Full Length Article

INCIDENCE OF ECTO AND ENDO PARASITES IN INDIAN PEAFOWLS (*PAVO CRISTATUS*) FROM THANJAVUR CAUVERY DELTA REGION OF TAMIL NADU

E. Tamileniyan[1], M. Jeevitha[2], A. Latchumikanthan[3], M. Veeraselvam[4], R. Velusamy[5], M. Saravanan[6] and S. Senthilkumar[7]

Department of Veterinary Parasitology
Veterinary College and Research Institute
Tamil Nadu Veterinary and Animal Sciences University
Orathanadu - 614 625

ABSTRACT

Free-range peafowls are commonly affected with mixed parasitic infections, which need to be diagnosed and treated for maintaining the eco-biological balance. The present paper investigated the ecto and endo parasitic infections in peafowls (Pavo cristatus) from various parts of Cauvery delta region of Tamil Nadu. Twelve peafowls of different age and sex were brought with different clinical signs during 2022-24. Faecal samples revealed the presence of eggs of helminths Ascaridia sp., Capillaria sp., Hymenolepis sp., gravid segments of Raillietina cesticillus and protozoal infection with Eimeria pavonina and E.mayurai. The ectoparasites from various body surface were identified as Colphocephalum tausi, Goniodespavonis, Menacanthus sp., Menopon sp., lice and adult and nymphal stages of Haemaphysalis sp., tick.

Keywords: Helminths, lice, ticks, eimeria, peafowls

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INTRODUCTION

Wild birds harbor-both internal and external parasites due to their free-ranging feeding habits. Peafowls are the most commonly encountered elegant bird in the world, which are exquisite witnesses to natural beauty that play a significant role in maintaining the eco-system. There are only three recognised species of peacocks: *Pavo cristatus* (Indian Peafowl), *Pavo muticus* (Green Peafowl) and *Afropavo congensis* (Congo Peafowl) which belong to the family Phasianidae. *Pavo cristatus* are the largest, most vibrant, most endearing birds among the poultry in South Asia, particularly in India, having an astonishing diversity of peacock species. Peafowl are omnivorous and devour small mammals, reptiles, fruits, insects and seeds. They unfortunately suffer the same

[1]UG Scholar, Veterinary College and Research Institute, Orathanadu
[2]UG Scholar, Veterinary College and Research Institute, Orathanadu
[3]Assistant Professor, Corresponding Author Email: latchupara2010@gmail.com
[4]Assistant Professor, Dept. of Veterinary Medicine
[5]Assistant Professor and Head
[6]Assistant Professor and Head, Dept. of Veterinary Medicine
[7]Professor and Head, Dept. of Veterinary Surgery abd Radiology, VCRI, Salem

problems as other wild birds, including stress and frequent parasite infections, which are among the most common diseases that affect them (Macpherson *et al*., 2000).

Peafowls harbour a wide range of ectoparasites, including ticks, mites, lice, fleas, and trombiculids and these parasites tend to thrive on the feathers and body of the birds (Ashraf *et al*., 2002). Infestation with lice (Insecta: Phthiraptera), an enduring ectoparasite of birds is a prevalent problem in Indian peacocks (Murari *et al*., 2005) which lead to weight loss, itching, and even anaemia in severe infestations. In addition, the ectoparasites found in peafowls have a high vector potential in transmitting infectious agents and blood parasites (Soulsby, 1982). Helminths parasites infection attributed towards clinical and sub-clinical parasitism in the gastro-intestinal tract of peafowl. In addition, peafowls frequently predate a variety of intermediate hosts of parasites, which contributes in the transmission of parasitic diseases, notably helminths. Coccidiosis, the most prevalentprotozoan infections are to blame for poor growth, diarrhoea, and high mortality, particularly in young peafowl (Titilincu *et al*., 2009). The parasitic infections in peafowls can either progress to a clinical state or potentially be fatal. These issues receive urgent attention when they endanger human or agricultural health (Kathiravan *et al*. 2017). Endo parasitic infections of wild and domestic peafowl play a key part in parasitic zoonoses, which demand study due to their economic and public health implications (Macpherson *et al*., 2000). Investigating the parasitic infection in free-range Indian peafowls was the primary goal of the current study, which may pave the way for further characterisation of various parasites and provide recommendations for formulating effective control strategies.

MATERIALS AND METHODS

2.1 Collection of faecal samples

A total of twelve peafowls of different age and sex were brought to the Exotic and Special Species Medicine Referral Clinic, Veterinary Clinical Complex, Veterinary College and Research Institute, Orathanadu, Thanjavur, at different points of time from Pattukottai and Thanjavur regions during the period 2022-2024 by the Tamil Nadu Forest Department. The peafowls were properly restrained and subjected for clinical examination depending on the history viz., leg injury, poisoning, dullness and anorexia. The faecal samples were collected in separate containers and the ectoparasites found on body surface were collected in 70% ethanol for further identification.

2.2 Coprological examination

Concentration methods of faecal examination including sedimentationand floatation (with saturated salt solution, specific gravity 1.18) were used for detection of endoparasites as described by Soulsby (1982). Faecal samples positive for endoparasites were subjected to quantitative analysis (Soulsby, 1982) using McMaster's counting chamber for evaluating oocysts per gram of faeces (OPG).

2.3Sporulation of coccidian oocysts

The morphological identification of oocysts was based on the taxonomical keys given by Pellerdy (1965), Soulsby (1982) and Jaiswal *et al*. (2013). Faecal samples positive for coccidial oocysts were mixed with 2.5% potassium dichromate solution in Petridish and filtered through a 1 mm sieve to remove the coarse debris. The contents were kept under aerated condition at room temperature for 2 to 4 days to promote the sporulation of oocysts. A drop of content was examined under microscope after 2 days for confirmation of sporulation (Venkateswara Rao *et al*., 2015).

2.4 Processing of ectoparasites

The collected ectoparasites were processed with 10% sodium hydroxide followed by washing in water & dehydration in ascending grades of alcohol, clearing in Xylene and mounted in DPX for morphological identification (Soulsby, 1982).

RESULT AND DISCUSSION

Most of the collected faeces were wet and semi-solid in consistency. Out of five peafowls samples examined, two showed *Eimeria sp*. oocysts and *Hymenolepis sp.* eggs, one sample revealed *Eimeria sp.* oocysts and *Ascaridia sp.* eggs, one sample showed *Capillaria sp.* and *Hymenolepis sp.* eggs, one sample was positive for Eimeria sp. oocysts and gravid segment of cestodes. Cestode eggs identified in this study were *Hymenolepis sp.* (Fig. 1) with characteristic features of round shaped egg, inner hexacanth embryo surrounded by thick shells with an additional embryophore. The gravid segment was dorsoventrally flattened, white in colour, highly elongated, and completely covered in a tegument (Fig. 2). Teasing of a gravid segment under the microscope released several egg capsules containing eggs, which contained a typical hexacanth embryo specific to cestodes. The tapeworm was identified as *Raillietina sp* based on the shape of gravid segment, presence of egg capsules and eggs measuring 55-60 µm, (Fig.3). Eggs of Ascaridia sp. (Fig. 4) featured the typical outermost thick shell with unsegmented embryo inside and were about 60 x 65 µm in size. Barrel shaped eggs with bipolar plugs and unsegmented embryonic mass inside were confirmed as *Capillaria sp.,* eggs (Fig. 5). Most of the samples screened were positive for at least one or more types of *Eimeria sp.* oocysts. Micrometry analysis showed spherical oocysts with the size of 18-27 x 13-20µm without micropyle were identified as *E.mayurai* (Fig. 6) and the ovoid oocysts of size 22-28 x 16-22µm without micropyle were identified as E. pavonina (Fig. 7) according to the key by Jaiswal *et al*. (2013) whereas, the OPG for *E. pavonina* and *E.mayurai* were recorded as 1200 and 800 respectively. Oocysts that were subjected to 2.5 % potassium dichromate solution incubation revealed the sporulation which was confirmed by the presence of characteristic four sporocysts each with two sporozoites (Fig. 8). The oocysts of *Eimeria pavonina sporulated* within 60–72 hours, whereas those of *Eimeria mayurai* required 72–96 hours under laboratory conditions.

The ectoparasites from the body surface and wings were identified as *Colphocephalum tausi, Goniodespavonis, Menacanthus sp*., and nymph of *Haemaphysalis sp*. The lice *Colphocephalum tausi* (Fig. 9) was observed in the wing region and characterized by circumfasciate head with well distinguished antennae, stout setae arranged at the lateral margin and the abdominal segments contained numerous irregularly distributed bristles. *Goniodes pavonis* (Fig.10) was noticed in the head, wattles and body& identified based on the broadly convex anterior margin of the head, while the preantennal nodus appeared robust and elongated with the size of 2.65 mm. The lice *Menacanthus sp.,* (Fig. 11) observed in the head and wing region possessed the morphological features such as narrow headin the anterior region, but was expanding significantly in the posterior region. All legs terminated with paired claws. The abdomen was found to be extensively rounded towards the posterior with two rows of bristles on each segment. The *Haemaphysalis sp.* nymphs (Fig. 12) displayed posteriorly fared palps, a triangular ventral spur on palp segment, and variations in the posterior margin of the basis capituli, which ranged from convex to straight.

Infection with parasites, particularly helminths and coccidian protozoans, are the root of a potential health issues in native poultry species, including wild birds. Endoparasitic infections typically result in persistent discomfort, anorexia and unthriftiness, which drastically decreases the population of wildlife especially wild birds (Steiner and Davis, 1981).

The present study which revealed the concurrent helminth and coccidian infections in peacocks from Cauvery delta region of Tamil Nadu was coinciding with the helminth and coccidian infections in wild and captive peacocks as reported by Titilincu *et al*., (2009) and Jaiswal *et al*., (2013). As peafowls forage freely in fields, there may be a possibility that they might ingest intermediate/transport hosts like earthworms or beetles and become infected with helminths (Soulsby, 1982). The present study concurs with the notion that the infection may be subclinical.In the context of cestodes pertaining to our study, *Hymenolepis sp.* infection in Indian peafowls have previously been reported from India by Jaiswal *et al*.,(2013). Considering the peafowls free-ranging status in residential and agricultural areas, the presence of *Hymenolepis sp*. in their faeces contributes to serious public health concerns. Roundworms, which inhabit in the intestine and shed their eggs in faeces to re-infect the same bird or other birds by direct transmission through the faeces in feed or water or by an intermediary host, are the most common mode of infections identified in captive and wild birds (Soulsby, 1982). It was found that mixed infections with *Eimeria spp*., with *Ascaridia spp.*, as these birds are more prone to mixed parasite infections and our findings were consistent with previous studies (Titilincu *et al*., 2009; Jaiswal *et al*., 2013). Ascarids have been linked to a variety of secondary infections in gallinaceous birds, including the spread of avian reoviruses, hepatic diseases and migration of Ascarids into developing peafowl's eggs.Additionally, this evidence

would suggest an expansion of host range for Ascaridia spp. with the cohabitation of several birds in free-ranging condition which provide a significant clinical or conservative vulnerability in peafowls. Another helminth, *Capillaria spp*. eggs were identified in our study which was reported in peafowls with 35.3 % prevalence rate by Titilincuet al., (2009) and Kathiravan *et al*. (2017). Identification of Capillaria spp., in peafowls was in agreement with Maurer *et al*. (2009) who analyzed the bird droppings and poultry litters as a source of gastrointestinal helminths, involving direct life cycle in captive gallinaceous birds.As per literature, there are just a few reports of *Eimeria sp* in Indian peafowl, which includes *Eimeria pavonina* (Banik and Ray, 1961), *Eimeria mandali* (Banik and Ray 1964), *Eimeria pavonis* (Mandal, 1965) and *Eimeria mayurai* (Bhatia and Pande, 1966). The present study also detected the oocysts of *Eimeria pavonina* and *Eimeria mayurai* which were confirmed with morphological and micrometry characteristics of the oocysts. Although the current study's birds were reported with other clinical signs despite having a considerable number of OPG, coccidiosis is known to cause significant mortality in growing galliform birds kept in captivity and in free-ranging (Rommel, 2000).

In peafowls, parasitic infestations, particularly ectoparasites, may cause itching, irritation, inappetance, stunted growth, weight loss, and decreased egg production (Jeyathilakan *et al*., 2024). Ectoparasitic occurrence is directly linked to increasing environmental temperatures and humidity. Chewing lice are common in all galliform birds, from residential to migratory as well as terrestrial to aquatic (Ansari, 1948; Farheen *et al*., 2010). The chewing lice, Colpocephalum tausi were reported in the Indian peafowls from Hyderabad Sindh region of Pakistan (Farheen *et al*., 2010) and Thanjavur region of Tamil Nadu, India (Tamileniyan *et al*., 2024). In total, over 135 species of the genus Colpocephalum Nitzsch, 1818 have been found in diverse host species of the Orders Ciconiiformes, Galliformes, Columbiformes, Strigiformes, Passeriformes, Piciformes, and Falconiformes (Farheen *et al*., 2010). Gonoidespavonis has been documented in Indian peafowls across different regions globally, including England (Stewart *et al*., 1996), Japan (Yoshino *et al*., 2011) and Pakistan (Naz and Rizvi, 2018) as reported in previous studies. Jeyathilakan *et al*. (2024) reported the combined occurrence of Gonoidespavonis and nymphal stage of Haemaphysalis sp. in an Indian peafowl from Cauvery Delta region of Tamil Nadu, which aligns with our findings. Similar kind of Haemaphysalis ticks were reported in Tamil Nadu (Ponnudurai *et al*., 2011) and Karnataka (Puttalaksmamma *et al.*, 2019). Menacanthus sp. lice are commonly found in the Phasianidae family, which includes birds such as peafowls. Previous studies have documented this lice species in peafowls from Pakistan (Khursheed *et al*., 2014) and India (Sharma *et al*., 2020). These findings align with our study, which also observes a higher occurrence of Menacanthus sp. in the Phasianidae family, indicating a wide spread distribution across different geographic regions.

CONCLUSION

In conclusion, investigation on ecto and endo parasites in peafowl from several localities of the Cauvery delta region of Tamil Nadu not only sheds light on their intricate ecosystems, but also paves the way for crucial advancements in monitoring, diagnosis, and conservation efforts. Since, free-ranging peafowls are commonly affected with mixed parasitic illnesses. With limited data existing on bird louse and tick, this study provides an important step towards identifying and comprehending their ecto parasitic inhabitants. By bridging the gaps in our knowledge, we empower conservationists with the tools necessary to safeguard the health and vitality of peafowl populations for generations to come.

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Fig. 1.*Hymenolepis sp.* eggs (x400)

Fig.2. Gravid segments of tapeworm in faecal sample

Fig.3. *Raillietina sp.* egg with oncosphere from teased gravid segment (x400)

Fig.4. *Ascaridia sp.* eggs (x100)

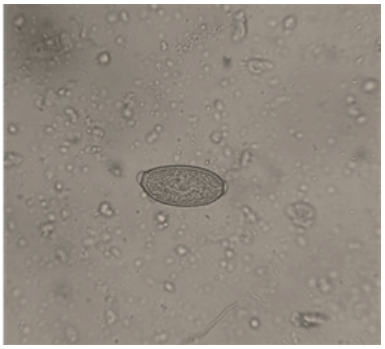

Fig.5. *Capillaria sp*., egg (x400)

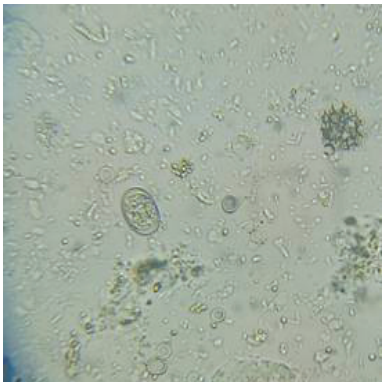

Fig.6.*Eimeria mayurai* oocyst (Unsporulated) (x400)

Fig.7. *Eimeria pavonina* oocysts - Unsporulated (Arrow) and Sporulated (Arrow head) (x400)

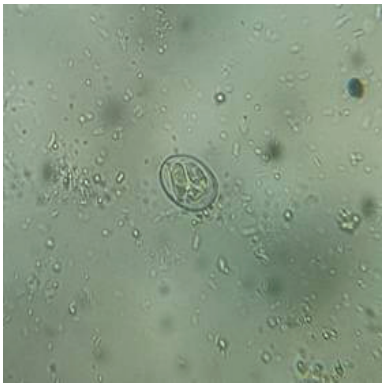

Fig.8.*Eimeria mayurai* oocyst (Sporulated) (x400)

Fig.9. *Colphocephalum tausi* - male (x40)

Fig.10. *Goniodes pavonis* - male (x40)

Fig.11. *Menacanthus sp.*- female (x40)

Fig.12. *Haemaphysalis sp.* - Nymph (x40)

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