The Haryana Veterinarian (June, 2025) **64(1),** 45-48 ISSN 0033-4359 (P) **Research Article**

PATHOMORPHOLOGICAL ALTERATIONS IN NATURAL INFECTION OF *ASCARIDIA GALLI* IN POULTRY

VARUN BASSESSAR, DEEPAK SUMBRIA[1], PRIYANKA SYAL*, VIKRANT SUDAN[1] and RAVINDRAN, R.
Department of Veterinary Pathology, [1]Department of Veterinary Parasitology
College of Veterinary Science, Guru Angad Dev Veterinary and Animal Sciences University, Rampura Phul, Punjab

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ABSTRACT

In backyard poultry farming, infection of *Ascaridia galli* is of serious concern due to its detrimental impacts on chicken productivity and health. This parasitic worm is the biggest helminth that lives in the poultry gut, can significantly lower growth rates, egg productivity and feed efficiency. The present study brings insight into the pathomorphological alterations in natural infection of ascariasis in poultry birds of backyard poultry farming. Carcasses of ten female poultry birds were collected for to post-mortem annexe of Department of Veterinary Pathology, College of Veterinary Science, Rampura Phul, GADVASU, Ludhiana. A thorough post mortem examination was carried out and representative tissues having lesions were collected in 10% neutral buffered formalin for histopathological examination. Gross lesions included the presence of adult parasites in the intestinal lumen, petechial to ecchymotic hemorrhages and evidence of hemorrhagic and necrotic enteritis. Further, histopathological examination revealed blunting and stunting of the villi, necrosis, desquamation of the mucosal lining, infiltration of inflammatory cells in the lamina propria and goblet cell hypertrophy and hyperplasia. Therefore, the combination of gross and microscopic findings confirmed ascariasis, with intestinal obstruction, anemia and malnutrition contributing to mortality.

Keywords: *Ascaridia galli*, Backyard poultry, Hemorrhagic enteritis, Histopathology, Intestinal obstruction

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The chicken industry is the fastest-growing agricultural subsector, especially in emerging nations, and plays a crucial role in food safety and nutrition. In developing countries, 80% of rural households raise poultry (Shohana *et al.*, 2023). The projected total egg production in India for 2022-2023 is 138.38 billion, with 118.16 billion coming from commercial poultry and 20.20 billion from backyard poultry. India's total meat production for 2022-2023 is estimated at 9.77 million metric tons (MMT), with poultry accounting for 4.995 MMT or 51.13%. According to the Government of India, the country ranks third globally in egg production and fifth in chicken meat output.

Poultry are infected by many devastating diseases caused by various viruses (avian influenza, New Castle disease, infectious bronchitis, Marek's disease, fowl pox etc.), bacteria (fowl cholera, colibacillosis, fowl typhoid etc.), fungal (aspergillosis, candidiasis, ringworm etc.) and parasitic disease (flukes, cestodes, nematodes, protozoan etc.). Among all above mentioned infectious agent, due to their scavenging nature, poultry in these systems are easily infected by various soil-transmitted parasites (Shohana *et al.*, 2023).

One of the most significant threats to indigenous chickens is *Ascaridia galli*, the largest parasite affecting poultry (Shifaw *et al.*, 2021). *Ascaridia galli* infections can lead to anemia and emaciation (Phiri *et al.*, 2007). In severe cases, large infestations can obstruct or damage the intestine, resulting in nutrient malabsorption (Sharma *et al.*, 2019). Additionally, *A. galli* can act as a vector for bacteria. Larvae of *A. galli* are known to undergo histotrophic phase of migration in the intestinal tissue of birds. During the migration phase, Larvae goes deep inside the intestinal crypt gland, it causes damage to granular epithelium and sometime also cause hemorrhage in the mucosa of the intestine.

Poultry infections are common in India (Ara *et al.*, 2021). Some reports of *A. galli* have been reported from central plain zone of Punjab (Singh *et al.*, 2021) but reports from the western zone are still lacking. Therefore, the present study brings insight into the pathomorphological alterations as a result of natural ascariasisin backyard poultry farming, especially from the western zone of Punjab, however, the detailed insights into the pathological impacts of *Ascaridia galli* on poultry health remain limited. Further, the study aims to inform better management practices and mitigate economic losses in backyard poultry systems.

MATERIALS AND METHODS

Punjab's diverse agro-climatic zones influence poultry farming practices, potentially affecting disease prevalence. This study focuses on cases from the western zone, particularly Bathinda district as raising poultry is not only a profitable endeavor but also an essential component of the local economy of Bathinda. The food supply chain and

*Corresponding author: drpriyankasyal.patho@gmail.com

Fig. 1. Abnormal congested ovarian follicles suggesting oophoritis (white arrow).

Fig. 2. Catarrhal exudate and worms adhered to mucosa (black arrow) along with admixed necrotic and haemorrhagic exudate in intestine.

Fig. 3. Adult parasite extracted from the intestine of infected bird

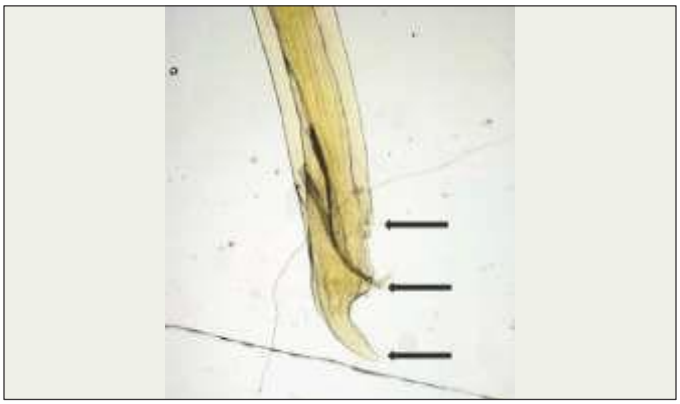

Fig. 4. Presence of sucker, spicule and alae in the ventral end of the parasite (black arrows)

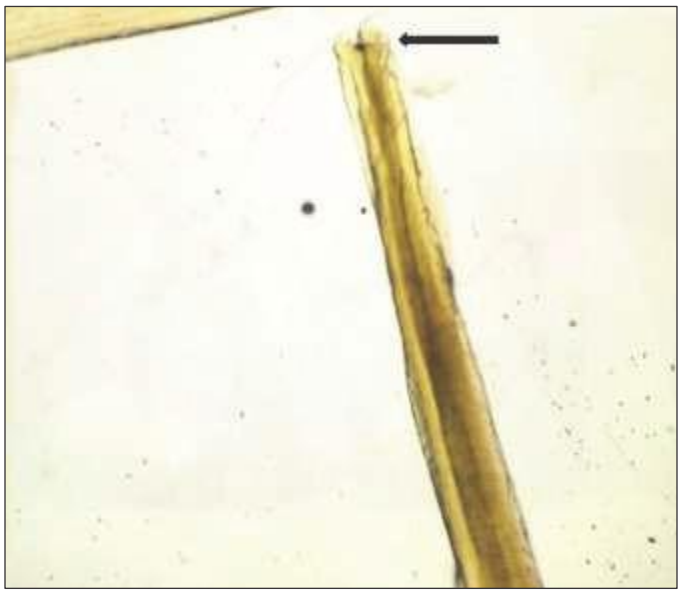

Fig. 5. Anterior end of the parasite showed a prominent mouth, with lips (black arrow)

local economies can suffer greatly from disease outbreaks. As a result, research on poultry diseases is essential to preserving the food security and economic stability of the area.

History: Carcass of ten female poultry birds of backyard poultry farming were brought to post mortem annexe of Department of Veterinary Pathology, COVS, RampuraPhul, GADVASU with no history of deworming and vaccination. The birds had history of ruffled feathers, dull and depressed appearance along with diarrhoea indicative of gastrointestinal disease.

Post-mortem examination and analysis of samples: Birds were thoroughly examined during post-mortem examination and representative tissue samples were collected in 10% Neutral buffered formalin for routine tissue processing and Hematoxylin & Eosin staining. The postmortem and further pathological procedures were done as per the standard guidelines (Bello *et al.*, 2012). The adult parasites were collected from intestine, processed and identified following standard keys (Taylor *et al.*, 2016).

RESULTS AND DISCUSSION

Gross examination revealed oophoritis in seven birds (Fig. 1), while all birds exhibited varying degrees of enteritis with catarrhal exudate in the lumen,intestinal congestion, and multiple hemorrhages. Parasitic worms

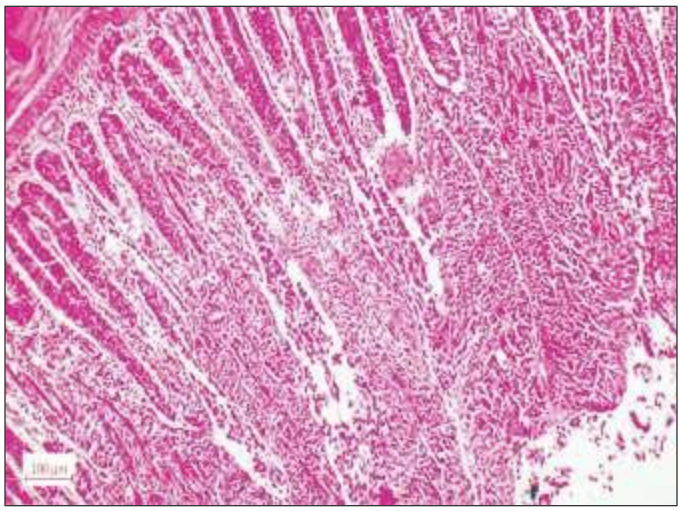

Fig. 6. Blunting and stunting of villi along with desquamation of mucosal lining. H & E, 10X

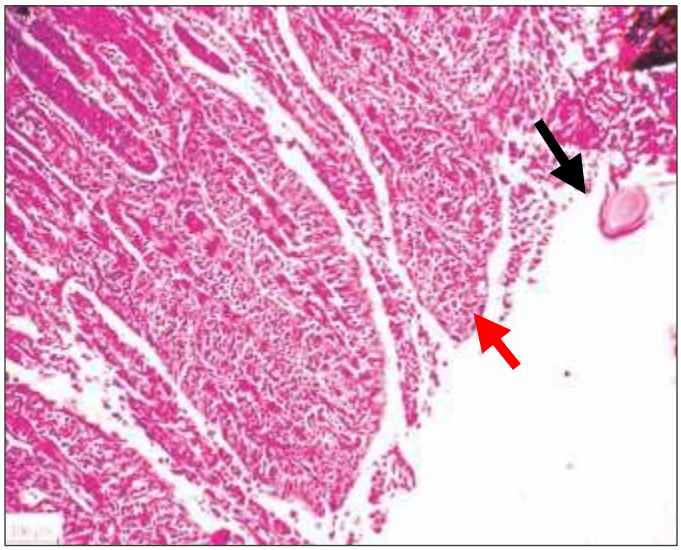

Fig. 8. Histopathology of intestine revealed blunting of villi (red arrow), desquamation of mucosa along with presence of parasite inside the lumen (black arrow) H & E, 10X

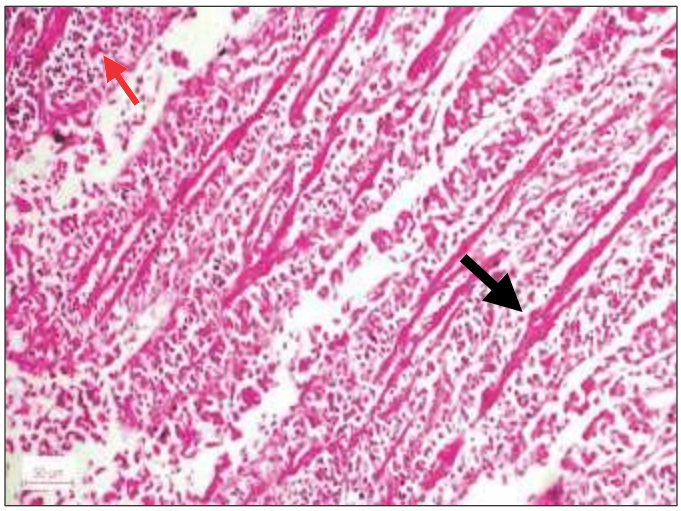

Fig. 7. Histopathology of intestine revealed infiltration of Inflammatory cells (red arrow) in the mucosa along with desquamation of epithelial cells and connective tissue proliferation (black arrow). H & E, 40X

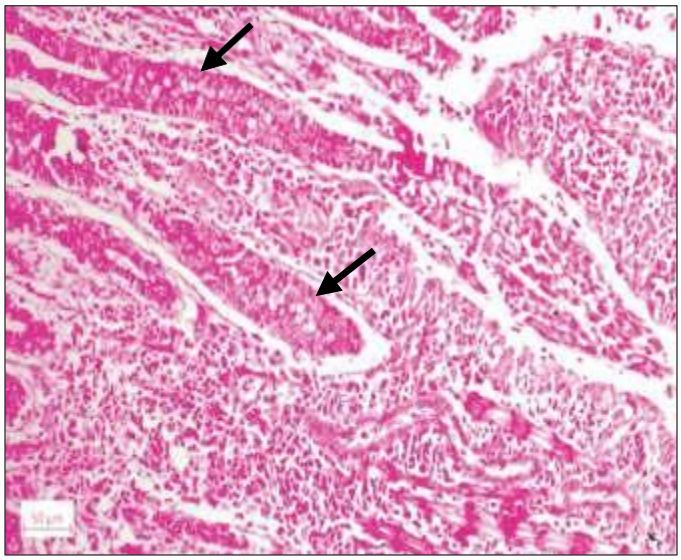

Fig. 9. Histopathology of intestine revealed hypertrophy and hyperplasia of goblet cells (black arrow) along with connective tissue proliferation. H & E, 40X

caused severe intestinal blockages, with some cases resulting in rupture and intestinal hemorrhages (Fig. 2). Various adult parasites were present in the infected bird (Fig. 3). Ventral view of the parasite depicted the presence of a sucker, spicule (Fig. 4) and small alae. The anterior end of the parasite showed a prominent mouth, with lips (Fig. 5). All these findings were in accordance with the literature (Taylor *et al.*, 2016).

Consistent with findings in many studies, this parasite causes various forms of haemorrhagic lesions (Brar *et al.*, 2016). A longitudinal section of the intestine showed some free worms in the lumen and some adult live worms adhered to the mucosa. These areas also exhibited congestion and petechial to ecchymotic hemorrhages, indicating hemorrhagic to necrotic enteritis. Other studies have similarly observed adult live worms in the intestine (Mishra *et al.*, 1984), causing hemorrhagic to necrotic enteritis (Ngongeh *et al.*, 2019). In cases of severe ascariasis infestation, the immune system may be weakened, leading to secondary infections and increased death from parasite blockage that can be correlated with the finding of oophoritis seen in the present study (Shohana *et al.*, 2023).

Furthermore, histopathological examination of the intestine revealed blunting and stunting of the villi, necrosis (Fig. 6), desquamation of the mucosal lining (Fig. 7), and the presence of parasites in the lumen. There was also infiltration of inflammatory cells in the lamina propria (Fig. 8, 9), along with congestion and hemorrhages in the blood vessels. The intestinal glands and muscularis mucosa showed areas of necrosis and infiltration by inflammatory cells, indicating diffuse enteritis. In

ascariasis, necrosis of the intestinal epithelial cells might be due to the mechanical destruction imposed by the worms passing through the intestinal lining and the inflammatory reaction brought on by the infection. This may further lead to breakdown of mucosal barriers, ulcerations and bleeding (Shohana *et al.*, 2023). Due to presence of parasites, the chicken's immune system reacts and cause intestinal inflammation that further leads damage and swelling of villi leading to blunting and stunting of villi (Raza *et al.*, 2017).

Additionally, the surface area available for absorption is diminished when ascariasis results in villus blunting and stunting that leads to deterioration of bird's health due to inadequate digestion and absorption of vital nutrients or nutrient malabsorption (Abbas *et al.*, 2024). Hypertrophy and hyperplasia of mucin-producing goblet cells were also evident in the intestine (Fig. 10) indicated a protective but insufficient mucosal response.Comparable studies in pigeons (Adang *et al.*, 2010) and chickens (Mishra *et al.*, 1984) have shown necrotic enteritis with mononuclear and polymorpho- nuclear infiltration that further corroborating the present findings. The observed histopathological changes align with previous studies (Balqis *et al.*, 2014), underscoring *A. galli's* ability to induce severe villous damage and inflammatory infiltration. These findings highlight the significant pathological impact of *A. galli* infestations, emphasizing the need for targeted deworming and improved management in backyard poultry systems.

CONCLUSION

The comprehensive gross and histopathological examination conclusively diagnosed ascariasis in the affected poultry. The pathological alterations, including severe intestinal obstruction, mucosal damage, and pronounced villous atrophy, highlight the profound impact of *Ascaridia galli* infestations. These findings emphasize that mortality in the birds likely resulted from a combination of mechanical obstruction, intestinal damage, anemia, and malnutrition caused by the parasitic burden. This study underscores the critical need for effective deworming protocols and enhanced management practices to mitigate the significant health and economic repercussions of parasitic infections in backyard poultry systems.

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