Short Communication

Liver Pathology Associated With Natural Infection of *Schistosoma Incognitum* in Slaughtered Pigs

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Abstract

Schistosomiasis is a wide-spread chronic helminthic infection which contributes to death of over half a million people yearly. It is a significant cause of morbidity and mortality. Pork is the world's most consumed meat. Liver the rich source of protein and is edible offal. The present study was conducted to study liver pathology and diagnosis of causative agents associated with the lesions in slaughtered house collected samples. During the study period, (100) liver samples showing gross pathological alterations were collected from pigs slaughtered in Bareilly, UP. The samples were fixed in 10% buffered neutral formalin and processed for histopathological examination. Out of 100 liver samples, Schistosoma incognitum was detected in 5 liver tissue sections. Histopathological examination revealed granuloma of liver which consists of epithelioid cells, macrophages, giant cells, eosinophils, lymphocytes and plasma cells with (and) small lymphoid nodules. On Masson's trichrome staining, fibrous tissue proliferation was demonstrated in periductal region around egg and adult male of Schistosoma incognitum. The Schistosoma species was identified by observing typical short stout sub terminal spine in eggs found in the liver granuloma.

Key words: Granuloma, Liver, Pigs, *Schistosoma incognitum*

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Introduction

Schistosomiasis caused by the trematode *Schistosoma sp.,* is an important zoonotic disease of mammals, affecting people and domestic as well as wild animals in endemic areas in Asia, mainly in the People's Republic of China, the Philippines and Indonesia (Collins *et al*., 2012). Livestock, such as water buffaloes, cattle, and pigs are all naturally infected by *Schistosoma* sp. and are considered to be important reservoir hosts for human infection in endemic areas (Yuan *et al.,* 1993). In India seven different species of

schistsoma namely *Schistosoma indicum, S. spindalis, S. bomfordi, S. incognitum* (Chandler, 1926), *S. nasalis, S. nairi* and *Orientobilharzia dattai* are known to occur.

World Health Organization (WHO) considers schistosomiasis as the second only to malaria in socioeconomic importance worldwide and the third more frequent parasitic disease of public health importance (Sarvel *et al.*, 2011). In India, dogs, pigs and sheep were the only reported natural hosts of *S. incognitum* (Rao and Ayyar, 1933; Dutt and Srivastava, 1963), but experimentally, a wide range of mammals (Sinha and Srivastava, 1965) and pigs (Ahluwalia *et al*., 1972) can be affected. Confirmed infection of *S. incognitum* had been reported from two human cases by Chandle, (1926). Detection of *S. incognitum* (19.12%), *B. coli* (15.60%) and *Fasciolopsis buski* (15.16%) in pig is an alarming situation as the pig faeces could be an important source for parasites to infect human beings (Singh *et al.*, 2017). In rural areas the pigs are housed near to human dwellings and the close association between pigs, dogs and humans can increase the risk of getting *Schistosoma* infection. The zoonotic potential of *S. incognitum* had been observed in dogs which were used for hunting aquatic birds (Khuddus *et al.*, 1971) and 3.9% of dogs were found excreting *S. incognitum* eggs in their stools posing risk to human population (Bunnag *et al*., 1983). The main target organs of *S. incognitum* in the pig are the same as those in man, the liver, the intestine and adult parasite may also occur in the lungs and can produce granulomatous reactions (Kumar, 2013). Intensity of schistosomal infection is related to the degree of liver fibrosis and granulomatous reaction and the number of granulomas is correlated with the severity of the disease (Mohsin *et al.*, 2011). In the present study we report the pathology and diagnosis schistosomiasis in slaughtered pigs.

Case Descriptions and Methods

A total of 100 livers of pigs showing gross pathological alterations were collected in 10% neutral buffered formalin (NBF) from slaughterhouses in Bareilly, UP. The collected samples were processed for histopathological examination as per method described by Luna. Masson's trichrome staining to detect fibrous tissue proliferation in the granulomatous areas. Schistosoma species was identified by observing the typical characteristics of eggs of *S. incognitum* in tissues sections.

Result and Discussion

Out of 100 liver specimens of slaughtered pigs examined, 5 were found positive for schistosomiasis. Grossly liver was firm with presence of diffuse gray to white nodules in the hepatic parenchyma. Histological sections of liver showed typical granulomas consisting of variable combinations of eosinophils, epithelioid macrophages, giant cells, plasma cells, lymphocytes and occasional infiltration of mononuclear cells around schistosoma egg in the portal areas (Fig. 1). Bluish-gray discoloration of the liver and egg granulomas in portal triads of the liver, lungs, spleen, intestines, pancreas and mesenteric

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lymph nodes has been observed in experimental infection of *Schistosoma japonicum* in pigs (Yason *et al.,* 1984, Baddamwar *et al.,* 2004). The key event in *Schistosoma* infection is the formation of granulomas around eggs trapped in the portal venules of the liver tissue (Mathew *et al.,* 1986) and the eggs release a variety of substances, leading to antigen-specific humoral and cell-mediated immune responses which is a complex pathophysiological cascade event which terminates in fibrosis and portal hypertension (Ghanem *et al.,* 2010). Fibrosed hepatic parenchyma with biliary hyperplasia surrounding the normal hepatic tissues was found at the periportal region (Fig.2).

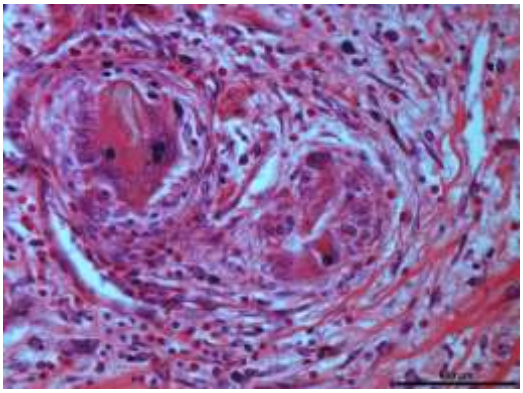

Fig.1: *Schistosoma* granuloma in liver, H&E, 400X.

Fig. 2: Biliary hyperplasia with fibrosis of periportal region, H&E, 100x.

Disorganisation of hepatic lobules were also seen. In some portions of liver sections, degenerative changes with haemorrhages were also observed. Fibrous connective tissue was demonstrated in tissue sections of liver by Masson's trichrome staining in portal triad areas surrounding the adult male and eggs of *S. incognitum* (Fig. 3 and Fig. 4). The eggs of *S. incognitum* was characterized by sub oval, with one side having slightly less curvature and a short stout sub-terminal spine (Fig.5) as by Carney *et al.,* 1977.

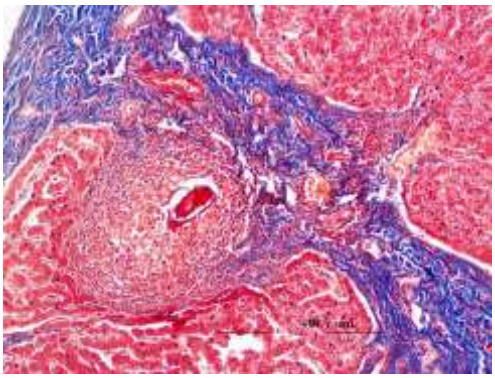

Fig. 3: Fibrous tissue proliferation demonstrated as blue areas around egg of *S. incognitum*, Masson's Trichrome staining, 400X.

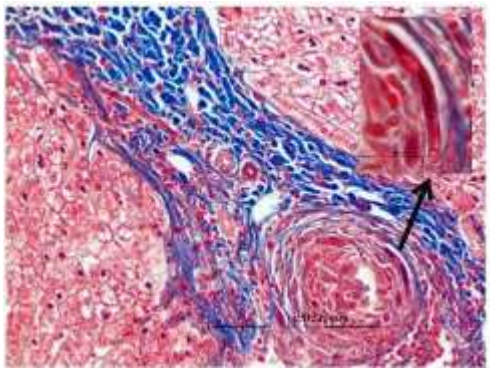

Fig. 4: Fibrous tissue proliferation demonstrated as blue areas around adult male of *S. incognitum*, Masson's Trichrome staining, 400x.

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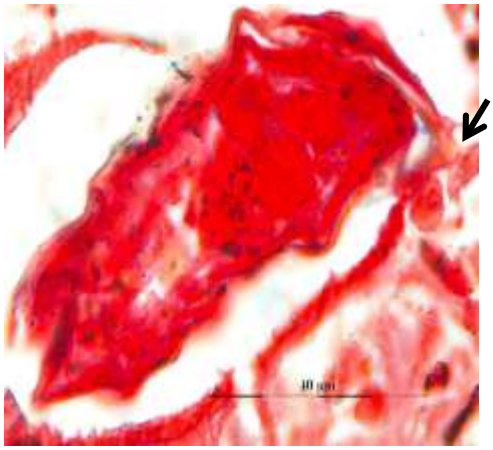

Fig.5: Eggs of *S. incognitum* was characterized by sub oval, with one side having slightly less curvature and a short stout sub-terminal spine, Masson's Trichrome staining, 1000X

Conclusion

In conclusion, the cases were diagnosed as *S. incognitum schistosomiasis* by observing typical granuloma in histopathological sections of liver and also from the typical characteristics of the eggs present in the granuloma.

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Conflict of Interest: None

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