SHORT COMMUNICATION

Histopathological Alterations Associated with Cestode Infections in Backyard Poultry of Krishna District, Andhra Pradesh

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Abstract

The study investigated gross and histopathological alterations associated with cestode infections in backyard poultry of Krishna district, Andhra Pradesh. A total of 702 gastrointestinal tracts (GIT) from desi (indigenous) chickens were collected from local slaughter points and examined for endoparasites. Organs showing cestode infection were fixed in 10% neutral buffered formalin, processed by paraffin embedding, and stained with hematoxylin and eosin (H&E) for microscopic evaluation. Cestode infection was detected in all examined birds (100%), either as single or mixed infections. The predominant species identified were *Cotugnia digonopora*, *Raillietina* spp., *Davainea proglottina*, and *Amoebotaenia sphenoides*. Grossly, infected intestines showed congestion, mucosal thickening, luminal obstruction, and focal petechiae. Microscopically, lesions included epithelial desquamation, villous atrophy, glandular degeneration, and infiltration of lymphocytes, mononuclear cells, and eosinophils around embedded scolices, along with congestion and cellular debris in the lumen. The findings indicate that cestode infections are highly prevalent and pathogenic in free-ranging desi fowl, hence regular deworming and improved management practices are essential to minimize economic losses in backyard poultry systems.

Key words: Andhra Pradesh, Backyard poultry, Cestodes, *Cotugnia digonopora*, Histopathology.

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Introduction

Backyard poultry plays a crucial role in rural livelihoods and nutritional security in India. However, parasitic infections remain a major impediment to productivity, with cestodes representing one of the most prevalent and pathogenic groups. The adaptability of desi birds to extensive rearing systems, coupled with low input costs, makes them central to rural poultry development programs (Pica-Ciamarra and Dhawan, 2009). However, disease constraints particularly parasitic infections pose a significant threat to sustainable production. Gastrointestinal helminthiasis, often overlooked, leads to poor feed conversion, stunted growth, and reduced egg output (Bhowmik and Sinha, 1983; Bandi *et al.,* 2020). Among helminths, cestodes are of major concern in scavenging birds due to their indirect life cycles involving intermediate hosts such as beetles and ants (Frantovo, 2002). These parasites inflict mucosal irritation, inflammation, and nutrient competition, with chronic infections resulting in marked intestinal pathology and production loss (Anwar *et al.,* 2000; Salam *et al.,* 2010). Although previous studies have documented the prevalence of gastrointestinal parasites in Andhra Pradesh (Sreedevi *et al.,* 2016; Bandi *et al.,* 2020), detailed histopathological descriptions of cestode-induced lesions in backyard poultry are scarce. Therefore, this study was designed to elucidate the morphological and microscopic lesions associated with cestode infections in indigenous poultry of Krishna district, providing insights into parasite-host interactions at the tissue level.

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Materials and Methods

A total of 702 gastrointestinal tracts (GIT) of freshly slaughtered desi birds were collected from various local poultry markets and village slaughter points across Krishna district, Andhra Pradesh (India). Each GIT was incised longitudinally, immersed in lukewarm water, and examined for the presence of cestodes adhering to the mucosa. Recovered cestodes were gently washed in saline and identified morphologically using standard parasitological keys (Soulsby, 1982). Tissues showing visible lesions were fixed in 10% neutral buffered formalin, dehydrated through graded alcohols, embedded in paraffin, sectioned at 4-5 µm, and stained with Harris hematoxylin and eosin following Luna (1968). Microscopic observations were made under different magnifications for evaluation of mucosal, submucosal, and inflammatory changes.

Results and Discussion

The species of cestodes identified adherent to gut mucosa included *Amoebotaenia sphenoides* (Fig. 1), *Cotugnia digonopora*, *Raillietina cesticillus*, *R. echinobothrida* (5A), *R. tetragona*, and *Davainea proglottina*. Cestode-infected intestines revealed marked congestion, thickened mucosa, and numerous tapeworms within the lumen (Fig. 3A). Nodular formations and rough mucosal surfaces were occasionally observed. Petechial haemorrhages were evident in severe infections, particularly with *Raillietina echinobothrida* and *Cotugnia digonopora*, corroborating the findings of Anwar *et al.* (2000) and Alam *et al.* (2014). Cestode scolices embedded deeply into the mucosa and submucosa (Fig. 6), often causing mechanical disruption of villous architecture was detected with villus atrophy, epithelial desquamation, and glandular necrosis in heavily parasitized segments. Inflammatory infiltration composed mainly of lymphocytes, plasma cells, eosinophils, and a few heterophils (Fig. 3B, 4, 5B). Congested blood vessels and cellular debris were observed within the intestinal lumen, with foci of haemorrhage and necrosis near embedded scolices.

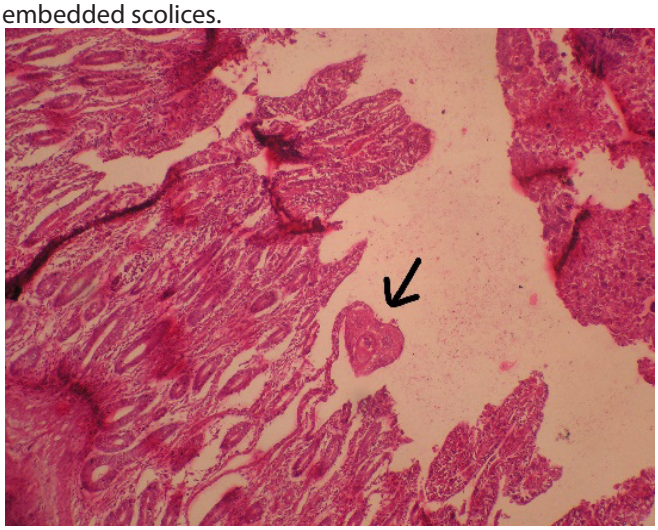
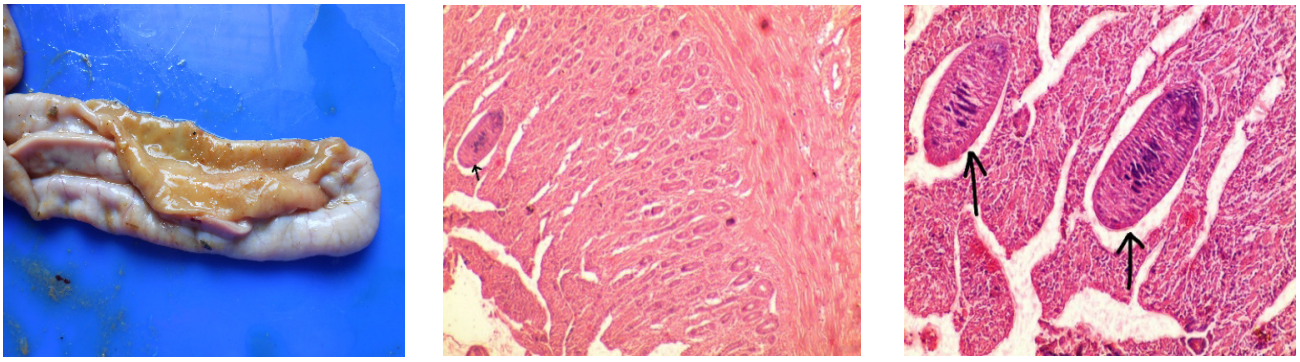


Fig. 1: Cut section of *Amoebotaenia sphenoides* parasite in the lumen of small intestine with loss of mucosal epithelium, H & E x 40.

These lesions were consistent with catarrhal enteritis and chronic mucosal damage reported by Samad *et al.* (1986) and Salam *et al.* (2010). *Davainea proglottina* infections caused penetrative mucosal degeneration, swollen intestines (Fig. 2A) and villous destruction (Fig. 2B, 2C). *Cotugnia digonopora* and *Raillietina* spp. produced marked inflammatory cell infiltration and fibrosis around the attachment sites (Fig. 4B) along with desquamated epithelium and cellular debris in the lumen (Fig. 5B). *Amoebotaenia sphenoides* infection resulted in superficial epithelial erosion and loss of mucosal continuity (Fig. 1), reflecting its less invasive nature compared to *Raillietina*. The high occurrence (100%) of cestode infections in the present study emphasizes the vulnerability of free-ranging desi fowl under extensive management conditions. Scavenging habits increase exposure to intermediate hosts, facilitating continuous transmission. Similar prevalence patterns have been reported in Bangladesh and Nigeria (Bawe *et al.,* 2005; Rabbi *et al.,* 2006).



A **B** **C**

Fig. 2: *Davainea proglottina* **(A)** Thickening of duodenal mucosa. (**B**) Longitudinal section of the adult worms penetrating deep into the duodenal mucosa with desquamation and degeneration of epithelium and villi, H & E x 40. (**C**) Section showing adult worms penetrating deep into the mucosa with neighboring cellular infiltration, H & E x 100.

The histopathological findings reaffirm the pathogenic potential of avian cestodes, which not only physically damage intestinal mucosa but also induce chronic inflammatory responses. Persistent epithelial loss and villus atrophy lead to malabsorption, anaemia, and reduced productivity. The observed lymphocytic and eosinophilic infiltrations indicate both cell-mediated and hypersensitivity-type immune reactions at the parasite attachment sites (Schwarz *et al.,* 2011). Comparatively, *Raillietina echinobothrida* and *R. tetragona* have been associated with severe intestinal pathology due to their scolex penetration and proglottid spination (Fig. 4 and 5A), resulting in villous necrosis and fibrotic healing (Bhowmik and Sinha 1983; Salam *et al.,* 2010). Cestode infections often occur in mixed parasitic environments; however, their individual histopathological impact, as revealed here, underscores their dominant role in gastrointestinal pathology. The study provides baseline data for future molecular investigations on host immune responses and parasite virulence mechanisms.

In brief, cestode infections, particularly those caused by *Raillietina* and *Cotugnia* species, are prevalent and pathogenic in backyard poultry of Krishna district. The observed histo-pathological lesions highlight their significant impact on gut integrity and bird performance. Strategic control through targeted anthelmintic programs, improved hygiene, and regular monitoring of intermediate host populations are crucial to minimize economic losses and ensure the sustainability of backyard poultry farming systems in India.

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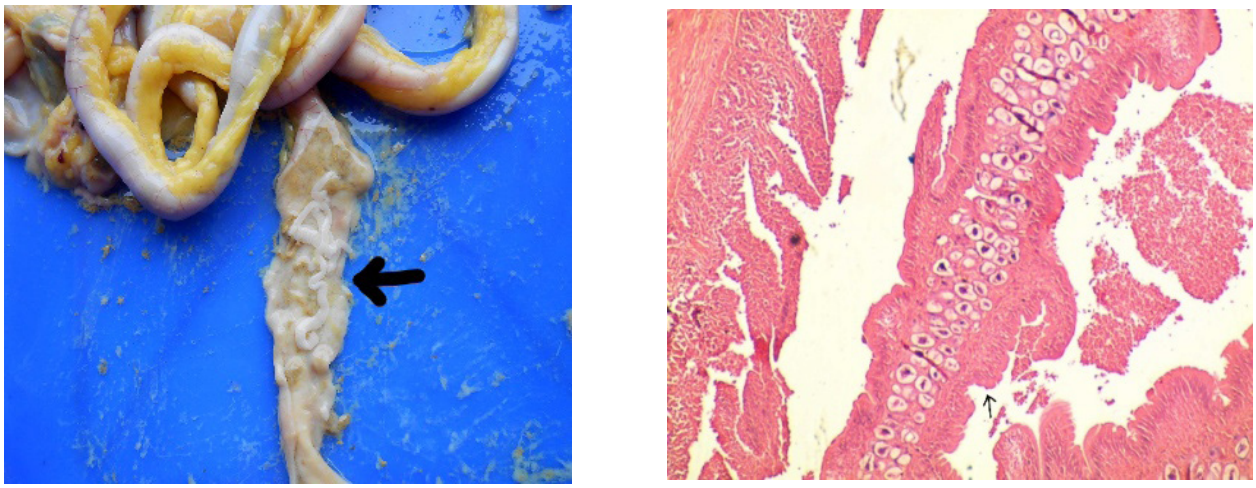


Fig. 3: *Cotugnia digonopora.* (**A)** Cut section of parasite in the lumen of small intestine. (**B)** Section showing gravid segment (with egg pockets) of the parasite in the lumen with cellular infiltration, H & E x 40.

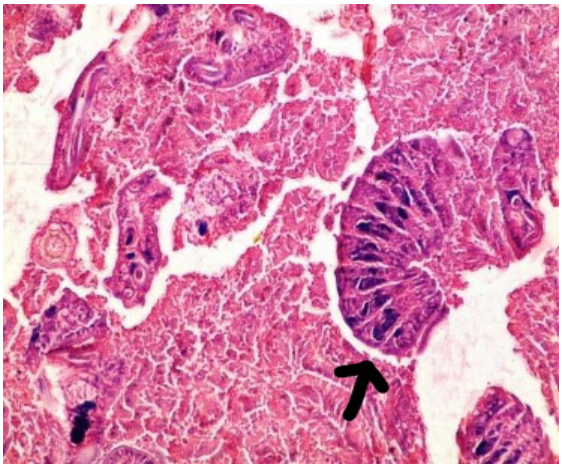
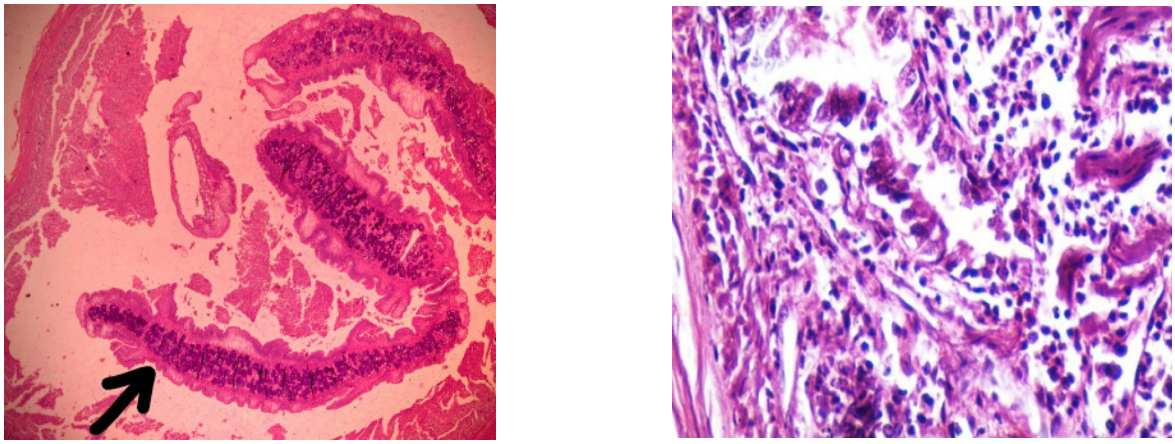


Fig. 4: Small intestine -section showing the *Raillietina cesticillus* parasite embedded deep in the mucosa admixed with presence of sections of round worms and parasitic ova/egg, H & E x 40.



A B

Fig. 5: (A) Small intestine - section showing *Raillietina echinobothridia* along with desquamated epithelium and cellular debris in the lumen, H & E x 40. **(B)** Cellular infiltration of inflammatory cells, H & E x 400.

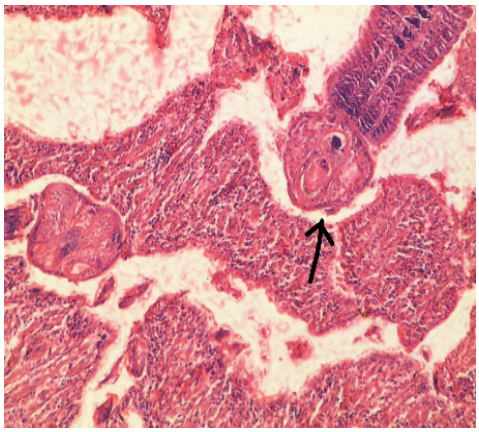


Fig. 6: Small intestine section showing *Raillietina tetragona* penetrating deep into the mucosa with scolex and cellular infiltration at the attachment site, H & E x 100.

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