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Gross and histopathological study of various condition in liver of goat

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Abstract

The present investigation was carried out from January 2020 to December 2020. During this period 216 samples of liver suspected for abnormalities were further processed for histopathological examination. The gross and microscopic findings of various lesions noticed in the liver of goats were described below. For the purpose of morphological description, the lesions were grouped into circulatory disturbances, necrosis, abscess and miscellaneous conditions. Lesions are overlapped in some cases, the predominant lesion was considered for the grouping of lesions. The various forms of affections were identified as circulatory disturbances 26.38%, (congestion 14.81%, haemorrhages 9.72%, haemosiderosis 1.85%); necrosis (7.87%); hepatic abscess (15.74%); miscellaneous condition 9.72% (calcification 2.31%, telangiectasis 4.16%, bile duct hypertrophy 3.24%).

Keywords: Liver, histopathology, occurrence, goat

Introduction

The total livestock population in the country is 535.78 million. The total population of Goat in India is 148.88 million in 2019, increased by 10.1% over previous census (20th Livestock census). Rajasthan is 1st largest Goat rearing state of the country with 21.67 million population of Goat (20th livestock census). 34 Goat breeds (NBAGR, 2019) are registered in India. Diagnosis of diseases and their control will definitely improve the potential wealth of goat for enhancement of the national economy. Liver is the largest gland in the body and it comprise 1-1.5% of the body weight of herbivores. The liver is reddish brown colour and has a soft and friable consistency. The liver has the enormous task of maintaining the body's metabolic homeostasis. Hepatic diseases are common in goat, various pathogenic organism, parasite, and toxin entering into blood stream and pass into liver. Many diseases of goat damage liver tissue and produce a considerable economic loss due to condemnation during meat inspection, the studies of goat liver lesion will help management of liver disease preventing disease condition and improve the production.

Materials and Methods

For the proposed investigation, samples of the liver of goat irrespective of age, sex and breed were collected from slaughter houses of Bikaner and adjoining areas of these districts. During post-mortem examination, the samples were thoroughly examined grossly for alteration in morphology in terms of shape, size, color, consistency, location and presence of cysts, tumours and abscesses etc. lesions in individual parts of liver. Following collection, all the samples were properly preserved in 10 percent formalin after cutting the affected parts. The part of affected tissues measured 2-5 mm thickness and presenting the lesions with normal tissue, were used for fixation and further histopathological examination. The section of 4-6 micron thickness were cut and stained with routine staining methods by hematoxylin and eosin. As far as possible, results were recorded by gross observations and microphotographs.

Results and Discussion

Circulatory Disturbances In the present study, circulatory disturbances comprised of 57 (26.38%) cases out of 216 liver lesions examined. Congestion in liver was found in 32 (14.81%) cases out of total 216 goat showing different hepatic lesion. Grossly The liver appeared slightly enlarged, red to dark red in colour and have either nutmeg or mottled appearance on section, and considerable amount of blood oozed out on slicing of fresh specimen. Some of the congested livers presented typical “nut-meg liver” characteristics. Microscopically Central vein, sinusoids and portal veins were distended with blood. Near the central vein, compressed hepatocytes were seen. In some specimen, the central vein and sinusoids were distended with blood to give a stellate appearance. A lower incidence of 1.95%, 5% and 5.21% of hepatic congestion in goats was reported earlier by Kushiluka *et al.* (1995)^[11], Ravi Kumar *et al.* (2006)^[10] and Sanjeeth *et al.* (2015)^[23] The pathomorphological changes as seen in the present study in congestion was also observed by Jithendran (1996)^[7].

Haemorrhages in liver was found in 21 (9.72%) cases out of total 216 goat showing different hepatic lesion. Grossly The affected livers were dark reddish patches of haemorrhages, slightly enlarged and showed either petechial or ecchymosis haemorrhages on the surface. when cut, blood oozes out as reddish-dark coloured fluid. Microscopically Sections of liver showed multiple areas of extensive haemorrhages necrotic cellular debris along with polymorphonuclear infiltration, presence of large number of erythrocytes in the hepatic parenchyma and sinusoids. In some cases addition to haemorrhage, necrosis and degenerative changes also found in liver. Haemorrhagic area observed immediately beneath the capsules. In certain area haemorrhage was seen to extend deep into the parenchyma separating the hepatic cell. In the hepatic parenchyma, haemorrhages were noticed in the focal form or in the diffuse form. Lower incidence of haemorrhage noticed in liver was recorded previously 4% and 7.5% by Kumar *et al.* (2006)^[10] and Sanjeeth *et al.* (2015)^[23] respectively. Either petechial or ecchymotic haemorrhage found in this study.

Haemosiderosis/Pigmentation: Haemosiderosis was observed in 4 (1.85%) cases out of total 216 goat showing different hepatic lesions. Grossly Colour of liver is reddish brown. Microscopically Haemosiderin appeared as a coarse granular golden-yellow to brown spherical deposits of pigments, distortion of hepatic sinusoids, dilation of hepatic vein and artery and degeneration of hepatocytes. These haemosiderin pigment generally present in the Kupffer cells of the sinusoidal lining, portal tracts or free in the sinusoids and central vein.

Necrosis in the present study, hepatic necrosis was noticed in 17 (7.87%) livers out of 216 hepatic lesions examined. Grossly Liver showed small numerous discrete pale foci of necrosis, distributed uniformly throughout the liver. The colour of the liver was either pale or mottled. Microscopically On the basis of histopathological findings, hepatic necrosis was further categorized into focal, centrilobular and periportal necrosis.

Focal necrosis

Microscopically Necrosis of focal parenchymal cells with disruption of reticular fiber and infiltration of inflammatory cells mostly lymphocytes and few neutrophils. The involved hepatocytes revealed pyknotic or lytic nuclei. Occasionally engorged vein with margination of neutrophils was observed

in some sections. Hepatic necrosis especially focal necrosis is encountered as a common postmortem lesion at slaughter with unknown pathogenesis and usually caused by organism from the gut that reached to liver in the portal blood by Johnson *et al.* (1999)^[8].

Centrilobular necrosis

Microscopically Most of the hepatocytes around the central vein have been found disappeared, and few were degenerated and the disappeared. degenerated hepatic parenchyma was replaced by erythrocytes. There was also dilatation of sinusoids at places.

Periportal necrosis

Microscopically There was necrosis of hepatocytes around the portal triad along with moderate to severe infiltration of inflammatory cells especially lymphocytes and few neutrophils around the necrotic areas. There was an extensive area of necrosis characterized by eosinophilic pink staining of hepatocytes below infiltrated portal triad. The hepatocytes were devoid of nuclei. The cells adjacent to this area showed fatty changes while the hepatic cells away from this area were normal.

Abscess

Hepatic abscess was observed in 34 (15.74%) cases out of total 216 goat showing different hepatic lesions. Grossly Abscesses were seen as focal whitish yellow spots with single to multiple in numbers and 1-3 cm in diameter found on both, the diaphragmatic and visceral surfaces of the liver and also embedded in the parenchyma. It contained thick creamy dry, inspissated as well as semisolid pus. In case of miliary and diffuse abscesses, livers were greyish red in colour and the surface had white raised spots.

Microscopically All the hepatic abscesses revealed a pyogenic membrane enclosing large number of polymorphs in various stages of degeneration mixed with a central area of liquefaction necrosis and bacteria. 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. There were extensive and degenerative and necrotic lesions observed in hepatic parenchyma. Similar to the present study, single to multiple abscesses were noticed in liver of goats by Santa Rosa *et al.* (1989)^[24], Sanjeeth *et al.* (2015)^[23] and Madhav *et al.* (2015)^[13].

Miscellaneous condition

Calcification in liver was found in 5 (2.31%) cases out of total 216 goat showing different hepatic lesion. Grossly Calcified liver were greyish white in appearance with normal shape and size on incision a peculiar grating sound was heard. Microscopically Aggregates of calcium deposits around the central vein and sinusoids with severe infiltration of neutrophil and fibrosed area in liver parenchyma. GEZU *et al.* (2014)^[5]. Higher incidence 4.2% was found by jibat *et al.* (2008)^[6].

Telangiectasis in liver was found in 9 (4.16%) cases out of total 216 goat showing different hepatic lesion. Grossly Affected liver show dark red area in irregular pattern. the size of the lesion varied from pinhead size to 10 cm in diameter. in some cases showed the whole liver was studded with such foci. In some cases, showed the whole liver was studded with the such foci. Similar finding was observed by Mellau *et al.* (2010)^[15]. In contrast to the present finding, very high

incidence was recorded by Pandey (1987)^[20]. Microscopically Marked dilation of sinusoids in hepatic parenchyma. the surrounding hepatic cells were compressed and showed degenerative changes. Sometimes infiltration of mononuclear cells and plasma cells were seen.

Bile duct hypertrophy Bile duct hypertrophy in liver was found in 7 (3.24%) cases out of 216 goat showing different hepatic lesion. Grossly The affected liver with bile duct hypertrophy were enlarged, light in colour with dark patches. Microscopically The liver was showing dilation of bile duct and bile duct hypertrophy with severe infiltration of inflammatory cells. Similar finding was observed by Bajwa *et al.* (1993)^[1].

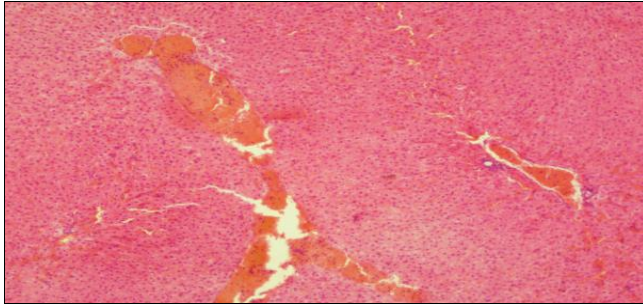


Fig 1: Photomicrograph of liver showing severe congestion in central vein. H&E, 40X

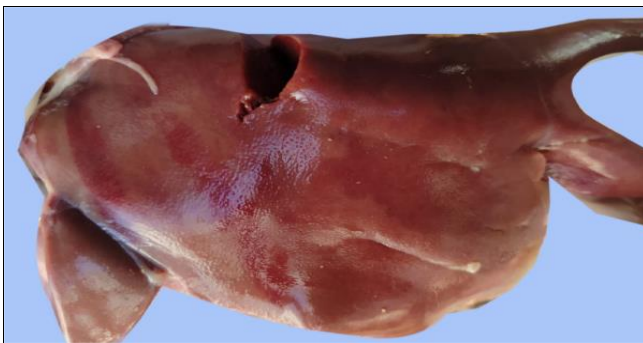


Fig 2: Gross specimen of liver showing congestion and haemorrhages

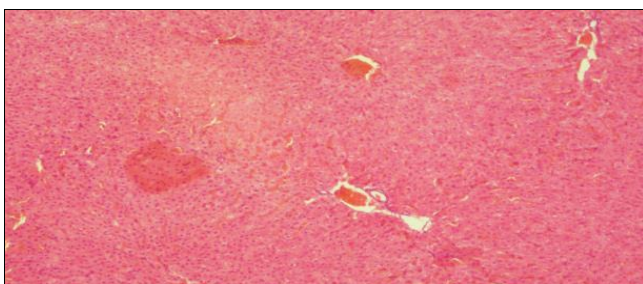


Fig 3: Photomicrograph of liver showing severe congestion and haemorrhage in the central vein and in the sinusoidal space H&E, 40X.

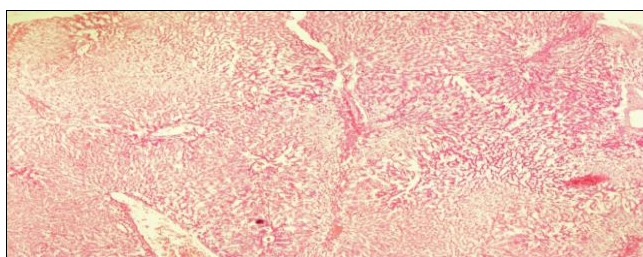


Fig 4: Photomicrograph showing nut meg appearance of liver parenchyma due to CVC.H&E 100X.



Fig 5: Photomicrograph showing gross specimen of liver showing haemosiderosis.

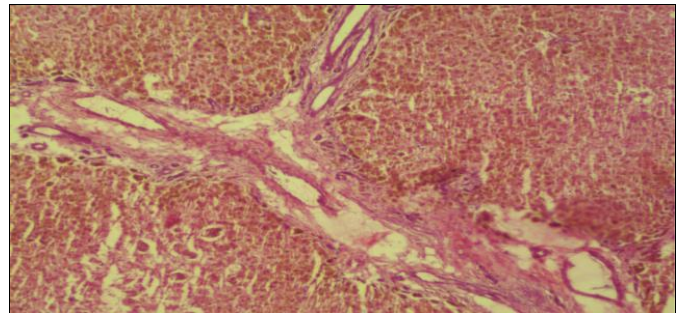


Fig 6: Photomicrograph of liver showing dilated portal triad, dilation of vein and artery, hepatocytes showing deposition of haemosiderin and distortion of hepatic sinusoids. H&E 100X.

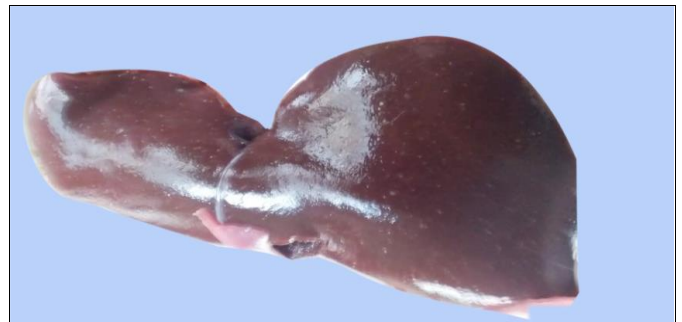


Fig 7: Gross specimen of liver showing numerous discrete pale foci of necrosis on liver surface.

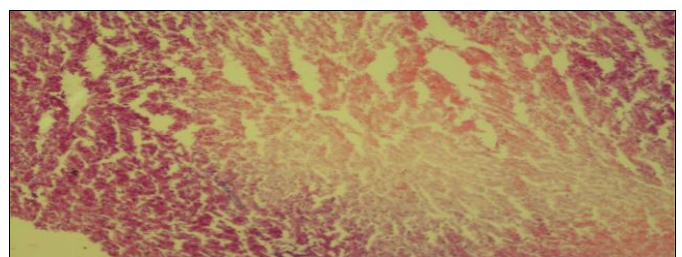


Fig 8: Photomicrograph of liver showing necrosis with loss of architectural detail as well as cellular detail.



Fig 9: Gross specimen of liver showing large size abscess on liver surface.

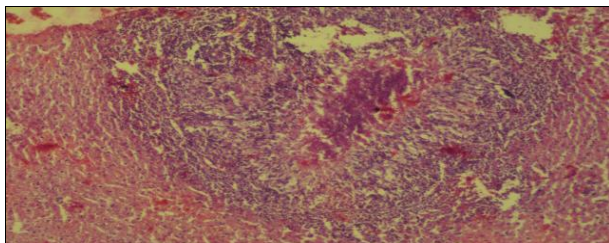


Fig 10: Photomicrograph showing abscess with central necrosis, hemorrhage, severe infiltration of inflammatory cells and degeneration of hepatocytes. H&E 100X.

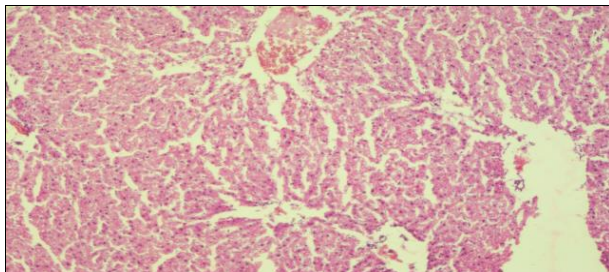


Fig 11: Photomicrograph showing increase in sinusoidal space. H&E 100X.

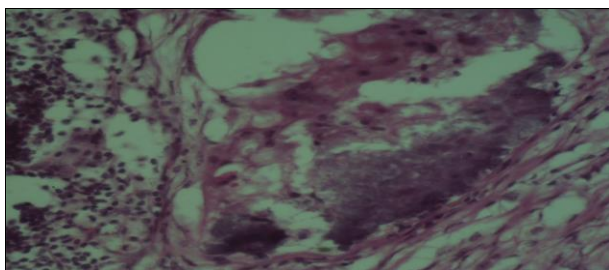


Fig 12: Photomicrograph showing severe infiltration of neutrophil in calcified and necrosed area in liver parenchyma. H&E 200X.

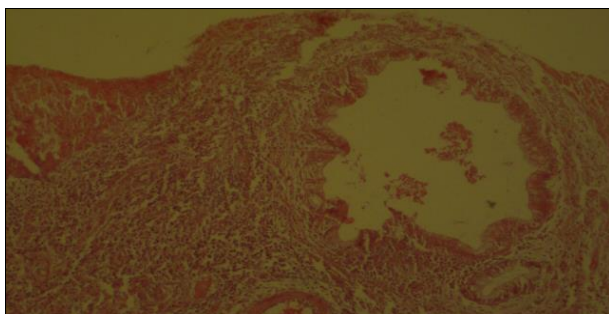


Fig 13: Photomicrograph showing bile duct hypertrophy with severe infiltration of inflammatory cells. H&E 100X.

Conclusion

According to histopathological findings in these study clearly indicate that significant number of goat suffer from various pathological condition of liver.

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