



Research Article

Pathological Status of Fascioliasis of Bovine Liver Collected from Slaughter Houses in Dinajpur City of Bangladesh

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Abstract | The pathological status of fascioliasis in cattle in Dinajpur city of Bangladesh was carried out from January to June, 2020 by clinical signs, pathological and coprological examinations. A total of 75 cattle (27 male and 48 female) were recorded as the study population. Seven cattle were found with pathological conditions. There was engorgement of bile duct with fibrosis and the percentage of fibrosis of fascioliasis was 10.6%. While 17.3% roughened and thick capsule with whitish or reddish discoloration throughout the capsule. Gross lesions of fascioliasis found in the liver were increase in the size of the organ were 14.6%. The infected bile ducts were also filled with blackish brown exudates giving the pipe stem appearance of the liver was noticed 13.3%. In histopathological study of acute Fascioliasis, there was lot of hepatocytic alterations like swelling of individual hepatocytes by increase in size and characterized by opaque cytoplasm. Sometime there was fatty change in which clear vacuoles appeared in the cytoplasm with peripherally located nuclei. Microscopically, depending on the duration and intensity of the infection, various changes were observed in the structures of *fasciola* infected cattle liver. Gross lesions of fascioliasis found in the liver were increase in the size of the organ and also there was engorgement of bile the duct with fibrosis. The infected bile ducts were also filled with blackish brown exudates giving the pipe stem appearance of the liver was noticed. In sometimes, there was roughened and thick capsule with whitish or reddish throughout the capsule.

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Introduction

Fascioliasis is a major disease that affects the productivity of livestock worldwide (Mas-Coma *et al.*, 2009), it is caused by *genes fasciola* (liver flukes). *Fasciola gigantica* and *Fasciola hepatic* are most commonly species concerned with the etiological agents of fasciolosis. Both of these two species are commonly infected farm animals, wild animals and also humans. Fascioliasis is distributed in many

countries where cattle and sheep population are very high and the areas were Lymnaeid snail constantly reported in the different continent such as Asia and Africa (Lotfy *et al.*, 2002). Economical fasciolosis is very important parasitic disease causes huge economic loses in farm animals due to reduction of milk and meat production and also causes high morbidity in all ages of animals (Saleha, 1991). Fascioliasis is related to the liver damage and hemorrhage because of relocation of flukes over the liver parenchyma, and

hematographic movement of adult flukes (Zewde *et al.*, 2019). The diagnosis of the disease based on the observational clinical signs, history of grazing and microscopic examination (Kassai *et al.*, 1999). Due to the tropical climate the causal agent of *Fasciola hepatica* and *Fasciola gigantica* is prevalent in this part of the world (Amin and Samad, 1998). Previously the prevalence of fascioliasis is reported around 19–53% in cattle in different districts of Bangladesh (Rahman and Mondal, 1983; Chowdhury *et al.*, 1994; Affroze *et al.*, 2013). In Dinajpur city of Bangladesh, there is much prevalence (65.78%) (Ducheyne *et al.*, 2015) of fascioliasis and in this study we tried to draw out the pathological condition gross pathology in case of fasciolosis showed enlargement of the organ (hepatomegaly) and hemorrhages. Liver parenchyma showed necrosis and fibrosis. Whereas the gross pathology of bile duct showed engorgement of bile in the duct and observation of blackish brown exudates in the bile duct associated with fascioliasis. The histopathological changes characterized by atrophy, necrosis and infiltration of fibroblasts and mononuclear leukocytes along the migratory tract. Portal fibrosis (Gu *et al.*, 2007). Which will be helpful for the proper diagnosis of this condition and also will be the key points for the comparison with other study on the basis of literature. So, the present study was conducted the following objectives:

- To evaluate the fasciolosis from the liver collected from slaughterhouses
- To assess the gross and histopathological features from infected liver

Materials and Methods

Study area

This study was design to focus on the Pathological status of faciolirosis in bovine liver collected from slaughter house of Dinajpur city of Bangladesh, the experiment plan was prepared in the Department of Pathology and Parasitology, Faculty of Veterinary and Animal Sciences, Hajee Mohammed Danesh Science and Technology University (HSTU), Dinajpur, Bangladesh.

Duration of the study

This study was conducted during the period of January to July, 2020 in Pathology Laboratory, at Hajee Mohammad Danesh Science and Technology University.

Selection of slaughter house area

A total 75 samples were collected randomly from different slaughter houses of Dinajpur city of Bangladesh. The samples were subjected to be collection for their gross alteration on palpation, incision and recorded any changes which observed in the normal tissue texture of liver parenchyma and bile duct. Possible protective measures like protective clothing, sterile instruments and appliances were used for the collection and transportation of the sample in the laboratory for further processing.

Study method

During necropsy, various organs having gross lesions were collected fixed in 10% buffered neutral formalin for histopathological studies. Formalin fixed tissue samples were processed, embedded with paraffin, sectioned and stained with Haematoxylin and Eosin stain as per standard method (Luna, 1968).

Processing of tissue for histopathology

Collection of tissue and processing: The liver samples were collected and fixed with 10% formalin for overnight, slides were prepared and staining done as per the protocol followed by Ashraf *et al.* (2019). Later, stained slides were photographed by camera.

Results and Discussion

Overall prevalence of fascioliasis

Out of 75 samples, 7 samples were positive with fascioliasis and overall percentage of fascioliasis was 17.3%.

Gross lesions

Gross lesions of fasciolosis found in the liver were presented in Table 1 and Figure 1 which showed about 14.6% liver were increased in the size (hepatomegaly) due to inflammation of parenchymal layer with pinpoint hemorrhages on the parietal surface. There was 16% sample with paleness in some areas which was due to the necrosis. Fibrosis was indicated by congestion and firm whitish areas within parenchyma which was about 10.6% and was the indication of chronic Fascioliasis. In 17.3% sample there was roughened and thick capsule with whitish or reddish discoloration throughout the capsule. Grossly there was engorgement of bile the duct with fibrosis in an out 10.6% of liver sample. Numerous twisted flukes including both mature and immature were openly visible and obstructed inside the swollen and the

fibrotic bile ducts. The infected bile duct was also filled with blackish brown exudates in about 13.3% sample and giving the pipe stem appearance of the liver were noticed.

Table 1: *The gross lesions of fasciola in male and female of bovine liver*

Gross lesions found in liver	No. of infected liver	Percentage
Fibrosis	8	10.6%
Flukes inside bile duct	12	16%
blackish brown exudates	10	13.3%
Roughened and thick parenchyma	9	12%
Necrosis	12	16%
Discoloration	13	17.3%
Increase size of liver	11	14.6%

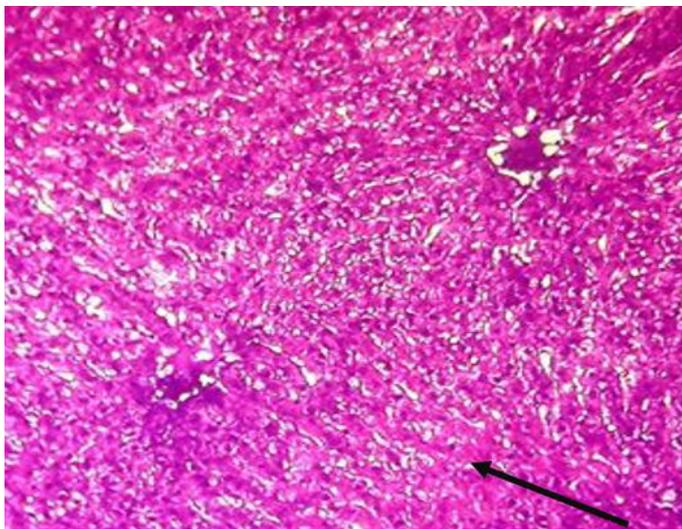


Figure 1: *Swelling of individual hepatocytes by increase in size and characterized by opaque cytoplasm (Black arrow).*

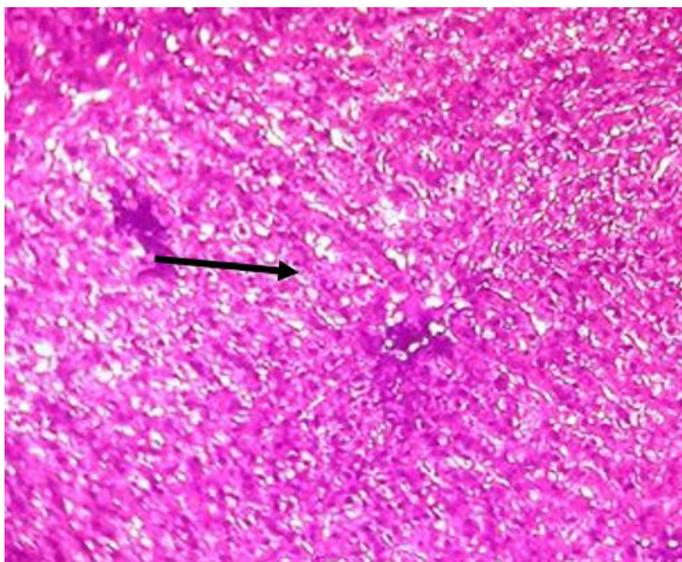


Figure 2: *Fatty change with clear vacuoles appeared in the cytoplasm with peripherally located nuclei (Black arrow).*

Histopathological lesions

Microscopically, depending on the duration and intensity of the infection, various changes were observed in the structures of *Fasciola* infected cattle liver. In histopathological study of acute Fascioliasis, there was lot of hepatocytic alterations like swelling of individual hepatocytes by increase in size and characterized by opaque cytoplasm (Figure 1) and sometime there was fatty change in which clear vacuoles appeared in the cytoplasm with peripherally located nuclei (Figure 2). Several abscesses including necrotic debris surrounded by a large numbers of inflammatory cells mainly neutrophils, histiocytes, eosinophils and lymphocytes and bounded by fibrous connective tissue capsule (Figure 3). Congestion was commonly found was due to dilation of central vein and sinusoids, engorged with a large number of RBCs (Figure 4). Migratory tract with lymphocytic infiltration was observed in few sections and some slides showed the cross section of mature liver fluke with heavy infiltration of inflammatory cells (Figure 5).

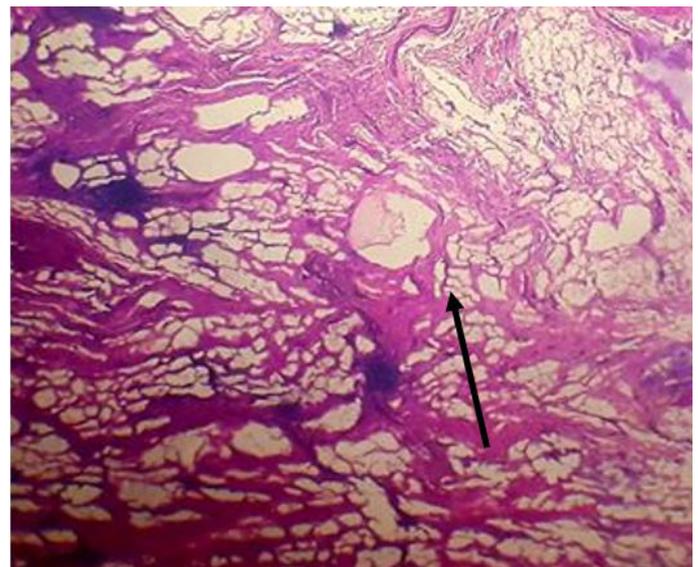


Figure 3: *Abscesses including necrotic debris surrounded by a large numbers of inflammatory cells (Black arrow).*

The histopathological lesions of chronic Fascioliasis were characterized by infiltration of fibroblasts admixed with lymphocytes and few mononuclear cells in the area previously migrated by young flukes. Huge proliferations of fibrous connective tissue associated with infiltration of lymphocytes and plasma cells in the portal area were commonly seen (Figure 6). Liver cirrhosis was indicated by different dark and light spots and proliferated fibrous connective tissue around the regenerative hepatic lobules was infiltrated with inflammatory cells (Figure 7).

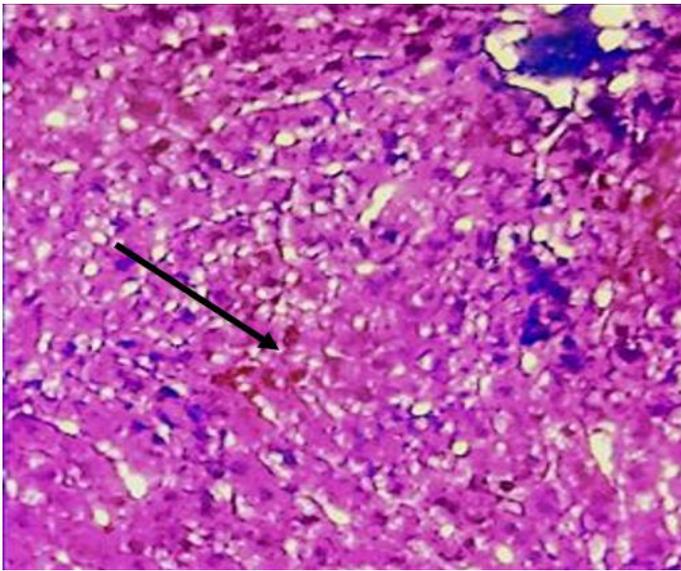


Figure 4: Congestion due to dilation of central vein and sinusoids and engorged with a large number of RBCs (Black arrow).

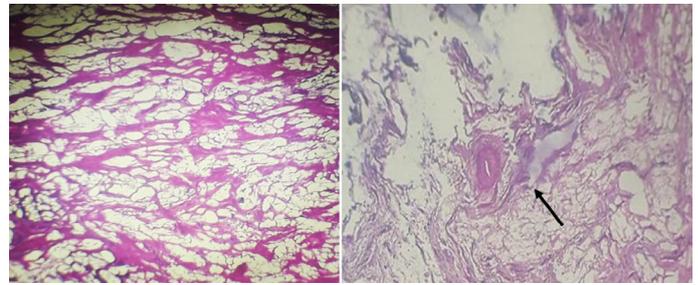


Figure 7: Liver cirrhosis, indicated by different dark and light spots and proliferated fibrous connective tissue around the regenerative hepatic lobules (Black arrow) was infiltrated with inflammatory cells.

Microscopically bile duct lesions revealed primary biliary cirrhosis with extensive proliferation of fibrous connective tissue around the intra-hepatic bile ductless with infiltration of mononuclear inflammatory cells of the bile ducts.

There was hepatomegaly and pin-point hemorrhage on the parietal outside of the liver because of the inflammatory changes and changes fibrosis that took place in the parenchyma. There were significantly. When the bile ducts were affected and, in the duct, wall was found fibrosis. These results are congruent with the previous findings of (Velusamy *et al.*, 2002), who tested that thickening of bile duct because of chronic nature of *Fasciola* disease and later, this finding is in covenant with previous studies of (Okaiyeto *et al.*, 2008). while the same results were achieved most of the above lesions in chronic Fasciolosis in Black Bengal goats Talukder *et al.* (2010).

Histopathologically the hepatic cells present variable degrees of cell inflammation, collapse and deposition of bile pigment. Similar results were also recorded by (Mac Gavin *et al.*, 2001).

In current study liver parenchyma displayed penetration of poly morphonuclear inflammatory cells, neutrophil and eosinophil with mononuclear inflammatory cells which were observed in the proliferated fibrous tissue among hyperplastic again shaped bile ductless. Our results are in agreement with two previous studies of (Doy and Hughes, 1984) who tested that the movement of young liver flukes through the tissue causing irritation and hemorrhage, and carried the cellular inflammatory reactions and this study is partially correlated with the finding reported by (Dow *et al.*, 1967), who suggested the infiltrations of inflammatory cells in experimentally formed Fascioliasis in heifers. Reported liver cirrhosis

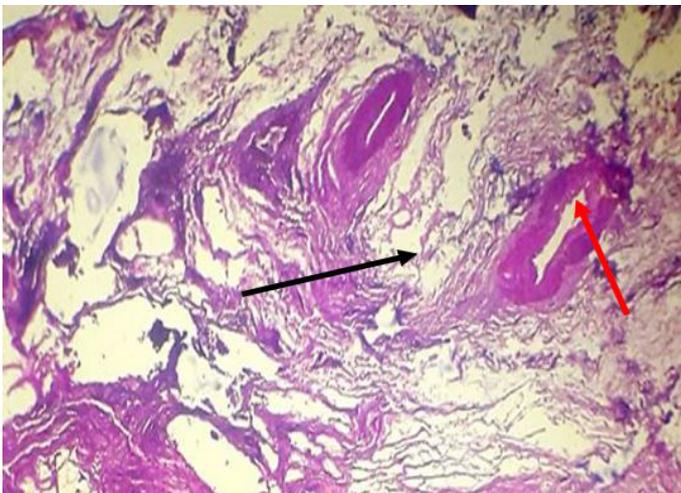


Figure 5: Migratory tract with lymphocytic infiltration (Black arrow) and cross section of mature liver fluke with heavy infiltration of inflammatory cells (Red arrow).

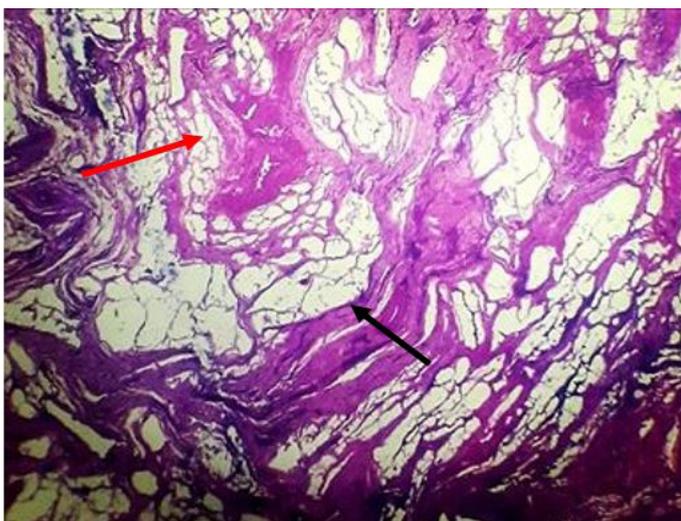


Figure 6: Fibroblastic proliferation in the previous migratory tract (Black arrow) and biliary cirrhosis with extensive proliferation of fibrous connective tissue around the intra-hepatic bile ductules (Red arrow)

and biliary cirrhosis in our study are in agreement with previous studies who described cirrhosis as portal, multilobular and biliary according to the fibrous connective tissue distribution (Swarup *et al.*, 1987). In the present observation, glandular hyperplasia of bile duct walls, which produced a thick and adenomatous picture, was marked. It was mostly seen in the main ducts containing many adult flukes. Number of studies identifies that the manifestation of mature flukes in the lumen of intra-hepatic bile ducts by hyper plastic proliferation (Modavi and Esseroff, 1984; Shaikh *et al.*, 2004).

Conclusions and Recommendations

Bovine fascioliasis is major constrains for the cattle development sector in Bangladesh . Although the present study results have some limitation because low sample size, large study area and low duration of the study may lead improper diagnosis. The current study exposed that the histopathological study of acute Fascioliasis, there was lot of hepatocytic alterations like swelling of individual hepatocytes by increase in size and characterized by opaque cytoplasm and sometime there was fatty change in which clear vacuoles appeared in the cytoplasm with peripherally located nuclei. All the findings could be helpful for proper diagnosis as well as could be the key point of further research work. finally, some points could be focused for further studies about epidemiology, isolation, morphology and morphology and characterization of *fasciola* sp. to develop good management practices like hygienic condition, vaccination program to minimize the risk of the disease.

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Novelty Statement

The study showed the current overall prevalence of fascioliasis in Dinajpur city of Bangladesh. Bovine fascioliasis is significantly decreased the production of dairy in developing countries.

Author's Contribution

YAM: Performed the research and wrote original draft.

MZI: Supervise the study, provide critical comments and review the manuscript.

MHA: Co-supervise the study and provide critical comments and review the manuscript.

MA, AIM: Review the original draft, prepare the final manuscript and provide critical comments.

All authors: Read the manuscript and agree to be.

Conflict of interest

The authors have declared no conflict of interest.

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