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Short Communication

A COMPREHENSIVE INVESTIGATION OF AN OUTBREAK OF CONCOMITANT PARASITIC INFECTIONS IN BACKYARD POULTRY

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ABSTRACT: A study was conducted to investigate the presence of parasitic infection in a poultry flock during an outbreak. A total of 32 Kadaknath birds died out of 600 birds. The succumbed birds had a history of anorexia, loose feces, and sudden death. During the necropsy, the birds were examined externally and internally, which revealed creamish-white colored multifocal necrotic foci on the liver parenchyma with diffusely congested hepatic tissue and a severe, diffuse condition of the lungs. The examination of the intestines of the affected birds showed severe and diffuse catarrhal enteritis resulting from roundworms present in the small intestine and the caecum of the birds, eventually causing button-shaped round lesions on the mucosal surface. The birds were found to be infected with *Ascaridia galli, Heterakis gallinarum* and *Histomonas meleagridis.*

Keywords: : Kadaknath fowl, Concomitant infestation, *Ascaridia galli, Heterakis gallinarum, Histomonas meleagridis.*

Parasitic diseases are a potential threat to poultry production and the major endoparasites are the gastrointestinal helminths [1]. Endoparasites in poultry birds interfere with the metabolism and uptake of nutrients thereby associated with a decline in production and impaired growth. The common endoparasites in birds include nematodes (roundworms), trematodes, and cestodes. The major nematode parasites in poultry birds are *Ascaridia galli*, which is present in the small intestines, and *Heterakis gallinarum* located in the caecum [2]. *Heterakis gallinarum* are whitish caecal worms with three equal-sized lips on the mouth, the presence of lateral alae, and a distinct esophagus consisting of vulvar apparatus. *Histomonas meleagridis* is a flagellated or amoeboid anaerobic protozoan parasite that is carried by embryonated eggs of the caecal nematode *Heterakis gallinarum*. Transmission occurs predominantly by the consumption of embryonated eggs of the caecal nematode *Heterakis gallinarum* carrying *H. meleagridis* trophozoites or through the consumption of earthworms that have consumed the nematode eggs. Histomoniasis is characterized by cecal mucosal-to-transmural necrosis with the development of luminal cores [3].

The study

A total of 32 Kadaknath birds died out of 600 birds. The affected birds had a history of anorexia, loose feces, respiratory rales, and sudden death. The birds after death were presented for necropsy examination to the Department of Veterinary Pathology, Dr. G.C. Negi College of Veterinary and Animal Sciences, CSKHPKV, Palampur, Himachal Pradesh, India. The birds were examined externally thoroughly for the presence of any injury or ectoparasitism and the lesions encountered during the necropsy examination were recorded. The representative tissue sections approximately 0.5 cm thickness from the

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Fig. 1. Small intestine filled with roundworms (*Ascaridia galli*).

Fig. 2. Caecum containing *Heterakis gallinarum* worms.

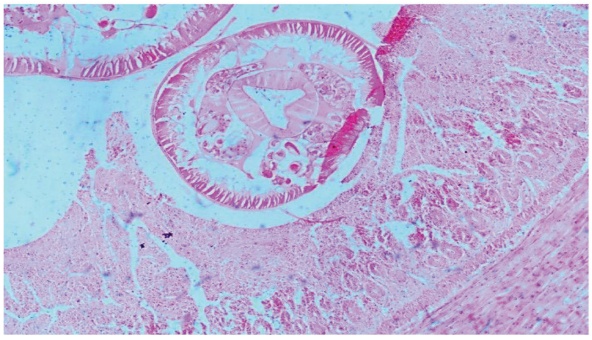

Fig. 3. Histology of small intestine exhibiting the presence of cross section of round worm with lymphocytic infiltration (H & E x 100).

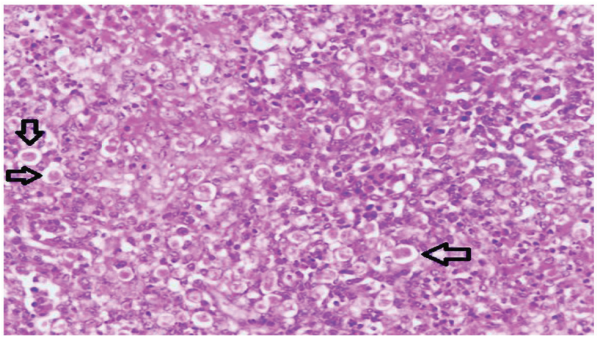

Fig. 4. Liver showing numerous *Histomonas meleagridis* stages with granular endoplasm (H & E x 100).

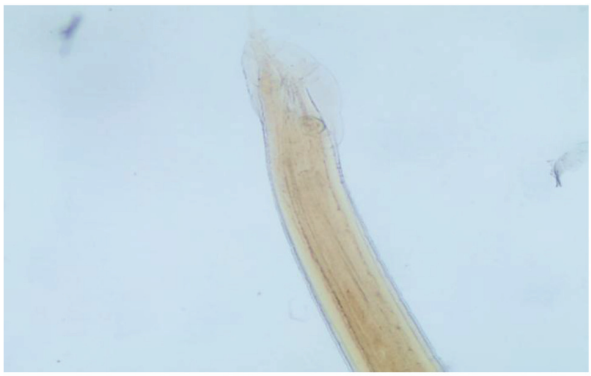

Fig. 5. Photomicrograph of male*Heterakis gallinarum* (10 x).

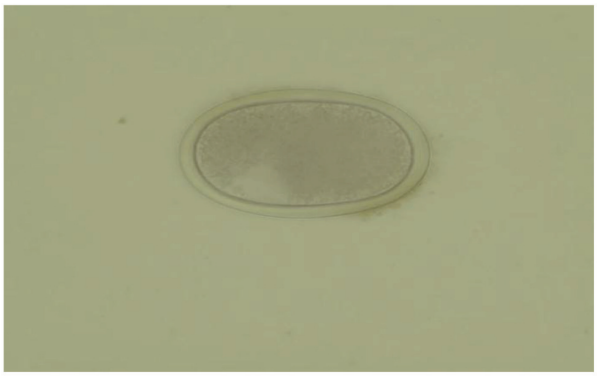

Fig. 6. Photomicrograph of *Heterakis gallinarum* egg (20 x).

affected organs were collected in 10% neutral buffered formalin (NBF). The fixed tissue sections were dehydrated in ascending grades of alcohol, cleared in benzene, impregnated in molten paraffin, and sectioned to 4-6 microns with the help of a microtome. Tissue sections were stained with Hematoxylin and Eosin (H&E) stain as per the standard protocol [4].

The roundworms retrieved from the intestines during the necropsy examination were removed gently, washed in normal saline, and sent to the Department of Veterinary Parasitology for species identification. The nematodes were cleared in lactophenol to ascertain the morphological and morphometric characteristics of male and female worms.

Result and analysis

In the present study, concomitant parasitism was observed in poultry birds, the diagnosis was based on postmortem examination that revealed parasitic load in intestines, fecal examination, and histopathology. These findings were very in concordance with the earlier studies [5, 6], which revealed a significant incidence of the helminth parasites. A thorough necropsy evaluation of died birds depicted typical creamish-white colored multifocal necrotic foci on the liver parenchyma along with diffusely congested hepatic tissue. The spleen of the dead birds was enlarged and exhibited the presence of 2-3 mm creamish white colored focal necrotic foci. The examination of the intestine of the affected birds has shown severe and diffuse catarrhal enteritis elicited by roundworms present in the small intestine (Fig. 1). The caecum of the birds also showed the presence of thread-like small roundworms causing button-shaped round lesions on the mucosal surface (Fig. 2). The parasitological examination of worms in caecum were confirmed as *Heterakis gallinarum* (Fig. 5 and Fig. 6).

Histologically, lymphoid aggregation along with the presence of a parasite in the lumen was observed (Fig. 3). The roundworms recovered from the small intestine were identified as *Ascaridia galli*. Similar findings have been reported by other researcher [7]. The histological examination of liver tissue showed hepatic necrosis throughout the parenchyma and moderately stained trophozoites of *Histomonas meleagridis* (Fig. 4). Histologically, fibrinonecrotic typhlitis, and necrotizing hepatitis were seen. Necrosis and bleeding had occluded the cecal mucosa, resulting in the loss of stromal components. Heterophils and macrophages increased in the lamina propria with fewer lymphocytes and plasma cells extending to the submucosa, muscular layers, and serosa. Trophozoites were also seen in intraluminal debris, penetrating the less afflicted neighboring lamina propria and submucosa. Multiple, large regions of necrosis expanded the liver, characterized by hepatocytes having shrunken, hypereosinophilic cytoplasm and pyknotic nuclei encircled by layers of epithelioid macrophages and heterophils with few lymphocytes and plasma cells and intra-lesional parasites. Similar findings have been reported by other researchers [3, 8]. It is well recognized that gastrointestinal parasites may infect poultry birds sub-clinically, resulting in indirect productivity and economic losses. Furthermore, gastrointestinal parasites can worsen pre-existing illness conditions and reduce the flock's resistance to secondary infections. Concurrent infections of two or more parasites may increase their impact on adult production losses and early chick death.

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