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Research Article

Cecal Worm Infection in Backyard Fowl of Kashmir Valley

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Abstract

Study was carried out for a period of two years on prevalence and pathology of cecal worm *Heterakis gallinarum* on a sample size of 478 domestic chicken (*Gallus g. domesticus* L., 1758), 243 males and 235 females, weighing between 1 - 2.5 kgs collected from the different localities covering almost entire Kashmir valley. The study revealed that prevalence rate of *Heterakis gallinarum* for 1st Year of study (2012) was 3.43% (8/233) and for the 2nd Year (2013) it was 5.3% (13/245) giving an overall prevalence rate for two year study (Jan 2012 to Dec 2013) to be 4.39% (21/478). Range of intensity of worms was found to be 02 – 55 with Mean intensity of infection observed to be 20 ± 2.1. Faecal Egg Count was found to be very low i.e <40 eggs per gram of faeces. Histological findings in the infected revealed presence of adult worms in the lumen of intestine along with cellular debri and the infected tissue revealed intense chronic diffuse inflammatory processes with mononuclear and polymorphonuclear (heterophils) leucocyte infiltrations extending up to submucosa. There was sloughing off of the epithelium and lumen was packed with fibrin, red blood cells and tissue debris.

Keywords: *Heterakis gallinarum*; Domestic Chicken; Kashmir Valley

Introduction

Backyard fowl are freely roaming in search of food, thereby exposing themselves to various helminth larvae and eggs. One such common worm infecting chicken is the nematode *Heterakis gallinarum* because backyard chicken frequently feed on earthworms which act as intermediate hosts for this nematode. *Heterakis gallinarum* infection in chicken is usually subclinical but it may function as a vector for *Histomonas meleagridis* (black head) which induces severe pathological lesions in the gut and liver leading to high mortality rates in susceptible hosts [1-3]. The present study was designed to have an idea about the prevalence of the nematode *Heterakis gallinarum* in free ranging chicken of Kashmir Valley and to study the extent of pathology caused by it to the caecum to design some strategy in future to curb this fatal association of these two parasites which causes great economic losses to our backyard poultry industry.

Materials and Methods

The present two year study was carried from January 2012 to December 2013 and for the study a sample size of 478 domestic chicken (*Gallus g. domesticus* L., 1758), 243 males and 235 females, weighing between 1 - 2.5 kg were selected. Chicken were collected from the different localities covering almost entire Kashmir valley. Individual clinical evaluation and euthanization was carried out according to Zander., *et al* [4]. Nematodes were collected, rinsed in normal saline (0.85%), fixed in hot 70% alcohol and then counted using a stereoscopic microscope. The nematodes were cleared in lactophenol, mounted in glycerin jelly, photographed and identified following Vicente., *et al* [5].

Prevalence was calculated as a percentage of the host population infected at a point in time [6]. Mean intensity was calculated as number of parasites per infested bird.

Faecal examination was carried out following Mc Master's flotation technique. Worm eggs were identified using the keys described by Thienpont., *et al* [7]. Faecal egg counts (FECs) were undertaken within 24 hours by a modification of the McMaster technique with a sensitivity of 50 eggs per gram of faeces [7].

Impression smears from scrapings of the caeca and intestine were stained with Giemsa and Gram's stain.

For pathological studies, fragments of the parasitized caecae and liver fixed in formalin and then routinely processed [8] for paraffin embedding. 5 µm sections were cut and stained with hematoxylin and eosin (H&E). Mc Manus periodic acid Schiff (PAS) stain was used to demonstrate protozoan inclusions in the sections. Grocott's stain was used to differentiate with fungal elements. Micrographs were obtained using digital microscope model BX60F-3, Olympus Optical Co. Ltd. (Tokyo, Japan), fitted with the Olympus camera model DP12.

Results and Discussion

Prevalence

Heterakis gallinarum is characterized by the presence of oesophageal bulb (Figure 1) and its eggs are more barrel shaped (Figure 2). Prevalence rate for 1st Year of study (2012) was found to be 3.43% (8/233) and that for the 2nd Year (2013) was found to be 5.3% (13/245) giving an overall prevalence rate for two year study (Jan 2012 to Dec 2013) to be 4.39% (21/478). Reported preva-

lence rates in chicken range from 10.2% to 72.5% in Europe [9,10], 1 to 84% in the USA [11] and 17.28% to 78.8% in Africa [12] but low prevalence in the present study can be attributed to either better adaptability of the nematode to chicks or to the more resistance of chicks which could be either innate or due to better nutrition. *Heterakis gallinarum* worm burden was slightly higher in backyard chickens with poor body conditions [13].

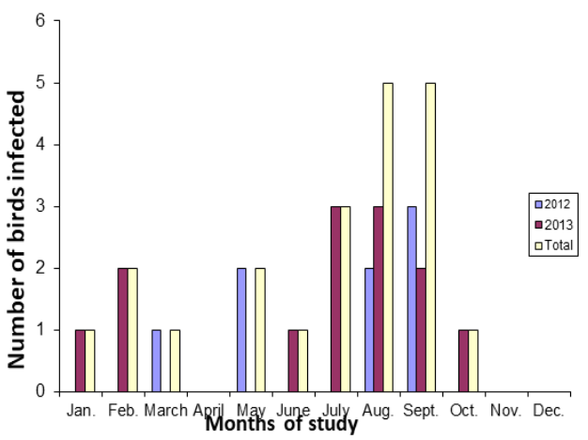

Figure 1: Month wise prevalence of *Heterakis gallinarum* in domestic fowl.

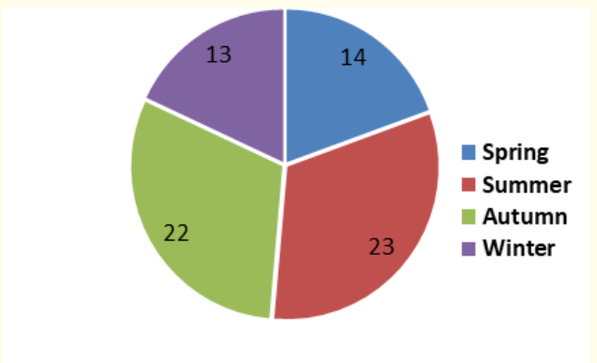

Figure 2: Season Wise Mean Intensity of infection of *Heterakis gallinarum.*

Range of intensity of worms was found to be 02 – 55 with Mean intensity of infection observed to be 20 ± 2.1. Faecal Egg Count was found to be very low i.e. < 40 eggs per gram of faeces.

Prevalence of nematode infection and Mean intensity of infection was found to be high during Summer and Autumn seasons of the study (Figure 3 and 4) which can be attributed to decreased resistance of chicks to infection and increased availability of intermediate host (Earthworms) due to high temperature and more rainfall in Summer and autumn (especially August – September).

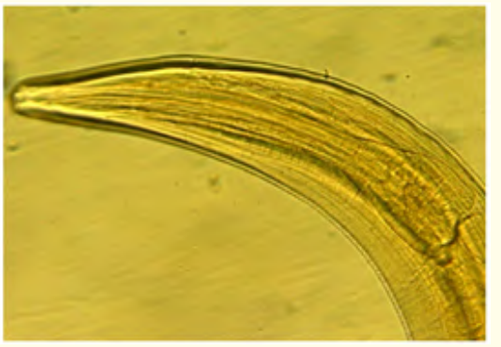

Figure 3: *Heterakis gallinarum* recovered from the domestic fowl showing anterior end revealing mouth, lips and oesophageal bulb.

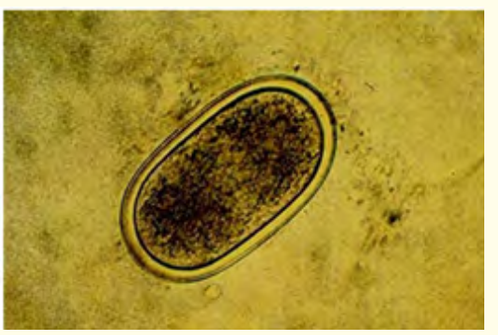

Figure 4: Barrel Shaped Egg of *Heterakis gallinarum.*

Pathology

No gross lesions were seen in the caeca during infection of *Heterakis gallinarum.* However histological findings in the caeca revealed presence of adult worms in the lumen of intestine along with cellular debris (Figure 5). Few sections show larvae penetrating the epithelium of cecum (Figure 6). The infected tissue revealed intense chronic diffuse inflammatory processes with mononuclear

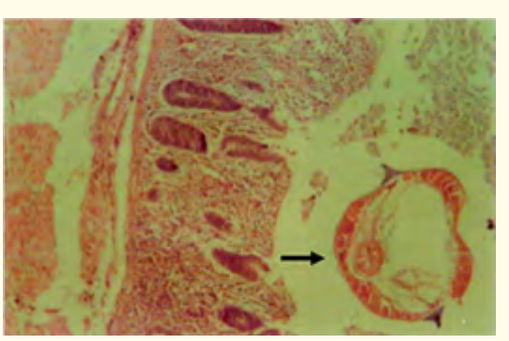

Figure 5: Photomicrograph of caecum of domestic fowl revealing adult *Heterakis gallinarum* in the lumen, Note the mucosal denudation and cellular debris in lumen H&E 40X.

and polymorphonuclear (heterophils) leucocyte infiltrations extending up to submucosa. T.S of the infected caeca showed mucosal erosion with parasites and cellular debris (Figure 5) as observed by other workers Toluidine blue staining of the infected sections clearly reveals the presence of mast cells. There was sloughing off of the epithelium and lumen was packed with fibrin, red blood cells and tissue debris (Figure 7). These observations are in line with the observations of other workers [14-23].

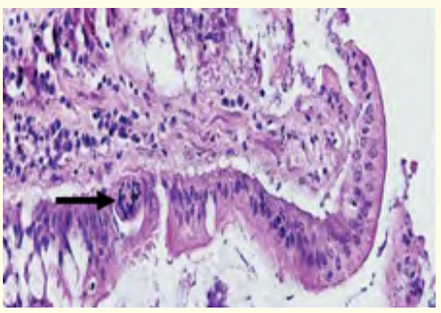

Figure 6: Photomicrograph of caecum of domestic fowl revealing adult *Heterakis gallinarum* in the lumen, Note the mucosal denudation and cellular debris in lumen H&E 40X.

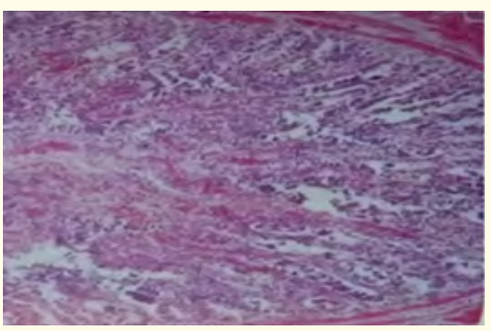

Figure 7: Caeca of chicken heavily infected with Heterakis gallinarum showing plugging of lumen with cellular debris, inflammatory cells and fibrin (HE x40).

Conclusions

Heterakis gallinarum is comparatively harmless nematode but with great potential to act as vector for blackhead causing severe pathological changes in the tissues during coinfection with *Histomonas meleagridis* especially in the warm and wet seasons. Investigations are thus advisable to know in detail local immunological responses of the chicken intestine to the mono infection and co infection *Heterakis gallinarum* with *Histomonas meleagridis* to devise the strategies such as recombinant vaccines and dietary immunomodulation to enhance gut immunity rather than relying on anti-helminthic drugs which contaminate meat and eggs showing great concerns in public.

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