

HISTOPATHOLOGICAL CHANGES IN THE INTESTINE OF INFECTED PIGEON (*COLUMBALIVIA*) NATURALLY INFECTED WITH *HELMINTH* PARASITES FROM HYDERABAD, SINDH PAKISTAN

Farheen Shaikh¹, Tahira Jabeen Ursani², Saima Naz³,
Khalid Hussain Dhilloo⁴, and Abdul Waheed Solangi⁵

^{1,2,3}Department of Zoology, University of Sindh, Jamshoro-76080 Pakistan

^{4,5}Department of Entomology, Sindh Agriculture University Tandojam-Pakistan

Corresponding author: khdhiloo@yahoo.com

ABSTRACT: The aim of study was to observe histopathological changes caused by *Raillitena tetragona* Molin 1858 (Cestode) and *Ascaridia columbae* Gmelin, 1780 (Nematode) in the duodenum of intestine. In helminth infected pigeon (*Columba livia*) histopathological findings revealed architectural disintegration of muscularis layer, destruction of crypt and Brunner's glands, serosal necrosis, migratory tunnels formed along with fibrosis, villus atrophy and necrosis and infiltration of mononuclear (lymphocytes and macrophages) inflammatory cells in lamina propria were noticed.

KEY WORDS: Histopathological changes, Intestine, Pigeon, Helminth, Parasites, Hyderabad.

INTRODUCTION

Pigeons (Aves: Columbiformes) are one the bird species, which have been successfully adapted to our urban environment. They live with human and other species in nature. They bred as a source of food, hobby, religious symbol and experimental aims [1]. Pigeon are not harmless. Many potential infections of human silently exist in them, which are not apparent [2]. They have a role in spreading some Zoonoses to the people and being a reservoir of many parasitic diseases for poultry. They have the potential for transmission of over 30 diseases to human and domestic animals. They are often a cause for repulsion and nuisance due to accumulation of fecal droppings and disturbing noise associated with their presence. Fecal droppings are also the cause of transmission of many air born diseases. There are 15 species of Pigeon and dove are found in Pakistan, which are also common in Hyderabad and in adjoining areas. Literature revealed that pigeon have been infected with Protozoa [3]. Most of the Helminthes have been habituating the intestine, which is the most favourable place for them. Intestine provide them shelter and plentiful supply of processed food [4]. The parasitic fauna seriously affect the intestine and cause metabolic effects growth effects, mechanical injuries and toxic effects [5]. Parasitic fauna of Pigeon have been reported from Pakistan and other countries [6]. Some work has been done on the pathology of these parasites. Since Helminth parasites live in the intestinal tract, hence these are expected to produce some interesting results. Most pigeons (*Columba livia*) were infected with 75% of *Raillitena tetragona* Cestodes and 23.5% of *Ascaridia columbae* Nematodes. These parasites cause severe histopathological changes in the host. The cestodes inflict gross lesions, including congestion, inflammation, nodule formation in the intestinal mucosa and pin pint hemorrhages [7]. Abundant work has been done on histopathology of different birds [8] Observed histopathological changes in intestine, kidney and liver of some pigeons infected with *Reillitena spp.* histopathological changes in heart & gizzard of quail chicks *Coturnix coturnix japonica* [9] Observed histopathological changes in pigeon suffering from new castle diseases [10]. Observed histological changes in intestine of female lesser flamingo infected with multiple cestodes, cestodes dilated the absorbing power of intestine for nutrients & vitamins [11].

Histopathology has great importance in the diagnosis of disease. Aim of study was to observe histopathological changes cause by cestode *Reillitena tetragona* and nematode *Ascaridia columbae*.

MATERIALS AND METHODS

The pigeon (*Columba livia*) were brought into the laboratory from the market of Hyderabad city time to time. The dissection was carried out and their intestine were carefully removed and examined for helminthes parasites. Tissue samples from infected part of the intestine were fixed in fixation (Bouin's fluid) for 24 hours to maintaining the molecular and structural composition of tissue, fixation is must to increase optical density and not interfere with the staining procedure. After fixation preparation of tissue for histological slides. Tissue procession through dehydration, clearing. After dehydration cleared in benzene Impregnation/infiltration start in this tissue was kept in wax with two bath containing melted paraffin wax at ratio of 1:1 in an oven at 60°C for an hour. The wax is infiltrated in interacts of the tissue which increased the optical differentiation and hardens the tissue and helps in easy sectioning of the tissue.

Tissue was poured in cavity blocks having slightly solidified wax, and then tissue was covered with melted paraffin wax. Using routine histological techniques 6-8 micron thick strips on slides were prepared. The slides were place on the hot plate adjusted between 40°C- 45°C for stretching the strips. After stretching or crease of the sections staining method was used with hematoxylin and eosin. Staining were used to obtain contrast between the component parts of tissue section than through the descending series processed of alcohol (100%-30%) for 5-8 mints in each grade and series of alcohol ascending order (30%-100%) for 5- 10 mints in each grade. To remove all traces of alcohol intended for (15 minutes) and mounted with synthetic mountant to a cover slip, when go to sets, the coverslip be held in place permanently.

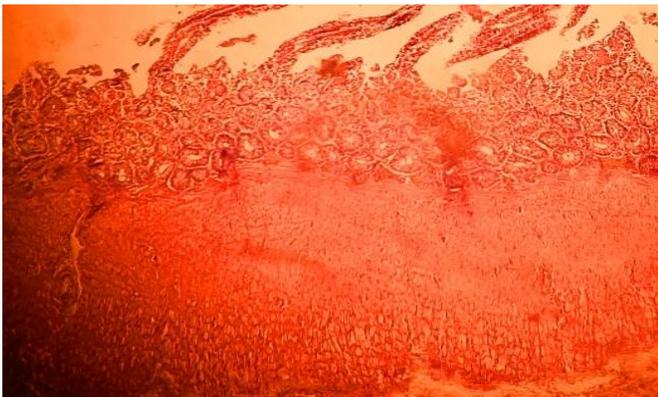
RESULTS

The small intestine tract of avian birds is multi-layered tube divided into (duodenum, jejunum and ileum) containing a serosal, longitudinal muscular, circular muscle, sub mucosal and a mucosal layers. A many complexes folded of intestinal

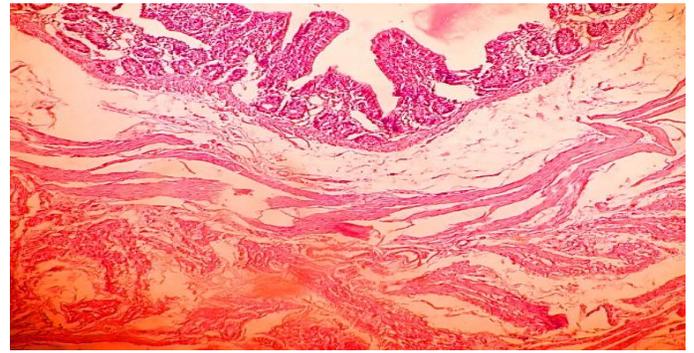
anterior surface known as villi which absorptive and highly increased the surface area of intestinal tract, in between the villi crypts cells migrate upward the villi. As crypt cells migrated up the villus, has differentiated into secretory of goblet cells. Certain stain i.e. they capable of constituent's parts of tissue section, shows differentiation of epithelial cells were most abundant along the length of the villi and dispersed irregularly of goblet cells. Sub mucosal tissue loosely supporting and binds with muscular wall of mucosa. The sub mucosa contains the larger blood vessels and lymphatics. The lamina propria is in the interior of the villi, beneath the epithelial cells. The lamina propria consists of connective tissue, capillaries, smooth muscle and nerve fibers.

Histopathology Associated With *Reillitena tetragona* and *Ascaridia columbae*:

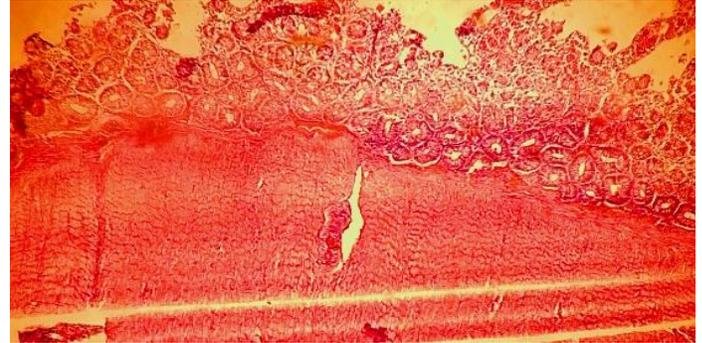
Histopathological findings of the infected intestine of avian birds was exposed and damaged. Whole obliteration of normal structure of intestine was experimentally observed in several sections (Fig. I to IV). The frequent damaged and increase cell reproduction of crypt and brunner's glands, was observed. Swelling and migrant tunnel created with the length of fibrosis in the well-developed muscular layer. Mucosal layer of villi was roughly damaged and destructed (Fig. I and III). In the intestine, there was infiltration of mononuclear cells (lymphocytes and macrophages) in lamina propria and there was increase in the number of the goblet cells. There was also a dwarfism of villi (Fig. III). Bends and increase cells production of crypt gland was notice (Fig. IV). The lumen of these glands was seen closed in same sections (Fig. II). In sections of infected intestine degeneration and death of brunner's glands was also observed (Fig. I). Muscular layer show destructions, degenerated, vacuolated and partition of muscular fibers were also discussed. (Fig. II and III). In the area of intestinal villi inflammation was also seen. (Fig. I). Blood vessels in the muscular layer also show disintegration. The structure was seen deformed in sections (Fig. II and III).



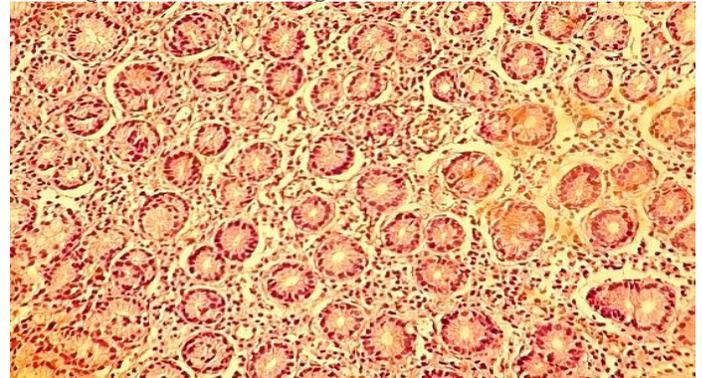
(Fig:I) Histopathology of infected intestine showing distortion of villi and glands with erosion and losing the normal structure. (X40).



(Fig:II) Section of infected intestine showing destruction, migratory tunnels formation and fibrosis of muscularis layer (X40).



(Fig:III) Photomicrograph of a section of infected intestine showing necrosis and shrinkage of serosa and sub mucosa(X40).



(Fig:VI) Section of infected intestine showing heavily infiltration of mononuclear (lymphocytes and macrophages) inflammatory cells in lamina propria (X40).

DISCUSSION

It is suggested all the way through present conclusion that the intestinal parasites of pigeon are common due to scavenging behavior. In present investigations on the prevalence of helminthes studied that the commonness and parasitic load of cestodes was found more common than the nematodes in the intestine of pigeon (*Columba livia*). The present investigations total 20 pigeons were dissect of which one species of cestodes: *Raillietina tetragona* and one species of nematode: *Ascaridia columbae* (both male and female) were recorded. No Trematodes were establish. Similar investigations more or less reported previously by other

investigators through out the world. The histopathological study of the infected intestine of pigeon (*Columba livia*) with *Raillietina tetragona* and *Ascaridia columbae* shows sever tissue damage and morphological alteration distressing the whole structural design of intestine. In present investigation abrasion included breakdown, dwarfism and erosion of villous epithelium and glands. Distortion of crypt glands and villi with erosion and loosing of normal structure were common concluded. Hyperplasia and death of burner's glands, inflammation, vacuolation, separation and degeneration of muscle fiber in mucosa and destruction of lamina propria were observed. Many workers agreed with these results. Worked on Cestodiasis in a lesser flamingo, Worked on cestodiasis in a lesser flamingo, observed cestodes scolices were embedded at the base of crypts between villi and also agree with fibrosis in muscular layer and infiltration of lymphocyte [12]. Worked on lesions created by gastrointestinal parasites in Guinea fowls agreed with attachment of parasites in intestine. Attachment of nematode and cestodes were noticed with mucosa of Ilium and also observed convoluted tracks in crop mucosa, necrosis of gland Cells, infiltration of inflammatory cells in lamina propia in intestine of infected Guinea fowl [9] Observed villous atrophy in *R. echinobothrida* infection in domestic fowl [13]. Reported degeneration of sub mucosal glands and epithelium along with cellular infiltration in indigenus and exotic layers of gut of poultry [14]. Worked on helminthiasis pathology in desi fowls, reported same results along with thickening of sub mucosa and mucosa of intestine infected with *R. cesticillus* in desi fowl [15]. Observe infiltration of inflammatory cells in lamina propia.

REFERENCES

- [1] Harlin, R. W., Pigeons. The veterinary clinics of North America. *Small animal practice*, **24**: 157-173. (1999).
- [2] Adang, K. L., Oniye, Ezealor, Abdu, P. A and Ajanusi, O. J., Ectoparasites of Domestic Pigeon (*Columba livia domestica*, Linnaeus) in Zaria, Nigeria *Research journal parasitology*, **3**: 79-84. (2008).
- [3] Msoffe, P. L. M., Muhairwa, A. P., Chiwanga, G. H. and Kassuku, A. A., A study of ecto-and endo-parasites of domestic pigeons in Morogoro Municipality, Tanzania. *Afr. J. Agr. Res*, **5**: 264- 267. (2010).
- [4] Bernard, E and Matthews., Getting settled. In *An introduction to parasitology*. Cambridge University press, pp81. (2001).
- [5] Cheng, T. C., General Parasitology, 2nd ed. Academic Press, Division of Harcourt Brace & Company, USA, pp. 402-416. (1986).
- [6] Dranzoa, C., Ocaido, M and Ketele, P., The ecto-gastro-intestinal and heamo-parasites of live pigeons (*Columba livia*) in Kampala, Uganda. *Avian Pathology*, **28**: 119-124. (1999).
- [7] Padhi, B. C., Misra, S. C and Panda, D. N., Pathology of helminthiasis in Desi fowls. Icastode infection, *Ind J Anim Hlth*, **25**:127-131. (1986).
- [8] Riaz, S., Alam, S. S and Ikram, A., Histopathological changes observed in the heart and gizzard of quail chicks *Coturnix coturnix japonica* administrated by the different levels of chrome shaving. *African Journal of Biotechnology*, **5**(19):1765-1769. (2006).
- [9] Shaheen, S., Anjum, A. D and Rizvi, F., Clinico-pathological observation of pigeons (*Columba livia*) suffering from new castle disease. *Pakistan Vet J*, **25**(1):5-8. (2005).
- [10] Sarah, L., Poynton, Mukherjee, G and John, D., Cestodiasis with intestinal diverticulosis in a lesser flamingo (*Phoeniconaias minor*). *Journal of zoo and wild life medicine*, **31**(1):96-99. (2000).
- [11] Hayat, B and Hayat, C. S., Incidence of intestinal parasites of chicken in Faisalabad district. *Pak vet J*, **3**:165-167. (1983).
- [12] Bawe, N. M., Joseph, A. O., Idris, A. R and Esiebo, K. A. N., Observation of lesion associated with gastrointestinal parasites of guinea fowls (*Numida meleagris galeata*) in Zaria Nigeria. *ISAH*, **2**:511-513. (2005).
- [13] Anwer, A. H., Rana, S. H., Shah, A. H, Khan M. N and Akhter, M. Z., Pathology of cestodes infection in indigenus and exotic layers *Pah. J. sci*, **37**(1-2):93-94. (2000).
- [14] Padhi, B. C., Misra, S. C and Panda, D. N., Pathology of helminthiasis in Desi fowls. Icastode infection, *Ind J Anim Hlth*, **25**:127-131. (1986).
- [15] Rodriguez, F., Ores, J., Rodriguez, L., Gonzalez, j., Castro, P and Fernandez, A., Intestinal cryptosporidiosis in pigeon (*Columba livia*). *Avain diseases*, **41**:748-756. (1996).