



Prevalence and pathology of liver infections in buffaloes

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Buffaloes, one of the key animals in agriculture economy contributing substantially to the gross national income (GNP), are prone to various infectious and non-infectious diseases which lead to drop in production and economy (Ahmedullah 2007). The liver is susceptible to various parasites and disease conditions, which affect the total health status of the animal (Kabir *et al.* 2010). Parasites and diseases damage the liver and make it unsuitable for human consumption. The indiscriminate use of toxic substances in agricultural practices i.e. insecticide, pesticide, fungicide, drug toxicity, environmental pollutants and climate affect the harmony of body system taxing the liver. The present study was aimed to identify pathological conditions of the liver of buffaloes by gross and microscopic examination.

Livers (2119) of slaughtered buffaloes were examined for gross pathological abnormalities from slaughterhouses located in and around Bikaner, Rajasthan. Detail gross lesions were noted during collection of samples and the lesion containing pieces (476) were preserved in 10% neutral buffered formal saline and processed for histopathology. The 4-5 µ thick sections were stained routinely with Hematoxylin and Eosin. Special stains were also used for confirmation and demonstration of some conditions such as Massin's Trichrome for connective tissue and muscles; Periodic Acid Schiff Techniques for schistosomes ova, Pearls' Prussian blue reaction for haemosiderin, Reticulin staining for reticular fibres (Culling 1974). Parasites present in the liver were collected and transported to laboratory in normal saline. Permanent whole mounts were prepared and identified as per Soulsby (1982).

The gross and histological alterations in the liver were observed in 476 (22.46%) out of 2119 cases. The prevalence

of various parasitic conditions was 61.97% (295/476) and other liver affections 38.03% (181/476). Prevalence of various liver affections is presented in Table 1.

Among the 295, livers examined for parasitic conditions 3.78% had *Gigantocotyle explanatum* infection. Grossly, liver was pale and with uneven surface. The common bile ducts were hard, distended, and cystic and packed with parasites. Parasites were seen closely attached to mucosa of common bile duct and on their separation from the mucosa, a large number of small nodules like structures of the size of a lentil were observed. Dilatation and erosions were commonly observed on the luminal surface of the large bile ducts, which were almost similar to the findings by Ghosh and Chauhan (1994). Microscopically, thickening of bile ducts with

Table 1. Prevalence and various liver affections in buffaloes

Pathological condition	Affected livers (n = 476)	
	No. of cases	Percentage among affected animals
Parasitic conditions		61.97%
Amphistomiasis	18	3.78%
Cysticercosis	10	2.10%
Fascioliasis	68	14.28%
Hydatidosis	112	23.53%
Schistosomiasis	87	18.28%
Degeneration and necrosis		13.46%
Cellular swelling	19	4.00%
Fatty change	29	6.09%
Apoptosis	7	1.47%
Necrosis	9	1.90%
Circulatory disorders		8.82%
Congestion	24	5.04%
Haemorrhage	14	2.94%
Telangiectasis	4	0.84%
Other conditions		15.75%
Cirrhosis	25	5.25%
Abscess	18	3.78%
Pigmentation	13	2.73%
RES response	18	3.78%
Neoplasm	1	0.21%

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moderate fibrosis and sclerosis of arterioles were found. Besides, there were cholangitis in the form of hyperplasia of biliary epithelium with mononuclear cell infiltration of biliary lamina propria, as reported previously (Ansari and Moazzeni 2006, Haque *et al.* 2011).

The incidence of cysticercosis was 2.10% in the livers affected with parasites. The variable sized multiple cysts were observed on the surface of livers and /or embedded in the parenchyma being translucent when viable and opaque when degenerated (Rao and Paliwal 1996). Histological changes were limited to the parenchyma as hemorrhagic tracks; presence of scolices with double row of hooklets in viable cyst. Further the degenerated cyst showing detritus and erythrocytes in the cavity and surrounding atrophied hepatic cords with typical chronic fibrocellular reaction corresponded to the report of Rao and Paliwal (1996).

In our study 14.28% of buffalo livers were found affected with fascioliasis irrespective of seasonal variations and sex. Grossly, numerous small and large hemorrhagic patches scattered over the parietal surface could be the indication of transperitoneal route of migration of young flukes. The damage of hepatic cells near these tracts might have resulted from feeding habit of these premature parasites (Ahmedullah 2007). Some parts of bile ducts had cystic appearance due to dilatation. In some other cases, the liver was greatly enlarged with presence of a few small irregular whitish areas indicating fibrosis over the parietal surface, and parenchyma was hard due to fibrous tissue which was thought to be due to healing of migratory tracts of immature parasites were in line with the observations of Kabir *et al.* (2010). Histopathologically, migratory track contains erythrocytes, plasma, and disrupted hepatic columns, degenerated hepatocytes infiltration of lymphocytes and mononuclear cells and proliferation of fibroblasts. Hyperplastic papillomatous and adenomatous bile ducts with and without lymphocytic infiltration, periductal fibrosis and atrophy of adjacent parenchyma were same as observed by Ansari-Lari and Moazzeni (2006). Cirrhotic lesions particularly enlarged prominent portal tracts with variable infiltration, fibrosis and their extension in to parenchyma with or without pseudolobulation were similar to those reported by Kabir *et al.* (2010).

Livers of the 23.53% cases were affected with hydatidiosis. Multiple cysts of variable characters i.e. variable size varied from 3 to 5 cm, fertile or sterile, intact or collapsed, unilocular or multilocular, located deeply or superficially was observed in the present report were consistent with the findings of Kabir *et al.* (2010). The parenchyma around the cyst was hard due to fibrous capsule. Histologically, structure of cyst was observed as per the age, stage of development and viability of the cyst. In developing cyst adjacent pressure atrophy with variable degeneration and infiltration was noticed. Around the viable fertile cyst there was marked cellular reaction characterized by proliferation of fibroblasts, infiltration of mononuclear cells,

eosinophils and germinal layer with the presence of scolices at various stages of development were also observed as reported earlier (Dhote *et al.* 1992). Laminated hyaline layer surrounded by thick coat of granulation tissue in sterile and collapsed cyst, corroborated with the Ahmedullah (2007).

Schistosomiasis was found in 18.28% cases. Grossly, liver was normal except for rough surface and harder to cut. Microscopically, the most significant lesion observed was granuloma in the portal vein. Thrombophlebitis showing schistome ova/chitin embedded in dense accumulation of proliferated endothelial cells, giant cells, lymphocytes, histiocytes, plasma cells and eosinophils in varying proportions are corroborated with the findings of Motto *et al.* (1990). Angiomatoid appearance of portal triad, proliferation of bile ductules and hyperplasia of bile duct are in line with the observations of Dhote *et al.* (1992).

Degeneration and necrosis was encountered in 64 (13.46%) cases which included cellular swelling (4.00%), fatty change (6.09%), apoptosis (1.47%) and necrosis (1.90%). Cell swelling were found in 19(4.00%) of the cases. Grossly the livers of these cases were enlarged, pale, soft, and greasy with rounded edges, in some cases, white opaque multiple necrotic foci was observed. In some livers cut surfaces appeared yellow in colors. Gross and microscopic lesions observed in these livers were in accordance with the earlier findings (Kumar *et al.* 1992, Behl and Tripathi 1999).

Circulatory disorders reported in 42 (8.82%) cases comprising congestion/haemorrhage with variable extents of degeneration, necrosis and neutrophilic and or lymphocytic infiltrations in the involved area. Telangiectasis was seen in 4(0.84%) cases, grossly, the liver showed dark reddish depressed single or multiple areas of variable size and microscopically, dilatation of group of sinusoids and / or larger cavernous spaces lined by endothelium and containing erythrocytes was seen. Other conditions such as cirrhosis (5.25%), abscess (2.94%) and pigmentation with haemosiderin particles (2.73%), reticulo endothelial system response (3.78%) and 1 case of neoplasm revealing characteristic feature of cholangiocellular carcinoma were also reported. These findings have been well reported and described in earlier reports (Dhote *et al.* 1992, Ahmedullah 2007).

SUMMARY

Livers (2119) of slaughtered buffaloes were examined and out of these 476 livers exhibiting gross alterations were subjected to microscopic examination. An overall prevalence of liver affections was observed in 476 (22.46%) out of 2119 cases. The prevalence and significant alteration of various parasitic conditions was observed in 295 cases out of 476 (61.97%). The parasitic conditions comprised hypertrophy and hyperplasia of bile duct with extensive fibrosis of biliary mucosa due to amphistomiasis (3.78%), negligible to extensive changes around cysts of cysticercosis (2.10%),

biliary ductular proliferation and peribiliary fibrosis due to fascioliasis (14.28%), enlargement of liver with fibrosis around cysts due to hydatidosis (23.53%) and granuloma, sclerosis and angiomas due to schistosomiasis (18.28%). The other conditions were degeneration and necrosis (13.46%), circulatory disorders (8.82%), cirrhosis (5.25%), abscess (3.78%), pigmentation (2.73%), RES response (3.78%) and neoplasms (0.21%).

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