

Prevalence of gastrointestinal helminths in Chickens and Ducks managed under backyard system in Imphal West District of Manipur, India.

Abstract:

Helminth are the most widespread endoparasites infecting fowls in India. Infection with parasites causes reduction in the growth rate and weight loss leading to low production. In the regions of concern, the most prevalent helminth were *Ascaridia* spp. and *Raillietina* spp. The variation of their prevalence is attributable to differences in local environmental conditions, which support larval development and facilitate transmission. Firm measures should be undertaken to control the parasites which effects economically. The poultry industry is an infant but fast-growing sector in Manipur. However, it is largely dependent on local chicken and ducks managed under backyard production system. The sector is facing different challenges mainly emanate from prevalence of infectious diseases such as helminthic infection. The study has taken up to determine the infection rate and identify the helminth parasite species in domestic fowls. A cross- sectional study was conducted from Dec, 2022 to October 2024. Post mortem samples of 116 chickens and 70 ducks were collected for necroscopy examination to identify infecting Helminthes in GI tract from different localities of Imphal West district of Manipur . The study shows overall prevalence of 41.93 % in the studied domestic fowls with *Raillietina* spp. (69.69%) being the most prevalent in chicken and *Ascaridia* spp. (59.45%) in duck. *Heterakis* spp.(8.9%) is found only in chicken in the present study. Out of 52 positive chickens and 26 positive ducks, 14 chickens and 12 ducks were found to have mixed infections. The study demonstrates unequivocally that helminth infection is prevalent in the studied domestic fowls and confirms the significant frequency of the worms *Ascaridia* spp. and *Raillietina* spp. in the Imphal West District of Manipur, India.

Key words: Gastrointestinal, helminth, duck, chicken ,Imphal west.

Introduction:

Poultry farming is one of the most important form of animal husbandry activities and a popular form of enterprise. Even though the impact of parasitic diseases has decreased in farm birds reared on cage systems due to modernization, scientific management and adoption of effective bio-security measures, the birds maintained on deep litter system and backyard free range birds are still remain susceptible to parasitic infection because of litter contamination, scavenging habits and environmental contaminants. The helminthic infection is considered to be one of the most significant constraints in poultry production especially in humid tropical climatic conditions of India which favour faster propagation and development of larval stages of helminth parasites (Matta and Ahluwalia,1981; Malhotra, 1983).

The helminthic infections in backyard chickens adversely affect the successful poultry farming by causing unthriftiness, emaciation, weight loss and lowered egg production. Both exotic and desi birds are equally susceptible even after adopting strict managerial practices. Poultry has been recognized for thousands of years to provide meat and eggs, which are considered the two primary sources of animal protein for humans. (Kulkarni et.al., 2001). India has a large poultry population of 498 million birds, which is growing at an

average annual pace of 8%–10%. India is the third largest producer of eggs and the sixth largest producer of broiler meat (International egg and poultry review, 2011). Poultry production is constrained by many factors, the most significant of which are illnesses, including bacterial, viral, and parasite infections (Ojok, 1993). Domestic chickens often consume a variety of foods, including grains (cereals), fruits, and insects that may contain the eggs or larval stages of certain helminth parasites, predisposing them to various parasitic illnesses, most notably gastrointestinal parasites (Oniye, 2001). Backyard farming is a form of traditional domestic breeding that requires few inputs and includes a variety of bird species such as chickens, turkeys, ducks, geese, and quails, and is the most traditional and widespread livestock activity in rural communities, as it benefits rural families by providing high-nutrient products such as meat and eggs, as well as revenue from surpluses. Backyard poultry farming is an important economic activity as a source of income and as a way to guarantee food security in unprotected communities. In this sense, support for backyard poultry farming has been widely used since it is considered that small-scale livestock production represents an effective alternative to achieving food security. Farm animals constitute an essential element of subsistence for the rural poor, performing multiple functions: food production, fertilizer, and income generation. The occurrence of parasitic infestations has a high prevalence, causing low economic conditions, increased mortality and prophylaxis, leading to low production, death of animals, and limited productivity.

Chicken and ducks are reared for protein source and self-generation of income under backyard management system as small poultry set up in Imphal west, Manipur. About 99% of Indian poultry resources managed under backyard production system undergo poor handling scheme. Backyard production system involves low productivity with less input and periodic flock devastation due to different reasons. Poultry industry in Manipur is infant but fast-growing sector. The industry faces various challenges such as shortage of food in terms of quality and poor husbandry practices, prevalence and wide distribution of infectious and non-infectious diseases. Poor veterinary services and lack of appropriate breeding practices are assumed to be additional challenges. Chickens and Ducks plays an important role in the provision of animal proteins in the form of eggs and meat and other socio-economic benefits. Reduction in the prevalence of most parasitic diseases of domesticated animals has been achieved on intensive farming systems due to improved housing hygiene and management practices. (Zerihum et.al., 2011). Gastrointestinal infections are widespread in many parts of the world including India. Nematodes constitutes the most important helminths infection of poultry in all the extent of damage they cause. The main nematode genera include *Ascaridia*, *Heterakis* and *Capillaria* (Poulsen et.al., 2000) among which *Ascaridia galli* and *Heterakis gallinarum* are the most common species causing considerable losses when large numbers are present. Investigation on the occurrence and identification of helminths in indigenous fowls under backyard system is essential for understanding the epidemiological situation and for formulating effective prevention and control measures. Improved poultry management practices are responsible for the reduction in the incidence of parasitic infections. However, there is lack of information regarding the prevalence of gastrointestinal helminth parasites of fowl in Imphal West, Manipur, India. Therefore, the present investigation is taken up to evaluate the prevalence of gastrointestinal helminths of backyard Chickens and ducks from Dec 2022 up to Oct 2024 to identify the most common species infecting fowls and to identify the possible risk factors in the parasitology laboratory, Department of Zoology, Dhanamanjuri University, Imphal, Manipur. This study may further help in establishing the preventive measures, control and management of poultry whenever there is outbreak of infection, poor growth or production.

Materials and methods:

1. Study area: -The study was conducted in selected areas of Imphal West, Manipur, India from December 2022 up to October 2024. The study sites were areas around the town of Imphal city. Imphal is the capital of Manipur (24.782784°N and 93.8859°E) with an altitude of 786 metres (2579ft) above sea level.
2. Study population and study animal: - The study population consists of chicken and ducks reared in backyard system in the study areas. The study animals were chicken and ducks brought for sale at chicken centers from different local backyard of Imphal west district of Manipur. A total of 116 chickens and 70 ducks gastrointestinal were collected.
3. Study design and sample size determination: -Cross sectional type of study design was employed from dec. 2022 to October 2024, with aim to estimate the prevalence of gastrointestinal helminths parasites of chicken and duck to identify associated risk factors. Chickens and ducks of all intensive, semi-intensive and backyard production systems. This sample has proportionally allocated to each of the management system, examined every after one month of the study period.
Furthermore. Necroscopy examination was conducted on chicken and duck of different chicken center originated from intensive farms and from chicken and duck slaughtered in randomly selected households at selected localities with backyard production systems were involved.
4. Sample collection: - The collected sample were directly taken from the intestine of duck and chickens and then placed in a clean universal bottle. collected samples were preserved using 10% formalin and transported to department of parasitology laboratory, department of Zoology, D.M.U, Imphal. In the parasitology laboratory, speciation of gastrointestinal helminths was done according to the helminthological keys of Soulsby (1982).
5. Necroscopy Examination: - The whole gastro-intestines of chicken and ducks were collected from volunteer of chicken centers and households within the selected localities of Imphal west districts.
The gut samples were collected soon after evisceration and immersed into sample box filled with 10% buffered formalin and kept in Parasitology laboratory, department of Zoology, D.M.U. The intestine was opened longitudinally with a scissors and the content for each intestine were carefully scraped into a Petri dish and a small amount of tap water was added to soften the debris to facilitate recovery of worms from the intestine. All worms visible to naked eyes are collected using thumb forceps. The recovered worms were transferred into another Petri dish labeled according to predilection site and 10% alcohol is added to help straightening before identification under stereomicroscope using morphological keys described according to Soulsby, 1982.

The prevalence of Gastrointestinal helminths is determined by the formula

$$\text{Prevalence(\%)} = \frac{\text{No. of infected host}}{\text{No. of host examined}} \times 100$$

Results and Discussion:

Out of 186 domestic fowls examined, no. of chickens is (116) and no. of duck is (70). 78 fowls (41.93%) were infected by three species of gastrointestinal helminth parasites, which comprised one Cestodes and two Nematodes. Cestodes are identified by their characteristic segmented flat body with scolex (head) bearing suckers and rostellum whereas Nematodes have elongated, cylindrical unsegmented body with tapering ends. (Soulsby, 1982). The helminth parasites recovered from chickens were 66 of which 46 were *Raillietina* spp. (69.69%) in case of Cestodes and 14 were *Ascaridia* spp. (21.21%) and 6 were *Heterakis* spp. (8.9%) in case of Nematodes. The endoparasites recovered from duck were 37 of which *Ascaridia* spp. were 22 (59.45%) in case of nematode and *Raillietina* spp. were 15 (40.54%) in case of cestode as shown in (Table 1 and 2). The overall prevalence of *Raillietina* spp., *Ascaridia* spp. and *Heterakis* spp. in both chickens and duck were 59.22%, 34.95% and 8.82% respectively. (Table 3). The predilection sites of the parasites in the gastrointestinal tract of the domestic chicken showed that most parasites were found in the small intestine, a few in the large intestine, only *Heterakis* spp. was found in the caecum and no single parasite was recovered in the crop and gizzard of the host. 33% of the infected hosts shows mixed infections. No single Trematode was recorded in this study. The study revealed that cestodes and nematode parasites were recovered in the domestic chickens and ducks. The findings are in agreements with the findings of Das et. al. (2021) and Kumari et. al. (2018) which reported 37.20% and 25% respectively.

The results of our study are comparatively low with the findings of Yoriyo et. al. (2008), Berhe et. al. (2019), Sarba et. al. (2019) which shows 87.8%, 87.7%, and 92.1% infectivity. The difference in prevalence may be due to difference in geographical region and climatic conditions. The high prevalence rate in the study area may be a result of poor sanitary conditions, high poultry population density, uncontrolled feeding, and a lack of attention to treatment and disease control and prevention measures, all of which expose birds to poor hygiene on farms and in poultry houses, allowing them to contract a wide variety of harmful parasites (Wangelu et.al., 2021). The lower prevalence of intestinal helminths might be due to the differences in the species of birds studied, the quality of husbandry and geographical location. Another possible reason that might have made the differences in prevalence was the possibility of less exposure to suitable intermediate hosts. (Jayenta and Mohilal, 2016). Chemical control of parasites is simple, inexpensive, and can be used both therapeutically and prophylactically. However, chemical treatment has several drawbacks, such as weakening natural immunity and the presence of residues in food and the environment. In addition, chemical anthelmintics can stimulate resistance, so alternative forms of control are needed (Jaiswal and Mishra, 2020). The prevalence of gastrointestinal parasites was high in all the study municipalities, regardless of geographic location without significant differences. Education and motivation of farmer producers on biosecurity measures may aid in mitigating the negative effects of parasitic infection on poultry response effectiveness (Singh et.al., 2021; Shrestha et.al., 2020).

According to several studies (Fakae et. al., 1991; Mpoame and Agbede, 1995; Permin et. al., 1997; Poulsen et. al., 2000; Shamsul-Islam, 1985; Yadav and Tandon, 1991) multiple infection by different helminths appears as a common phenomenon in chickens. Studies carried out in Ethiopia revealed that 73.8 % of chickens had an association from one to six species (Eshetu et. al., 2001). In Botswana, *A. galli* was found with *Raillietina* spp. (Mushi et. al., 2000) which shows conformity with our present study where 14 chickens and 12

ducks have mixed infection of cestodes and nematodes. *Raillietina* spp. was the most prevalent and predominated infecting chickens and *Ascaridia* spp. are the most common type of parasite infecting domestic ducks. Helminthic parasitism changes the gastrointestinal system of chickens, resulting in decreased performance and, in some cases, mortality (Shaikh, 2016; Singh et.al., 2021). According to a systematic study conducted in Upper Assam, there is a significant helminthic infection in ducks with prevalence of 66.93% attributed by their favourable climatic conditions and presence of intermediate host. (Boorah et.al., 2018).

Helminthic infections are highly prevalent and common in chicken with significant variation across different regions and production systems. Decreased in prevalent rate can be seen than before among the developing countries because of increasing awareness and regular deworming in the last few decades. However, a higher prevalence has been recently seen in certain regions where extensive systems like free-range, organic and backyard farming is commonly practiced. (Shifaw et.al., 2021). The emergence of widespread antimicrobial agents also increases parasitic infections leading to low poultry production. (Kadykalo et.al., 2018). The most effective way to prevent parasitic infections depends on the controlling and examining the transmission. (Ghorbani and Garedaghi, 2023).

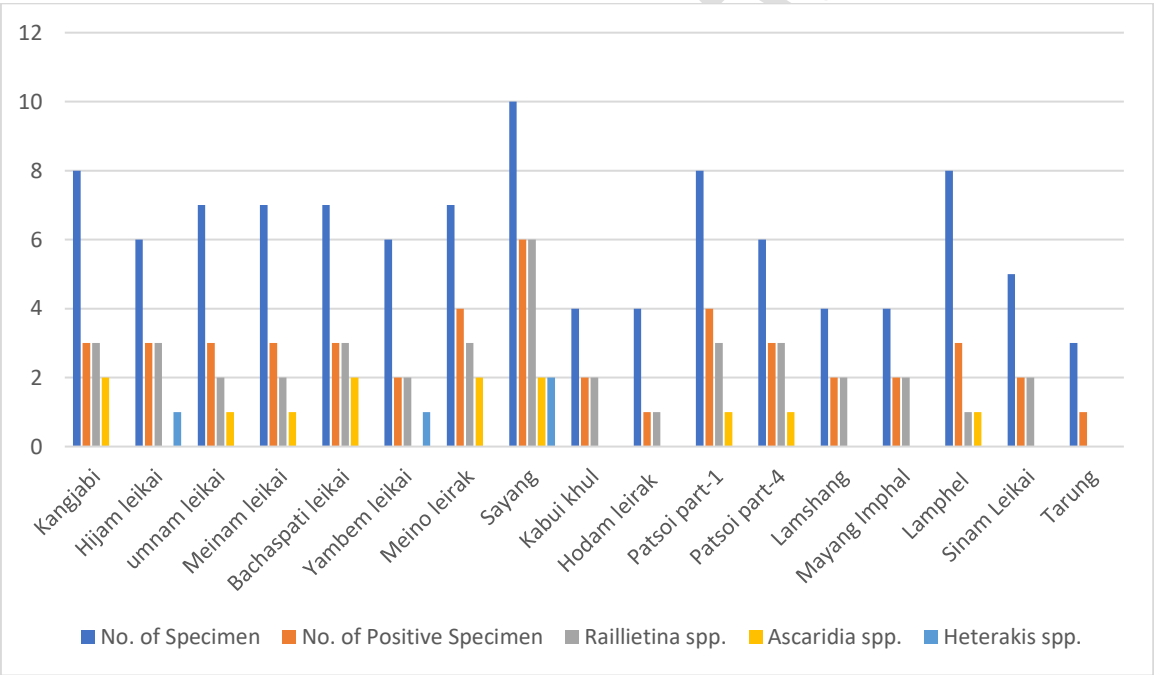


Fig.1. Gastrointestinal helminths of chickens found in Imphal west District of Manipur.

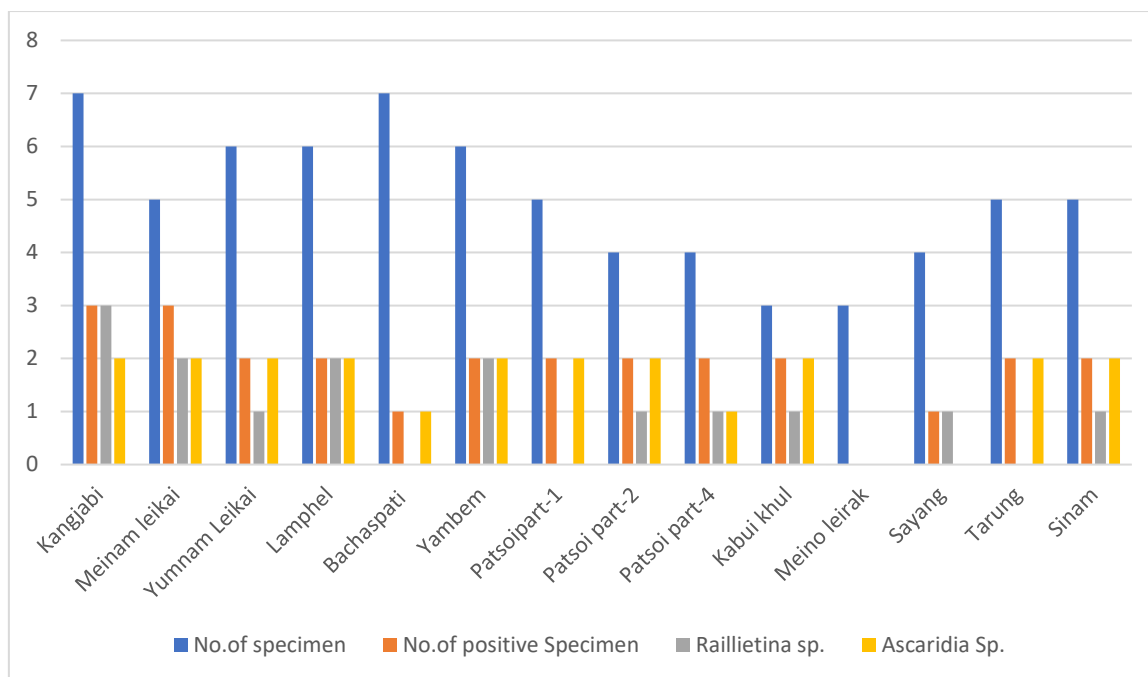


Fig. 2. Gastrointestinal helminths of ducks found in Imphal west District of Manipur.

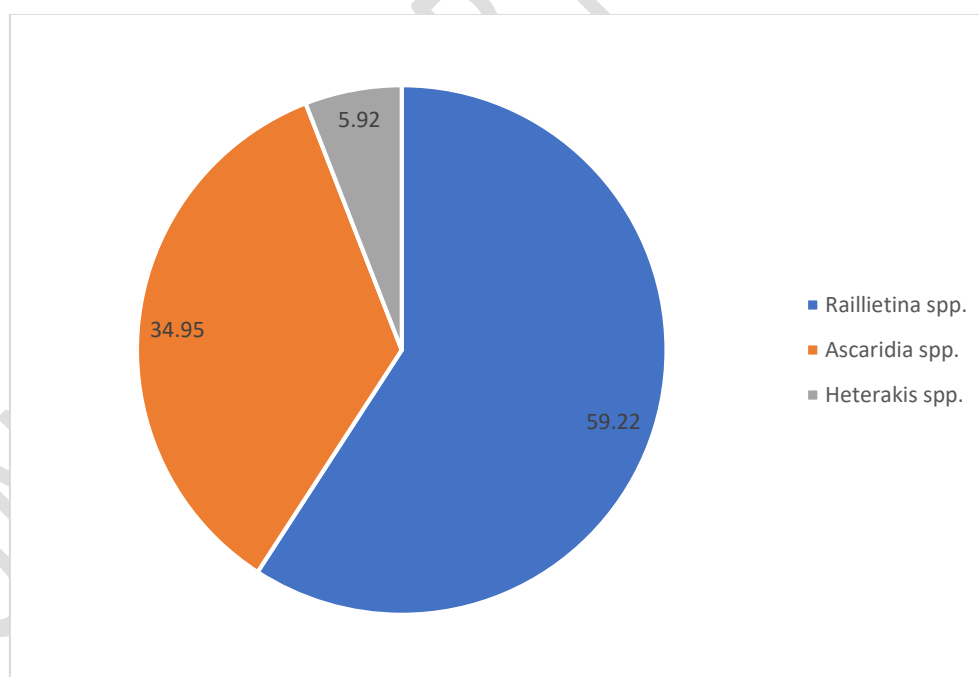


Fig.3. Percentage of different helminths found in chickens and ducks of Imphal East of Manipur based on Gastrointestinal examination.

Table : 1 Gastrointestinal helminths of chickens found in Imphal west District of Manipur

Location	No.of Specimen	No. of Positive specimen	<i>Raillietina sp.</i>	<i>Ascaridia sp.</i>	<i>Heterakis sp.</i>	No. of host infected by more than 1 helminths
Kangjabi leirak	8	3	3	2	-	2
Hijam leikai	6	3	3		1	1
Yumnam leikai	7	3	2	1		
Meinam leikai	7	3	2	1		
Bachaspati leikai	7	3	3	2		2
Yambem leikai	6	2	2		1	1
Sorbon thingel	6	3	1	1	1	
Meino leirak	7	4	3	2		1
Sayang	10	6	6	2	2	4
Kabui khul	4	2	2			
Hodam leirak	4	1	1			
Patsoi part- 1	8	4	3	1		
Patsoi part -4	6	3	3	1		1
Lamshang	4	2	2			
Mayang Imphal	4	2	2			
Lamphel	8	3	3	1	1	2
Lourung purel	6	2	2			
Sinam leikai	5	2	2			
Tarung	3	1	1			
Total	116	52	46	14	6	14

Table 2: Gastrointestinal helminths of ducks found in Imphal West District of Manipur

Location	No. of specimen	No. of positive specimen	<i>Raillietina sp.</i>	<i>Ascaridia sp.</i>	No.of host infected by more than 1 helminths
Kangjabi leirak	7	3	3	2	2
Meinam leikai	5	3	2	2	1
Yumnam leikai	6	2	1	2	1
Lamphel	6	2	2	2	2
Bachaspati leikai	7	1	-	1	-
Yambem leikai	6	2	2	2	2
Patsoi part-1	5	2	-	2	
Patsoi part -2	4	2	1	2	1
Patsoi part -4	4	2	1	1	
Kabui khul	3	2	1	2	1
Meino leirak	3	-			
Sayang	4	1	1		
Tarung	5	2		2	

Sinam leikai	5	2	1	2	1
Total	70	26	15	22	11

Table 3: Prevalence of endoparasites of chicken and ducks found in Imphal-west district of Manipur based on Gastrointestinal Examination

Name of Recovered heminths	No.of host	Prevalence percentage
<i>Raillietina spp.</i>	61	59.22%
<i>Ascaridia spp.</i>	36	34.95%
<i>Heterakis spp.</i>	6	5.82%
Total	103	

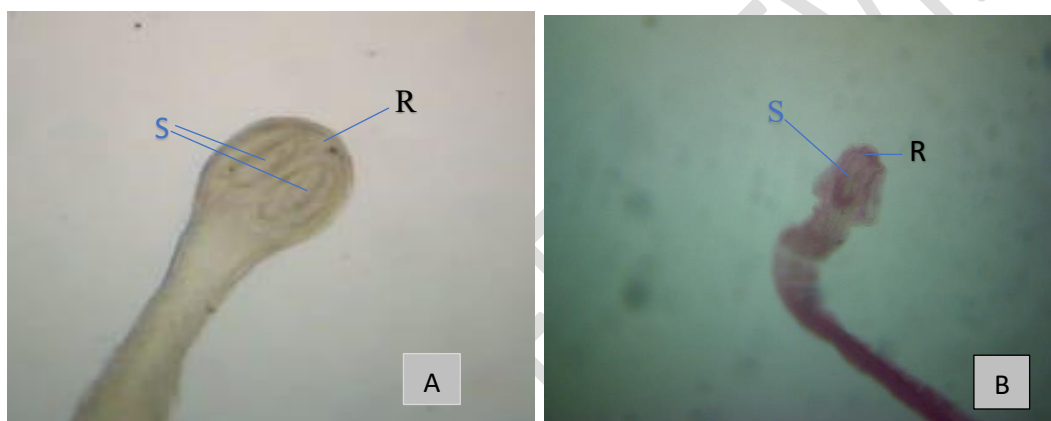


Fig.4. Morphological features of two different *Raillietina* species (A, B) Scolex with Rostellum (R) surrounded by four Suckers(S).



Fig.5. *Ascaridia* species found in GI tract of chicken (A) and duck(B)



Fig. 6. Anterior(A) and Posterior (B) end of male *Heterakis* sp.

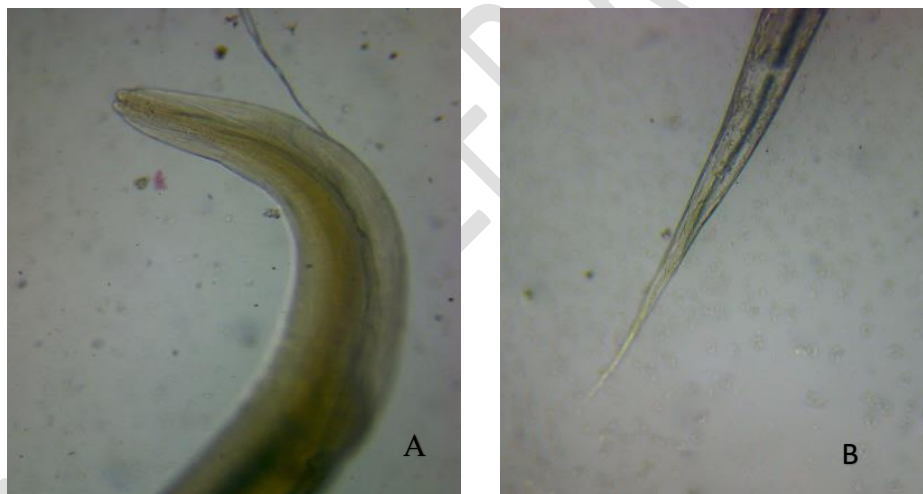


Fig. 7. Anterior (A) and Posterior (B) end of female *Heterakis* sp.

Conclusion:

Gastrointestinal helminths are found among the domestic poultry managed under the backyard system in the Imphal, West Districts, Manipur, showing a moderate prevalence of gastrointestinal parasites, the most frequent being, *Raillietina* spp., in Chickens and *Ascaridia* in Ducks in the 22 months studied period of the present findings. It is essential to know the conditions of the farm to develop the best prevention program, allowing the recognition of the factors that influence the possibility of disease incidence. Although cestodes in poultry are known for causing retarded growth, enteritis, diarrhoea, haemorrhages and hypo-vitaminosis B, however heavy infections may also be associated with mortality in young birds. As a result of this study, future researchers will be able to

design control strategies for these helminths based on their dispersion patterns. Increased attention should be paid to poultry management and maintenance of domestic chicken in backyards. In conclusion, additional studies highlighting and controlling various elements of parasitism in poultry and increasing domestic fowl production in the region should be conducted.

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