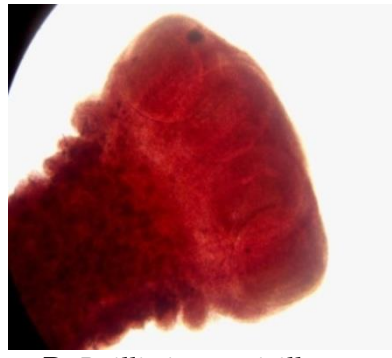


N. Sporulated oocyst of *Eimeria mitis* (sub-spherical shaped oocyst (17-20µm/16-18µm) x 400)

Fig. 3: Endoparasites identified in the faecal samples of desi birds



**A.** *Cotugnia digonopora* Mature segments: Note two sets of genital organs x40



**B.** *Raillietina cesticillus* a. Wide scolex x100.



**B.** *Raillietina cesticillus*: b. Mature segment: Note single set of genital organs and unilateral genital pores x100



**C.** *Raillietina echinobothridia* Scolex with circular shaped suckers x40



**D.** *Raillietina tetragona*: Scolex with oval shaped armed suckers x40



**E.** *Ascaridia galli* Anterior end: Note three lips without posterior bulb x40.



**F.** *Heterakis gallinarum* oesophagus with posterior bulb x 40



**G.** *Tetrameres mohtedai* Adult: Note globular red colour body



**H.** *Dispharynx spiralis* Anterior end: Note spinous course of cords which are recurrent and not anastomosed x 40

**Fig. 4:** Endoparasites identified in the GIT of desi birds

**Age-Wise Prevalence of GI Parasites**

**Table 1: Age-wise prevalence of endoparasites in desi birds**

S. No	Age Group	No of birds examined	No of birds found +ve	Cestodes							Nematodes							Protozoa			
				<i>Amoebotaenia sphenoides</i>	<i>Cotugnia digonopora</i>	<i>Davainea proglottina</i>	<i>Hymenolepis cariooca</i>	<i>Raillietina cesticillus</i>	<i>Raillietina echinobothridia</i>	<i>Raillietina tetragona</i>	<i>Ascaridia galli</i>	<i>Capillaria</i> spp.	<i>Heterakis gallinarum</i>	<i>Strongyloides avium</i>	<i>Subulura brumpti</i>	<i>Tetrameres mohiedai</i>	<i>Dispharynx spiralis</i>	<i>Eimeria acervulina</i>	<i>Eimeria mitis</i>	<i>Eimeria necatrix</i>	<i>Eimeria tenella</i>
1	Chicks	173	119 (68.8)	36 (20.8)	57 (32.9)	27 (15.6)	3 (1.7)	44 (25.4)	33 (19.1)	29 (16.8)	44 (25.4)	19 (10.9)	32 (18.5)	-	-	5 (2.9)	14 (8.1)	-	2 (1.2)	-	2 (1.2)
2	Growers	428	302 (70.6)	92 (21.5)	144 (33.6)	96 (22.4)	10 (2.3)	124 (28.9)	104 (24.3)	94 (21.9)	131 (30.6)	31 (7.2)	102 (23.8)	14 (3.27)	12 (2.8)	7 (1.6)	-	5 (1.2)	9 (2.1)	9 (2.1)	17 (3.9)
3	Adults	846	653 (77.2)	217 (25.7)	331 (39.1)	221 (26.1)	24 (2.8)	258 (30.5)	231 (27.3)	205 (24.2)	272 (32.2)	78 (9.2)	220 (26.0)	34 (4.0)	35 (4.1)	9 (1.1)	-	9 (1.1)	17 (2.0)	23 (2.7)	19 (2.2)
	Total	1447	1074 (74.2)	345 (23.8)	532 (36.8)	344 (23.8)	37 (2.6)	426 (29.4)	368 (25.4)	328 (22.7)	447 (30.9)	128 (8.8)	354 (24.5)	48 (3.3)	47 (3.2)	21 (1.5)	14 (0.9)	14 (0.9)	28 (1.9)	32 (2.2)	38 (2.6)

Chi square; Non-Significant at  $P > 0.05$ . Figures in parenthesis indicate per cent.

Overall, the prevalence of endoparasites was 68.8, 70.6 and 77.2 per cent in chicks, growers and adults respectively (Table 1). In all age groups *C. digonopora* and *A. galli* were the highest prevalent cestode and nematode parasites respectively. *Strongyloides avium* and *Subulura brumpti* were not observed in chicks. Among *Eimeria* spp. only *E. tenella* and *E. mitis* were observed in chicks. In growers, *Eimeria tenella* and in adults, *Eimeria necatrix* were the most prevalent species compared to other coccidia. *Dispharynx spiralis* was exclusively found in chicks in study area in accordance with the report of Alam *et al.* (2014).

Though rate of infection was more in adult, statistically it was not significant ( $P > 0.05$ ). Whereas Momin *et al.* (2014) observed significant difference in prevalence between age groups of birds in Bangladesh and the infection was highly prevalent in adults. High prevalence of endoparasites in adult birds could be due to their gregariousness compared to chicks, which expose them to more access to infective stages and intermediate hosts than the former. Moreover, chicks are usually retained interior to protect them from predators. Contrary, Hembram *et al.* (2015) observed higher prevalence in chicks than that of adult birds in Mayurbhanj district of Odisha.

**Table 2:** Sex-wise prevalence of endoparasites in desi birds

S.No	Sex of the bird	No of birds examined	No of birds found positive	Cestodes							Nematodes					Protozoa				
				<i>Amoebotaenia splenoides</i>	<i>Cotugnia digonopora</i>	<i>Davainea proglottina</i>	<i>Hymenolepis carioaca</i>	<i>Railletina cesticillus</i>	<i>Railletina echinobothridia</i>	<i>Railletina tetragona</i>	<i>Ascaridia galli</i>	<i>Capillaria</i> spp.	<i>Heterakis gallinarum</i>	<i>Stomoxylodes avium</i>	<i>Subulura brumpti</i>	<i>Tetrameres mohtedai</i>	<i>Eimeria acervulina</i>	<i>Eimeria mitis</i>	<i>Eimeria necatrix</i>	<i>Eimeria tenella</i>
1	Male	556	404 (72.7)	132 (23.7)	197 (35.4)	128 (23.0)	9 (1.6)	151 (27.2)	137 (24.6)	124 (22.3)	171 (30.8)	42 (7.6)	129 (23.2)	17 (3.1)	16 (2.9)	-	-	9 (1.6)	12 (2.2)	14 (2.5)
2	Female	718	551 (76.7)	177 (24.7)	278 (38.7)	189 (26.3)	15 (2.1)	231 (32.2)	198 (27.6)	175 (24.4)	232 (32.3)	77 (10.7)	193 (26.9)	31 (4.3)	31 (4.3)	21 (2.9)	14 (1.9)	17 (2.4)	20 (2.8)	22 (3.1)
	Total	1274	955 (75.0)	309 (24.3)	475 (37.3)	317 (24.9)	34 (2.7)	382 (30.0)	335 (26.9)	299 (23.5)	403 (31.6)	119 (9.3)	322 (25.3)	48 (3.8)	47 (3.7)	21 (1.6)	14 (1.1)	26 (2.0)	32 (2.5)	36 (2.8)

Chicks were not included as sexing of chicks is difficult.

Chi square; Non-Significant at  $P > 0.05$ , Figures in parenthesis indicate per cent.

### Sex-Wise Prevalence of Endoparasites in Desi Birds

With regard to the sex of birds, females were more susceptible to GI parasites than males with no statistical significance ( $P>0.05$ ) (Table 2). This could be due to the voracious feeding habits of female birds especially during egg production, than that of males which are largely selective in nature. Similarly, no statistical difference was reported by Hembram *et al.* (2015) and Rehman *et al.* (2016). In contrast, Momin *et al.* (2014) and Sheikh *et al.* (2015) reported more prevalence of parasitic infections in males than in female birds. Within each age group, there was no difference between the rates of infection in female and male birds. In both male and female birds, *C. digonopora*, *A. galli* and *E. tenella* were the most prevalent species of cestode, nematode and coccidian respectively. *Tetrameres mohtedai* was exclusively identified in female birds.

### Seasonal Prevalence of GI Parasites

In relation to season, though the prevalence was high during rainy season (Alam *et al.*, 2014; Hembrem *et al.*, 2015) no significant ( $P>0.05$ ) relationship between the seasonality and prevalence of GI parasites was observed in the present study (Table 3). Significant relationship between the seasonality and prevalence of gastrointestinal parasites was observed during rainy season by Dube *et al.* (2010) and Sreedevi *et al.* (2014) in rural area of Zimbabwe and Gannavaram respectively. The climate of this region, hot and humid, support the development and survival of free-living stages of parasites and arthropods that act as vectors for parasites resulting in increased accessibility of infective stages for backyard poultry (Dube *et al.* 2010) particularly during scavenging. Contrary, Solanki *et al.* (2015) and Rehman *et al.* (2016) reported highest incidence of helminth infection in winter and Naphade and Chaudhari (2013) and Sheikh *et al.* (2015) observed high prevalence of GI parasites during summer season. *Dispharynx spiralis* was observed only during summer season which was in agreement with the findings of Alam *et al.* (2014). Climatic conditions such as temperature and humidity may amend the population dynamics of the parasites, leading to variations in the occurrence and intensity of parasitic diseases (Magwisha *et al.*, 2002).

Among different helminth species identified *C. digonopora* was the more prevalent species and *H. carioeca* was the least prevalent parasite throughout the year. *Tetrameres mohtedai* infection was observed during rainy and summer seasons only. *Dispharynx spiralis* was recorded only during summer season. Infection with different *Eimeria* spp. was noticed exclusively in rainy season (Table 3).

**Table 3:** Season-wise prevalence of endoparasites in desi birds

S. No.	Season	No of birds examined	No of birds found positive	Cestodes							Nematodes							Protozoa			
				<i>Amoebotaenia sphenoides</i>	<i>Cotugnia digonopora</i>	<i>Davainia proglottina</i>	<i>Hymenolepis carioeca</i>	<i>Raillietina cestitillus</i>	<i>Raillietina echinobothridia</i>	<i>Raillietina tetragona</i>	<i>Ascaridia galli</i>	<i>Capillaria</i> spp.	<i>Heterakis gallinarum</i>	<i>Stongyloides avium</i>	<i>Subulura brumpti</i>	<i>Tetrameres mohtedai</i>	<i>Dispharynx spiralis</i>	<i>Eimeria acervulina</i>	<i>Eimeria mitis</i>	<i>Eimeria necatrix</i>	<i>Eimeria tenella</i>
1	Winter	505	372 (73.7)	121 (24.0)	179 (35.4)	114 (22.6)	12 (2.4)	142 (28.1)	122 (24.2)	116 (23.0)	151 (29.9)	52 (10.3)	124 (24.6)	16 (3.2)	16 (3.2)	-	-	-	-	-	-
2	Summer	449	322 (71.7)	95 (21.2)	149 (33.2)	92 (20.5)	9 (2.0)	119 (26.5)	102 (22.7)	89 (19.8)	127 (28.3)	15 (3.3)	98 (21.8)	12 (2.7)	13 (2.9)	9 (2.0)	14 (3.1)	-	-	-	-
3	Rainy	493	380 (77.1)	129 (26.2)	204 (41.4)	126 (25.6)	16 (3.2)	155 (31.4)	134 (27.2)	123 (24.9)	169 (34.3)	61 (12.4)	132 (26.8)	19 (3.9)	18 (3.7)	13 (2.6)	-	14 (2.8)	28 (5.7)	32 (6.5)	38 (7.7)
	Total	1447	1074 (74.2)	345 (23.8)	532 (36.8)	344 (23.8)	37 (2.6)	426 (29.4)	368 (25.4)	328 (22.7)	447 (30.9)	128 (8.8)	354 (24.5)	48 (3.3)	47 (3.2)	21 (1.5)	14 (1.0)	14 (1.0)	28 (1.9)	32 (2.2)	38 (2.6)

Chi square; Non-Significant at  $P > 0.05$ , Figures in parenthesis indicate per cent.

## Conclusion

The high prevalence rate of GI parasitism in desi fowl in the present study could be attributed to the fact that the desi fowl were free ranging and have access to infective stages in the environment and to the intermediate hosts like beetles, earth worms, and ants etc. in search of feed which act as intermediate hosts for helminth parasites. The results of this study facilitate to devise new means and methodologies to formulate the appropriate control strategies to gain maximum income through backyard poultry farming.

## Acknowledgement

The authors are thankful to the Dean, Sri Venkateswara Veterinary University, Tirupathi, for the facilities provided. The facilities provided by villagers, poultry shop owners during collection of samples are thankfully acknowledged.

## Conflicts of Interest

The authors declare that the research was conducted in the absence of any commercial relationships that could be construed as a potential conflict of interest.

## References

1. Alam, M.N., Mostofa, M., Khan, M.A.H.N.A., Alim, M.A., Rahman, A.K.M.A. and Trisha, A.A. (2014). Prevalence of gastrointestinal helminth infections in indigenous chickens of selected areas of Barisal district, Bangladesh. *Bangladesh Journal of Veterinary Medicine*, 12(2), 135-139.
2. Bharti, R., Sagar, M.P., Chander, M., Singh, D. and Yadav, P. (2018). Socio-Economic Status of Backyard Poultry Rearing Rural Women of Bundelkhand Region of Uttar Pradesh. *International Journal of Livestock Research*, 8 (11), 158-163.
3. Bhat, S.A., Khajuria, J.K., Katoch, R., Wani, M.Y. and Dhama, K. (2014). Prevalence of endoparasites in backyard poultry in North Indian region: a performance based assessment study. *Asian Journal of Animal and Veterinary Advances*, 9, 479-488.
4. Butt, Z., Shaikh, A.A., Memon, S.A. and Mal, B. (2014). Prevalence of Cestode parasites in the intestine of local chicken (*Gallus Domesticus*) from Hyderabad, Sindh, Pakistan. *Journal of Entomology and Zoology Studies*, 2(6), 301-303.
5. Dube, S., Zindi, P., Mbanga, J. and Dube, C. (2010). A study of scavenging poultry gastrointestinal and ecto-parasites in rural areas of Matebeleland Province, Zimbabwe. *International Journal of Poultry Science*, 9(9), 911-915.
6. Eshetu, Y., Mulualem, E., Ibrahim, H., Berhanu, A. and Abera, K. (2001). Study of gastro-intestinal helminths of scavenging chickens in four rural districts of Amhara region, Ethiopia. *Scientific and Technical Review of the Office International des Epizooties*, 20(3), 791-796..
7. Hembram, A., Panda, M.R., Mohanty, B.N., Pradhan, C.R., Dehuri, M., Sahu, A. and Behera, M. (2015). Prevalence of gastrointestinal helminths in *Banaraja* fowls reared in semi-intensive system of management in Mayurbhanj district of Odisha. *Veterinary World*, 8(6), 723-726.
8. Katoch, R., Yadav, A., Godara, R., Khajuria, J.K., Borkataki, S. and Sodhi, S.S. (2012). Prevalence and impact of gastrointestinal helminths on body weight gain in backyard chickens in subtropical and humid zone of Jammu, India. *Journal of parasitic diseases*, 36(1), 49-52.
9. Kotaiyah, T. (2016). Poultry Production in India – The Current Scenario. *Food and Beverage News*.
10. Manaswini, D. (2007). Incidence of gastrointestinal helminths of desi fowls in Bhubaneswar area. *Intas Polivet*, 8(1), 200-201.

11. Momin, M.A., Begum, N., Dey, A.R., Paran, S.M. and Alam, M.Z. (2014). Prevalence of blood protozoa in poultry in Tangail, Bangladesh. *IOSR Journal of Agriculture and Veterinary Science*, 7(7), 55-60.
12. Naphade, S.T. and Chaudhari, K.V. (2013). Studies on the seasonal prevalence of parasitic helminths in Gavran (desi) chickens from Marathwada region of Maharashtra. *International Journal of Fauna and Biological Studies*, 1(2), 4-7.
13. Obiora, F.C. (1992). A guide to poultry production in the Tropics. 1st edition Acena Publishers, pp. 59-61, 381-382.
14. Percy, J., Pias, M., Enetia, B.D. and Lucia, T. (2012). Seasonality of parasitism in free range chickens from a selected ward of a rural district in Zimbabwe. *African Journal of Agricultural Research*, 7(25), 3626-3631.
15. Petrie, A. and Watson, P. (2013). Statistics for veterinary and animal science, 1st edition. *Blackwell Publishing, Oxford*, 101-109.
16. Pica-Ciamarra, U. and Dhawan, M. (2009). A Rapid Rural Appraisal of the Family-Based Poultry Distribution Scheme of West Bengal, India. *South-Asia Pro-Poor Livestock Policy Initiative Research Report*, RR Nr. 09-07
17. Puttalakshamma, G.C., Ananda, K.J., Prathiush, P.R., Mamatha, G.S. and Suguna Rao. (2008). Prevalence of gastrointestinal parasites of poultry in and around Bangalore. *Veterinary World*, 1(7), 201-202.
18. Rayala Reddy, V., Bhargavi, M. and Krishna Kanth Reddy, M. (2017). A Study on Empowerment of Rural Women through Backyard Poultry in Anantapur District of Andhra Pradesh. *International Journal of Livestock Research*, 7 (9), 212-219
19. Rehman, T., Zada, L., Ahmad, A. and Zeb, M.A. (2016). Prevalence rate of *Raillietina cesticillus* in domestic chickens of District Mardan, KPK, Pakistan. *International Journal of Medicine & Biomedical Sciences*, 1(2), 13-16.
20. Saif, Y.M., Fadly, A.M, Glisson, J.R., McDonald, L.R., Nolan, L.K. and Swayne, E.F. (2008). Diseases of poultry, 8th edition. *Blackwell Publication, London*, 1025-1066.
21. Shah, A.H., Anwar, A.U.H., Khan, M.N., Iqbal, Z. and Qudoos, A. (1999). Comparative studies on the prevalence of cestode parasites in indigenous and exotic layers of Faisalabad. *International Journal of Agriculture and Biology*, 1(4), 277-279.
22. Sheikh, B.A., Sofi, T.A. and Ahmad, F. (2015). Prevalence of helminth parasites in *Gallus domesticus* from Gurez valley. *Agricultural Advances*, 4(11), 129-137.
23. Singh, A., Yadav, A., Khajuria, U.K., Borkataki, S., Pande, N., Konwar, D. and Katoch, R. (2009). Comparative evaluation of different breeds of backyard poultry under field conditions. *Veterinary Practitioner*, 10, 181-182.
24. Solanki, J.B., Kumar, N., Varghese, A., Thakre, B.J. and Puri, G. (2015). Prevalence of gastrointestinal parasitism in poultry in and around Navsari area of South Gujarat. *Livestock Research International*, 3(1), 28-30.
25. Sonune, M.B. (2012). Analysis of gastrointestinal parasites of poultry birds around Chikhli, Buldana (M.S.) India. *Science Research Reporter*, 2(3), 274-276.
26. Sreedevi, C., Jyothisree, Ch., Rama Devi, V., Annapurna, P. and Jeyabal, L. (2016). Seasonal prevalence of gastrointestinal parasites in desi fowl (*Gallus gallus domesticus*) in and around Gannavaram, Andhra Pradesh. *Journal of Parasitic Diseases*, 40(3), 656-661.