

INCIDENCE AND PATHOLOGICAL CHANGES IN FASCIOLIASIS (*FASCIOLA GIGANTICA*) OF DOMESTICATED DEER

M. Masuduzzaman, M. L. Raman¹ and M. A. Hossain

Department of Pathology and Parasitology and ¹Department of Anatomy and Histology, Chittagong Government Veterinary College, Pahartali, Chittagong- 4202, Bangladesh

ABSTRACT

An investigation was carried out on incidence and pathology of fascioliasis in deer of Chittagong Zoo and some houses of Chittagong city during the period from January 2001 to June 2004. A total of 57 domesticated deer of various types were examined to diagnose the fascioliasis in Chittagong zoo and some house deer of Chittagong city. By faecal examination out of 44 cases 34 (77.3%) were positive for fascioliasis, of which, 15 (34.1%) cases were recorded in Chittra deer, 12 (27.3%) in Maya deer, 05 (11.4%) in Shambar deer and 02 (4.5%) in Nathrini deer. In post mortem examination, fascioliasis found in 13 (100%) cases, of which, 08 (61.5%) from Chittra deer and 05 (38.5%) from Maya deer. The overall incidence of fascioliasis in deer was 82.5%. In relation to sex the fascioliasis was significantly ($p < 0.05$) higher in female (82.6%) than male (71.4%) deer. The incidence of fascioliasis in various types of deer in relation to age was significantly ($p < 0.05$) higher in age group of above 2 years old than in age group below 2 years old. The gross examination revealed enlarged livers with round edges and thickened capsule with numerous haemorrhagic spots on the parietal surface (subacute form). In chronic form, the livers were cirrhotic and reduced in size. The affected intra-hepatic bile ducts were protruded and were engorged with flukes. Microscopically the migratory tracts were represented by the presence of haemorrhagic, oedema and infiltration with numerous eosinophils mixed with few lymphocytes. The wall of the bile ducts was thickened with fibrous tissue proliferation and the lining epithelium showed hyperplastic changes.

Key words: Deer, fascioliasis, incidence, pathological changes

INTRODUCTION

Deer is an ornamental animal in the glorious family and in the zoo. Presence of various types of deer enhance the source of recreation for the visitors in the zoo. As they are food animals and many of them kept together in the same shed, parasitism claims to be one of the obstacles in deer rearing in Bangladesh. The agro-ecological and geoclimatic conditions of Bangladesh are highly favourable for growth and multiplication of helminths. Fascioliasis is one of the major helminth infections causes enormous economic losses all over the world and these losses are due to reduction in milk and meat production, condemnation of liver, loss of draft power, reproductive failure and mortality in ruminants (Kendall, 1954; Garrels, 1975). Voluminous work carried out on different aspects of fascioliasis in buffaloes (Alim *et al.*, 2000), cattle (Howlader *et al.*, 1990; Chowdhury *et al.*, 1994), goats (Howlader *et al.*, 1991; Hossain and Ali, 1998) and sheep (Qadir, 1975-76; Alam *et al.*, 1994) in Bangladesh. But no investigation was carried out on fascioliasis in deer in Bangladesh. Hence, the present paper describes the incidence of fascioliasis with pathological changes of liver in deer in Bangladesh.

MATERIALS AND METHODS

Rectal faecal samples of 44 deer suspected to be suffering from parasitic diseases and 13 carcasses of deer (8 Chittra and 5 Maya) were collected during the period from January 2001 to June 2004 from Chittagong Zoo and some houses of Chittagong city. Chittra (*Axis axis*) deer (spotted) were 26 in number while Maya (*Muntiacus muntiak*) were 20, Shambar (*Cervus unicolor*) 08 and Nathrini (*Axis pornicas*) were 03 in number. Sex and age of deer were recorded. The faecal samples were examined by direct, flotation and simple sedimentation methods as described by Samad (1996) with some modification. The visceral organs were mainly examined for gross and microscopic lesions and were recorded carefully. During post mortem examination all the affected livers were collected in 10% formal-saline for histopathological examination. The well fixed liver tissues were processed, sectioned and stained with hematoxylin and eosin following the routine procedure of Luna (1968) for histopathological studies. Results were analyzed statistically by using Student's 't' test for significance (Gupta, 1982).

RESULTS AND DISCUSSION

By faecal examination out of 44 cases 34 (77.3%) were positive for fascioliasis, of which, 15 (34.1%) cases were recorded in Chittra deer, 12 (27.3%) in Maya deer, 05 (11.4%) in Shambar deer and 02 (4.5%) in Nathrini deer (Table 1). In post mortem examination, fascioliasis found in 13 (100%) cases, of which, 08 (61.5%) from Chittra deer and 05 (38.5%) from Maya deer (Table 1). The overall incidence of fascioliasis in deer was 82.5%. In relation to sex the fascioliasis was significantly ($p < 0.05$) higher in female (82.6%) than male (71.4%) deer which supports the results of Hossain and Ali (1998) who also recorded similar findings in goats. The incidence of fascioliasis in various types of deer in relation to age was significantly ($p < 0.05$) higher in age group of above 2 years old than in age group below 2 years old (Table 2).

Table 1. Sex-wise incidence of fascioliasis in deer in Chittagong

Type of deer	Faecal examination			Postmortem examination			Overall (n = 57) No. (%)
	Male (n = 21)	Female (n = 23)	Total (n = 44)	Male (n = 5)	Female (n = 8)	Total (n = 13)	
	No. (%)	No. (%)	No. (%)	No. (%)	No. (%)	No. (%)	
Chittra	07 (33.3)	08 (34.8)	15 (34.1)	03 (60.0)	05 (62.5)	08 (61.5)	23 (40.4)
Maya	05 (23.8)	07 (30.4)	12 (27.3)	02 (40.0)	03 (37.5)	05 (38.5)	17 (29.8)
Shambar	02 (09.5)	03 (13.0)	05 (11.4)	–	–	–	05 (08.8)
Nathrini	01 (04.8)	01 (04.3)	02 (04.5)	–	–	–	02 (03.5)
Overall	15 (71.4)	19 (82.6)*	34 (77.3)	05 (100)	08 (100)	13 (100)	47 (82.5)

n = No. of calves / carcasses, *Significant at $p < 0.05$.

Table 2. Age-wise incidence of fascioliasis in deer in Chittagong

Type of deer	Faecal examination			Postmortem examination			Overall (n = 57) No. (%)
	< 2 years (n = 15)	> 2 years (n = 29)	Total (n = 44)	< 2 years (n = 2)	> 2 years (n = 11)	Total (n = 13)	
	No. (%)	No. (%)	No. (%)	No. (%)	No. (%)	No. (%)	
Chittra	04 (26.7)	11 (37.9)	15 (34.1)	01 (50)	07 (63.6)	08 (61.5)	23 (40.4)
Maya	03 (20.0)	09 (31.0)	12 (27.3)	01 (50)	04 (36.4)	05 (38.5)	17 (29.8)
Shambar	01 (06.7)	04 (13.8)	05 (11.4)	–	–	–	05 (08.8)
Nathrini	–	02 (06.9)	02 (04.5)	–	–	–	02 (03.5)
Overall	08 (53.3)	26 (89.7)*	34 (77.3)	02 (100)	11 (100)	13 (100)	47 (82.5)

n = No. of calves / carcasses, *Significant at $p < 0.05$.

Gross changes

In sub acute form the affected livers appeared to be enlarged with slight deviation of normal color and the edges were rounded. The capsule was more or less thickened opaque and rough, numerous haemorrhagic spots or elongated tracks were scattered on the parietal surface and the liver was soft in consistency. In some cases there were sub capsular tracks filled with blood, which might have resulted from the migration of immature flukes. The affected bile ducts were moderately distended and contained both pre-adult and few adult flukes mixed with dirty bile and tissue debris. The gall bladder was either normal or slightly distended with stagnation of bile. The hepatic lymphnodes appeared to be hemorrhagic, congested and swollen. The livers affected with chronic form of fascioliasis became cirrhotic and reduced in size with irregular and granular surfaces (Fig. 1 & 2). The color of the livers became pale, the capsule was thick, opaque and rough, that was closely adhered to the parenchyma. Some irregular whitish areas were found to be scattered on the parietal surface of the liver and the parenchyma was somewhat tough to cut due to the presence of fibrous tissue and its presence was thought to be due to healing of migratory tracks caused by the immature flukes. The affected intra-hepatic bile ducts were protruded that can easily be separated from the underlying parenchyma and were engorged with pre-adult and adult flukes. In majority of cases the gall bladder was highly distended with bile (Fig. 2). As a result of fibrosis the bile ducts were tough to cut with scissors and the lumen was of dirty appearance. Some parts of the bile ducts were dilated and some tissues of the wall of ducts were folded. In some cases the caudate lobe of the liver was hard and fibrotic and in few cases the livers were greatly reduced in size and weight and cirrhotic. Most of the gross lesions are observed in this study are some what similar to the observations of Das and Dewan (1987) in goats, Alim *et al.* (2000) and Masuduzzaman *et al.* (1999) in buffalo and cattle.

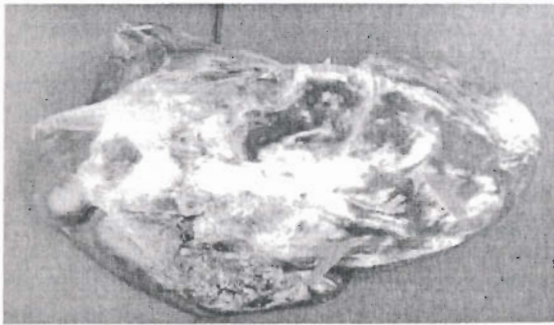


Fig. 1. Liver of a deer with natural fascioliasis showing cirrhosis and pipe stem liver.



Fig. 2. Liver of deer with chronic infection fascioliasis showing irregular and granular surfaces.

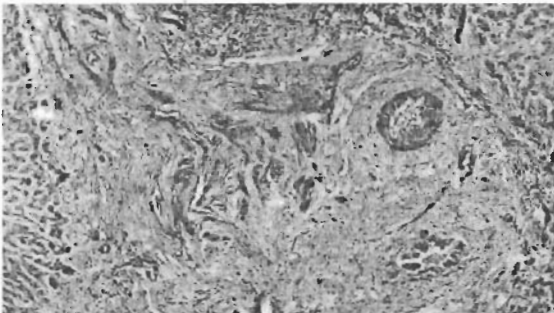


Fig. 3. Liver of deer with severe fascioliasis showing extensive portal cirrhosis that has extended into the liver parenchyma with thickening of the wall of the bile ducts (H & E 25X).

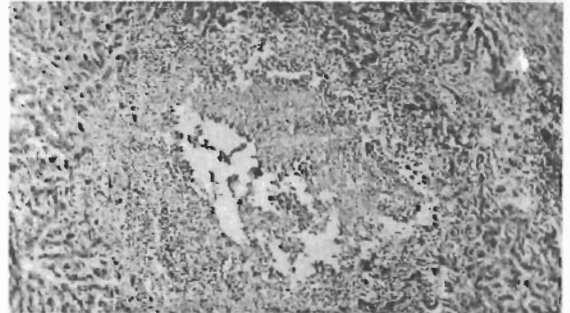


Fig. 4. Deer liver section of fascioliasis showing granulomatous reaction and necrosis of the liver parenchyma (H & E 25X).

Microscopic changes

The grossly visible migratory tracks were represented by the presence of haemorrhagic, odema and infiltration with numerous eosinophils mixed with few lymphocytes. The blood vessels in the zone of reaction were congested, dilated and often ruptured and the bile ducts showed hyperplastic changes. In the older lesions, there were lymphocytic infiltration with few reticulo-endothelial cells and foreign body type giant cells. Considerable amount of fibrous connective tissue proliferation was observed at the portal areas and the portal veins were dilated. The wall of the bile ducts was thickened with fibrous tissue proliferation and the lining epithelium showed hyperplastic changes. The lesions were most likely to have been produced due to penetration of the liver parenchyma by the immature flukes. Some of the haemorrhagic tracks were found to be healed up with proliferation of fibroblasts. The sinusoids beneath the liver capsule were greatly dilated and engorged with blood where as sinusoids around the central veins was dilated but remained empty. In chronic fascioliasis the areas infiltrated with fibroblasts, lymphocytes and mononuclear cells represented the haemorrhagic tracks described in sub-acute form. The lobular architecture was found to be greatly distorted by heavy infiltration of lymphocytes and proliferation of excess amount of fibrous connective tissues in the periportal and portal areas. In some cases the connective tissue penetrated into the lobules. The portal triads were usually observed to be closer to each other, manifested by their large lumen and irregular luminal border. In some cases they were found to be very close due to proliferation of bile ducts, and infiltration of lymphocytes, mononuclear cells and plasma cells in their walls. There were hyperplastic changes in the epithelial cells associated with connective tissue of the ductular walls. The adult *F. gigantica* was noticed in cross section in the lumen of the thickened bile ducts (Fig. 3). In most advanced stages these hyperplastic changes in some of the larger bile ducts appeared as gland like structure and the dilated ducts produced pressure atrophy, necrosis, fatty changes of surrounding hepatocytes (Fig. 4). Cirrhosis of the liver was observed in the most carcasses of deer. The *F. gigantica* infection was recorded mainly in sub-acute and chronic form of the diseases. It is very difficult to justify the causes of higher incidence of cirrhosis in deer and sheep due to paucity of such information. The microscopic lesions were more or less similar to those reported by Masuduzzaman *et al.* (1999) and Dhote *et al.* (1992), Alim *et al.* (2000) and Howlader *et al.* (1991) in cattle, buffalo and goats, respectively.

REFERENCES

1. Alam MM, Samad MA, Chowdhury NS and Ahmed MU (1994). Haemato-biochemical changes and therapeutic management of clinical fascioliasis in sheep and goats. *Bangladesh Veterinary Journal* 28: 7-14.
2. Alim MA, Mondal MMH, Islam MK and Khan MAHNA (2000). A note on the pathology in *Fasciola gigantica* and *Gigantocotyle explanatum* in the livers and gall bladder of buffaloes. *The Bangladesh Veterinarian* 17: 124-125.
3. Chowdhury SMZH, Mondal MMH, Islam FMS, Taimur MJFA, Biswas HR and Ershaduzzaman M (1994). The prevalence of fascioliasis in cattle at Savar, Dhaka. *Indian Veterinary Journal* 71: 121-123.
4. Das PM and Dewan ML (1987). Pathology of goat liver. *Bangladesh Veterinary Journal* 21: 19-26.
5. Dhote SW, Ingle AD, Bhandarkar AG, Joshi MV and Dhagwat SS (1992). Hepatic lesions in buffaloes. *Indian Journal of Veterinary Pathology* 16: 42-44.
6. Garrels G (1975). Gastrointestinal parasitic infestation of cattle in some villages of Dacca and Tangail districts in Bangladesh. *Bangladesh Veterinary Journal* 9: 9-10.
7. Gupta SP (1982). *Statistical Methods*. 16th edn., Sultan Chand & Sons, New Delhi.
8. Hossain MA and Ali KM (1998). Effects of anthelmintics on the body weight of goats naturally infected with fascioliasis and gastro-intestinal nematodiasis. *Bangladesh Veterinary Journal* 32: 41-46.
9. Howlader MMR, Hoq MM and Chowdhury SMZH (1991). Correlation of *Fasciola gigantica* infestation with faecal egg counts in Black Bengal goats. *The Bangladesh Veterinarian* 8: 1-3.
10. Howlader MMR, Hoq MM, Chowdhury SMZH, Taimur MJFA and Jahan S (1990). Fluke infestations of cattle in some selected villages of Bangladesh. *The Bangladesh Veterinarian* 7: 45-47.
11. Kendall SB (1954). Fascioliasis in Pakistan. *Annals of Tropical Medicine and Parasitology* 48: 307-313.
12. Luna LG (1968). *Manual of Histologic Staining Method of the Armed Forces Institute of Pathology*. 3rd edn., McGraw Hill Book Company, New York.
13. Masuduzzaman M, Bhuiyan MJ and Shahabuddin M (1999). A study on hepatic abscess in slaughtered cattle with special reference to its pathology. *The Bangladesh Veterinarian* 16: 101-102.
14. Samad MA (1996). *Poshu Palon O Chikitsavidya*. 1st edn., LE Prokasoni, Mymensingh.
15. Qadir ANMA (1975-76). Epidemiology and control of fascioliasis in sheep and goats. *Bangladesh Journal of Animal Science* 9-10: 5-8.