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Pathology of parasitic hepatitis in slaughtered goats

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Abstract

Parasitism is one of the major problems that affect the productivity of livestock worldwide. The present study was aimed to investigate the pathology of parasitic conditions among the slaughtered and necropsied goats in and around Puducherry. Out of the 1011 goat carcasses examined, gross lesions were recorded in the hepato-biliary systems of 106 (103 slaughtered and 3 necropsied) carcasses. Out of the 106 cases, parasitic hepatitis accounted for 25/106, (23.6%) cases. The different parasitic conditions recorded were cysticercosis 12/106, (11.3%), hydatidosis 11/106, (10.4%) and fascioliasis 2/106, (1.9%) cases. In cysticercosis, the liver was paler and varying sized cysts containing clear fluid with invaginated protoscolices were mostly found attached to the visceral surface of the liver. Hydatid cysts were either seen on the liver surface or embedded in the hepatic parenchyma. The cysts had a thick turgid capsule and varied in size from 0.3 to 1.5 cm in diameter. Histopathologically, the cyst wall was composed of thick fibrous tissue with intense cellular reaction consisting of eosinophils, neutrophils and lymphocytes along with proliferating fibroblasts. In fascioliasis, the affected livers were swollen with diffused haemorrhagic patches. On incision, flukes emerged out from the liver parenchyma and thickened bile duct. The isolated flukes were identified based on their morphological features as *Fasciola hepatica*.

Keywords: Cysticercosis, fascioliasis, hydatidosis, pathology, goats

Introduction

The occurrence of diseases is an important factor which influences the productivity and economy of animal farming. Generally goats are resistant to many diseases. However, insufficiency of pasture facilities and intensive system of rearing leads to spread of many diseases. This causes reduced production potential and more mortality which in turn causes economic losses to the farmers. According to Rekib and Vihan^[1], diseases in goats result in mortality which ranges from 5 to 25% in adults and 10 to 40% in kids.

In India, the total annual average loss due to all diseases in goats has been found to be Rs.246.8 lakhs^[2]. Several common goat diseases principally involve the liver and may produce a considerable amount of economic loss^[3]. Liver is considered to be the most important organ for mammalian metabolism thus any disturbance in this organ will reflect on the general health causing great economic losses in animal production^[4]. Liver lesions are common and they indicate the presence of disease in other organs and systems as the liver acts as a catchment for the vast absorptive area of the gut, with all its resident microorganisms^[5].

Hepatic failure means loss of normal hepatic function as a result of either acute or chronic liver damage either by non-infectious or infectious causes. Parasitic diseases in the tropics are responsible for great losses in the meat industry than infectious or metabolic disease^[6]. According to Khaniki *et al.*^[7] the annual economic losses (USD) associated with liver condemnations in Iran by *Fasciola* spp, *Dicrocoelium dendriticum*, *Cysticerci* and Hydatid cyst were 346058, 479100, 10716 and 535825 USD respectively. The frequency of liver condemnation due to parasitic diseases/conditions in goats was estimated to be 41.65 per cent (160/384) in Ethiopia^[8]. In India, the prevalence of parasitic hepatitis in Gaddi goats was reported to be 15.88 per cent^[9]. Considering the above, the present study reports the occurrence and pathology of parasitic hepatitis in goats.

Materials and Methods

The samples from goats were collected from the slaughterhouses located in and around Puducherry, India. These goats were apparently healthy stock brought from the shandies and farmers belonging to Gingee, Vadalur, Thiruvanmalai, Villupuram, Cuddalore, Tindivanam

and Tiruchi regions of Tamil Nadu, India. In the present study, the hepato-biliary systems of 1011 goat carcasses inclusive of three necropsy cases were examined. All the animals were of non-descript breed belonging to both the sexes and various age group.

Out of the 1011 carcasses examined, gross lesions were recorded in the liver of 106 (103 slaughtered and 3 necropsied) carcasses. Representative tissue samples were collected from those animals which had lesion(s) in any one of the organs (liver, bile duct and gall bladder). The details of the lesion including the location and the extent were recorded. The representative tissue samples collected were fixed in 10% NBF were processed by routine paraffin-embedding techniques and 4-5 μ m thick sections were prepared and stained by routine Haematoxylin and Eosin (H&E) for detailed histopathological studies. In selected cases, adjacent sections of tissue samples were stained with Masson's Trichrome (MST) for collagen, Vonkossa's stain for calcium and Giemsa stain for eosinophils as per standard procedure [10].

Parasites detected on gross examinations in the liver, bile duct or gall bladder were collected and examined in a fresh state and then preserved in Normal Saline (NS) and the preserved flukes were stained by borax carmine aqueous staining method for morphological confirmation.

Results and Discussion

Parasitism is one of the major problems that affect the productivity of livestock worldwide. In the present study, parasitic hepatitis accounted for 25/106, (23.6%) cases. In a similar study in India, the prevalence of parasitic conditions in the liver of Gaddi goats was reported to be 15.88 per cent. According to Zinabu and Abdeta [11], the rate of condemnations due to parasitic causes was higher in the liver (23.3%) than other organs studied. The results from the present study and the observations of earlier authors clearly indicate that the parasites continue to haunt the animals in general and food animals in particular.

In the present study, the different parasitic conditions recorded were cysticercosis 12/106, (11.3%), hydatidosis 11/106, (10.4%) and fascioliasis 2/106, (1.9%) cases. *Cysticercus tenuicollis* is the larval stage of *Taenia hydatigena*, which is a tapeworm of dogs, cats and wild canids [12]. The intermediate hosts for the mature metacestode, *C. tenuicollis*, are sheep, goats, cattle, dromedaries, antelope, rarely pigs [13]. Metacestode stage are frequently found attached to the omentum, mesentery and to the serosal surface of abdominal organs, especially liver [12]. In the present study, it was recorded in 12/106 cases. Earlier workers have reported a highly variable data with respect to the prevalence and organ condemnation due to cysticercosis in goats [14-17, 8, 18].

In the present study, cysticercosis affected liver was paler than normal with apparently normal consistency. The cysts were mostly found attached to the visceral surface of the right and left lobes of liver. Cysts were white in colour, round to oval in shape and varied in size from 0.5 to 2 cm diameter (Fig. 1). On incision, the cysts had a thin capsule and contained clear fluid with invaginated protoscolices. Microscopically, in all the cases, mild to moderate degree of venous congestion were observed. Similar microscopic observations have been made by earlier workers [19, 20, 21]. In addition the authors have also recorded variable degree of degeneration of hepatocytes and haemorrhages tracts. Larvae migrating through the liver cause hemorrhagic tracts

commonly called hepatitis cysticercosa.

Cystic Echinococcosis (CE) caused by larval stages of *Echinococcus granulosus* is one of the most common zoonotic diseases associated with severe economic losses and great public health significance worldwide [22]. In the present study hydatidosis was recorded in 11/106, (10.4%) cases. The data pertaining to the prevalence and organ condemnation due to hydatidosis in goats is well documented by earlier workers [14, 15, 16, 23, 8, 18]. The prevalence of hydatid cysts can be reduced by educating the goat farmers, antihelminthic treatment of dogs and controlled slaughtering measures to avoid stray dogs from consuming offal of slaughtered animals.

Grossly, the cysts were found to be either protruding from the liver surface or embedded in the hepatic parenchyma (Fig. 2). The cysts were located mostly on the right lobe (7 cases) followed by the left lobe (2 cases) and also at the border of the right and quadrate lobes (2 cases). The cysts, had a thick turgid capsule, were whitish to grey in colour, round to oval in shape and varied in size from 0.3 to 1.5 cm in diameter. On incision, protoscolices were noticed in three cases. Histopathologically, the cyst wall was surrounded by a thick fibrous tissue encapsulation. The cellular reaction around the cysts was intense (Fig. 3) and consisted of eosinophils, neutrophils along with proliferating fibroblasts. Although, the earlier workers have observed hard hepatic parenchyma in hydatidosis, the microscopic features described in their studies corroborated with the present study [16, 17]. According to Daryani *et al.* [24] hydatid cysts in the liver of intermediate hosts are usually tolerated without any clinical signs, and the majority of infections are only detected at the abattoir. Since, in all the cases of hydatidosis, the affected organ are to be condemned, this is of much concern because of its potentiality to cause economic losses. Due to its zoonotic importance, the cost of medical and surgical care of human cases is also enormous [25, 26].

Fascioliasis is an economically important helminthic disease of ruminants worldwide and is caused by *Fasciola* spp. In the present study fascioliasis was recorded in 2/106, (1.9%) cases. The reported percent occurrence of fascioliasis in different parts of the world varied from 1.38 per cent to 8.7 per cent [14, 15, 27, 28, 29, 8, 17, 30, 31]

Grossly, in both cases, the affected liver appeared slightly swollen with pale yellow discoloration, along with diffused haemorrhagic patches over the parietal surface of right and left lobes. In one case, the gall bladder was severely distended with thin watery bile. On incision of the liver, flukes emerged out from the liver parenchyma and thickened bile duct (Fig. 4). The flukes varied in size, (4-8 cm in length and 0.5-3 cm in width), were transparent to brown in colour, and had smaller anterior cone with a short to broad shoulder. The isolated flukes were stained by borax carmine aqueous staining method and were identified based on their morphological features as *Fasciola hepatica*.

Histopathologically, in one case, the transverse sections of the flukes were observed within the hepatic parenchyma (Fig. 5). Severe haemorrhages, thrombosis, fibrinous inflammation coagulative necrosis along with infiltration of eosinophils and lymphocytes were noticed around the flukes. In the second case, additionally, periportal fibrosis was also recorded. In the bile duct epithelial hyperplasia was recorded in both cases. In the gall bladder, diffuse mucosal necrosis was observed in one case and atrophy of mucosa in the other case. The reported gross features in fascioliasis dependent upon the stage of

development of the fluke and it varied from severe haemorrhagic tracts and thickened bile duct [17, 30, 31]. However, the histopathological features observed in the present study concurred with the observations of earlier workers [32, 17, 30, 31, 32].

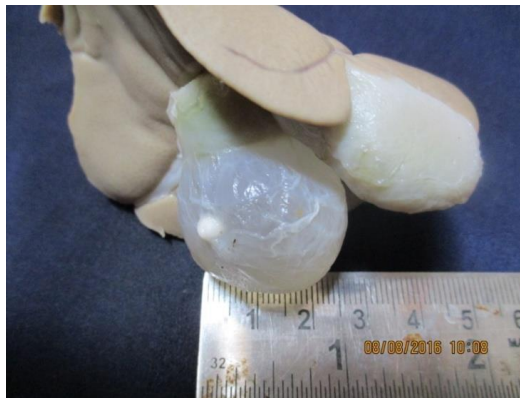


Fig 1: Cysticercus cyst with prominent Protoscolices attached to the visceral surface of the liver



Fig 2: Hydatid cyst embedded in the hepatic parenchyma.

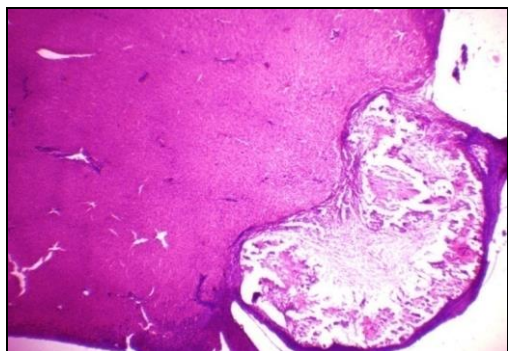


Fig 3: Liver showing well encapsulated hydatid cyst attached to the capsule of the liver H&E x 40



Fig 4: Cut surface of the liver showing the presence of liver flukes (arrow) that migrated out of the bile duct

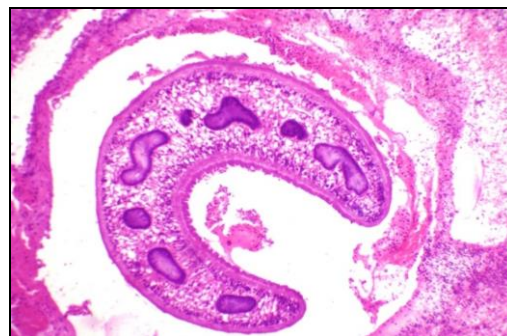


Fig 5: Liver showing transverse section of *Fasciola hepatica* and extensive necrosis of the hepatic parenchyma H&E x 400.

Conclusion

The condemnation of liver in the slaughterhouses due to pathological conditions/parasitic infestations represents significant economic losses. Since most of the liver conditions were caused by parasites, deworming programs coupled with good animal husbandry practices would possibly be effective in lowering their incidence. Furthermore, deworming helps in the prevention of the distribution of contaminated meat that may result in public health risk.

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