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Types, pattern and morphology of liver inflammatory conditions prevalent in pig (*Sus scrofa domestica*) of Rajasthan

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Abstract

A total number of 545 specimens of liver of pig were collected from organised and unorganised farms of Bikaner, Jaipur and Alwar districts of Rajasthan. Out of these, 157 specimens showing frank macroscopic lesions were further processed for histopathological examination. Inflammatory conditions were reported in 41 (26.11 per cent) cases. The occurrence of different type of inflammatory conditions i.e., acute hepatitis, chronic hepatitis and hepatic abscess, was 8.92 per cent, 12.10 per cent and 5.10 per cent respectively.

Keywords: Hepatitis, liver, pig, histopathology, inflammatory conditions

Introduction

Pigs are crucial to the economic well-being of small-scale farmers and pig farmers. Indigenous pigs are prospering and competing for attention from scientists. (Singhal 2019) ^[19]. Pigs have great potential as biomedical models for studying human developmental processes and other utility as xenotransplant organ donors and vaccine and drug design tools (Lunney, 2021) ^[15]. As the liver is an edible organ that is a highly-priced, partial or total condemnation of the liver leads to financial losses (Purohit PK, 2021) ^[17]. Inflammatory conditions are appeared earliest in all types of cell injuries. There are different inflammatory conditions like acute hepatitis (Kiran *et al.*, 2020) ^[13], chronic hepatitis (Estheru, 2010) ^[8] and hepatic abscesses (Mundotiya, 2018) ^[16] at different stages of the inflammatory process previously reported.

Material and Methods

In the present study, a total number of 545 specimens of the liver of pig of different age groups, sex and breeds were collected from organized and unorganized farms of Bikaner, Jaipur and Alwar districts of Rajasthan. Out of these, 157 samples showing frank macroscopic lesions were used for further histopathological examination. The samples were properly preserved in 10 percent formalin and processed mechanically for paraffin embedding by acetone benzene technique (Lillie, 1965) ^[14]. Sections of 4–6-micron thickness were cut and stained with haematoxylin and eosin method.

Results and Discussion

Inflammatory conditions

This condition was noticed in 41 (26.11 per cent) cases. These changes were described as acute hepatitis, chronic hepatitis and hepatic abscess.

S. No.	Type of condition	Percent
1.	Acute Hepatitis	8.92
2.	Chronic Hepatitis	12.10
3.	Hepatic Abscess	5.10

1. Acute hepatitis

In the present study, this condition was recorded in 14 (8.92 per cent) cases. A relatively lower incidence was recorded by Estheru (2010) ^[8] as 2.5 per cent. Grossly, the liver was enlarged in size, swollen and rounded edges along with congestion corresponded well with the findings of Estheru (2010) ^[8]. Microscopically, there was perilobular and periportal infiltration of

polymorphonuclear cells. The liver showed periportal infiltration of neutrophils and few mononuclear cells along with congestion of blood vessel. Liver showed infiltration of polymorphonuclear cells in between hepatic cells and congested blood vessel.

Almost Similar observation was recorded by Estheru (2010)^[8] and Kiran *et al.* (2020)^[13]. It might be caused by hepatitis E virus (De Souza *et al.* 2018)^[7].

2. Chronic hepatitis

In present study, this condition was recorded in 19 (12.10 per cent) cases. Almost Similar occurrence was recorded by Mundotiya (2018)^[16] as 10.09 per cent. Whereas, lower occurrence was recorded by Strombeck and Gribble (1978)^[20] as 1.2 per cent and Agrawal (2006)^[2] as 2.38 per cent. Grossly, the livers were shrunken, firm, smaller and lighter in colour than normal along with nodular structure on the surface of liver. The liver revealed fibrous band in hepatic parenchyma. These findings corresponded well with the earlier reports of Johnson *et al.* (1982)^[12], Adamus *et al.* (1997)^[11], Agrawal (2006)^[2] and Estheru (2010)^[8].

Microscopically, the liver showed perivascular fibrosis and marked proliferation of fibrous tissue in the interlobular septa resulting in extensive thickening and in advanced cases, the fibrous tissue extended into the lobules replacing the hepatic cells and in some places, leaving only small groups of cells in a mass of fibrous tissue. The septa were also infiltrated by mononuclear cells mainly lymphocytes. Perivascular fibrosis along with infiltration of mononuclear cells and few neutrophils was also seen. Liver revealed the greenish coloured fibrous tissue bands with Mason's Trichome stain. Liver showed pseudolobulation. Almost similar observation was recorded by Strombeck *et al.* (1976)^[21], Bishop *et al.* (1979)^[5], Agrawal (2006)^[2] and Estheru (2010)^[8].

This condition may occur by many etiological agents such as virus like Porcine circo virus 2 (Rosell *et al.*, 2000)^[18] or helminth such as *Dicrocoelium dendriticum* (Cappucchio *et al.*, 2009; Gojmerac *et al.*, 1995)^[10] and *Ascaris suum* (Gaurat and Gatne, 2009)^[9].

3. Hepatic abscess

In present study, this condition was reported in 8 (5.10 per cent) cases. Almost similar observation recorded by Goswami (2002)^[11] as 4.49 per cent and Mundotiya (2018)^[16] as 4.61 per cent. Higher occurrence of hepatic abscess was recorded by Tahir and Sheikh-Omar (1985)^[22] as 12 per cent. While, lower occurrence of hepatic abscess was recorded by Yamini (1999)^[25] as 3.78 per cent, Vyas (1989)^[23] as 1.14 per cent and Agrawal (2006)^[2] as 4.08 per cent.

Grossly, the abscesses were seen as focal whitish yellow spots. In some cases, the liver was showed small sized multiple abscess. It contained thick creamy dry, inspissated as well as semisolid pus. These findings corresponded well with the findings of Goswami (2002)^[11] and Agrawal (2006)^[2].

Microscopically, the liver showed central area of necrosis surrounded by infiltration of polymorphonuclear cells and few lymphocytes enclosed by thick fibrous tissue capsules. Central necrotic area contained degenerated neutrophils and cellular debris. In some cases, liver was showed micro abscess in hepatic lobule and congestion in central vein. These observations were in agreement with those mention by Goswami (2002)^[11] and Agrawal (2006)^[2].

It may be due to bacteria such as *Escherichia coli* and *Klebsiella* (Tahir and Sheikh-Omar, 1985)^[22] or helminth like

migrating *Stephanurus dentatus* (Anderson, 1978; Ashizawa *et al.*, 1988)^[3, 4] and *Ascaris suum* (Wade and Gaafar, 1981)^[24].

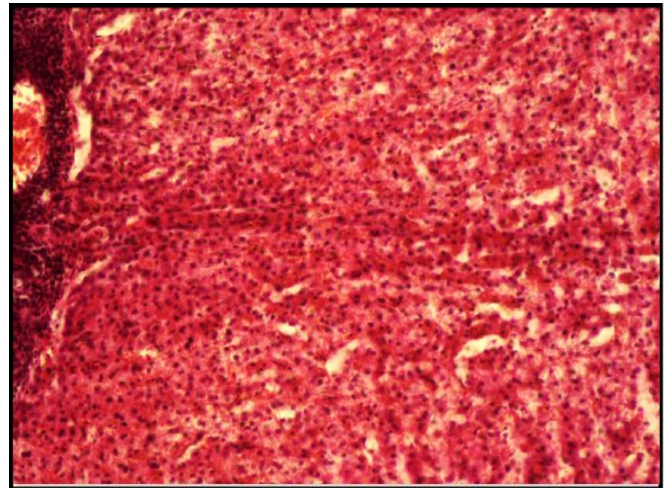


Fig 1: Microphotograph of liver showing infiltration of polymorphonuclear cells in hepatic parenchyma. (H&E, 200X)



Fig 2: Microphotograph of liver showing perivascular fibrosis and marked thickening of interlobular septa. (H&E, 40X)

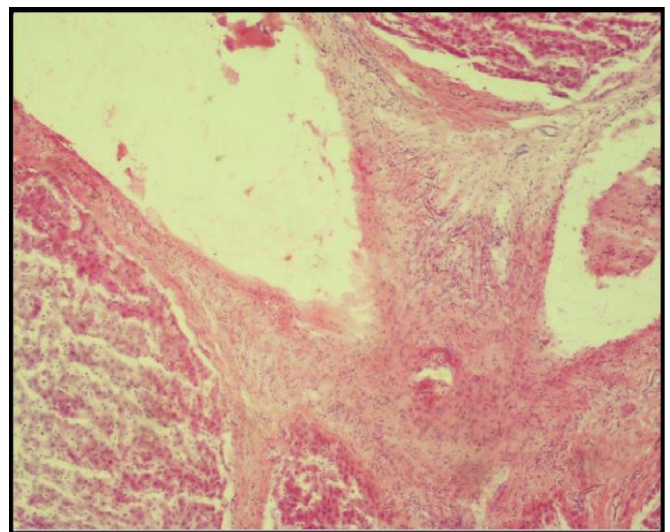


Fig 3: Microphotograph of liver showing perivascular fibrosis and marked thickening of interlobular septa along with infiltration of mononuclear cells mainly lymphocytes. (H&E, 100X)

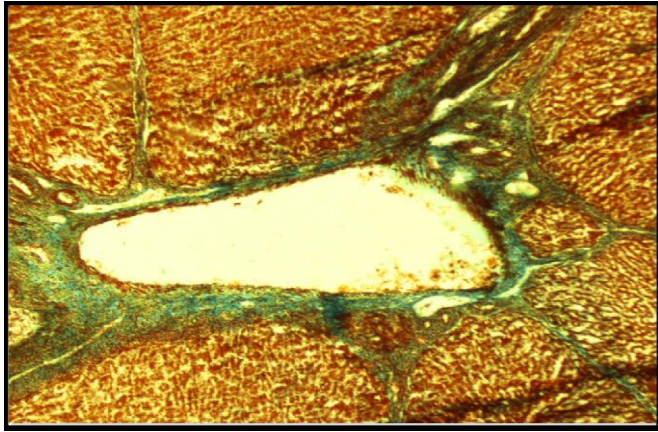


Fig 4: Microphotograph of liver showing greenish coloured fibrous tissue bands around the blood vessels. (Masson's Trichrome stain, 100X)



Fig 5: Gross photograph of liver showing abscess.

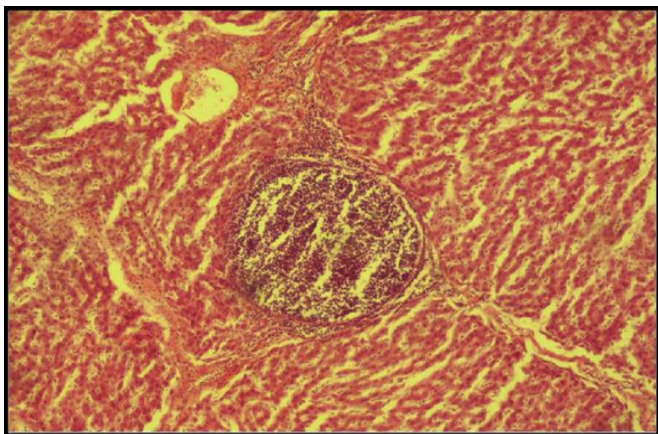


Fig 6: Microphotograph of liver showing macro abscess in hepatic lobule. (H&E, 100X)

Conclusion

The current findings prove that inflammatory conditions of the liver in pig was prevalent in Rajasthan. Chronic hepatitis, acute hepatitis and hepatic abscess were occurring due to bacterial, viral and parasitic infection. These inflammatory conditions were affecting the meat production, immunity of the pig and economy of the farmers. Regular screening and adopting the good sanitation practices on pig farms can reduce the production loss and public health hazards.

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