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## Pathomorphological studies in goats effected with gastrointestinal tract disorders

**Amrender Nath Tiwari, KK Jakhar, Vikash Sharma and Babu Lal Jangir**

### Abstract

The present study was envisaged to elucidate the pathomorphological aspects of gastrointestinal tract (GIT) disorders of goats. Study was conducted on 21 (6 healthy goats and 15 diseased goats/kids) and 19 carcasses of goats/kids brought for postmortem to the Department of Veterinary Pathology, LUVAS, Hisar. This study revealed that incidence of GIT disorders was maximum in goats of age group 2-6 months. Major gross lesions noticed were abomasitis, congestion and haemorrhages in intestine and necrotic foci on liver surface alongwith hepatomegaly. Mesenteric lymph nodes were enlarged and oedematous. In case of lungs there was congestion, haemorrhages, consolidation of lungs and pneumonia. Congestion and petechial haemorrhages were the major changes seen in spleen. Heart revealed congestion and hydropericardium. Kidneys revealed congestion and soft kidneys as the major change. Histopathological lesions in abomasum were oedema, congestion and mononuclear cells infiltration in mucosa. In intestine there was desquamation of mucosal epithelium, congestion in mucosa and submucosa along with mononuclear cells infiltration in mucosa, haemorrhages in mucosa, goblet cell hyperplasia and necrosis and replacement of mucosal glands by mononuclear cells. However in one case there was presence of epithelioid cells and Langhan's type giant cells in mucosa indicating Johne's disease. Mesenteric lymph nodes revealed congestion and depletion of lymphocytes in germinal center of lymphoid follicle and in one case there was presence of giant cells in cortex of lymph gland. In the liver major change was congestion, degenerative changes in hepatocytes including cloudy swelling, fatty changes, congestion in sinusoids and dilatation of sinusoids leading to atrophy of hepatocytes. There was bile duct hyperplasia along with fibroblast proliferation. Spleen revealed congestion and depletion of lymphocytes in white pulp. Lungs evidenced oedema, congestion, emphysema, serous inflammation and thickening of interlobular septa by fibrinous exudate. Heart revealed congestion, sarcocystosis and mononuclear cell infiltration in myocardium. In kidneys, congestion, focal interstitial nephritis and hyaline degeneration were seen.

**Keywords:** Pathomorphological studie, goats effected, gastrointestinal tract disorders

### Introduction

Agriculture, alongwith allied sectors such as animal husbandry, is largest livelihood provider sector in India. It also contributes about 15.18% to the gross domestic product [NDDDB, 2014]<sup>[7]</sup>. Goats are an important part of livestock in India, producing milk, meat, hide and wool. In India, the goat population is 14.053 million (DAHD, 2013)<sup>[1]</sup> and out of this 538 thousand goats account for Haryana (DAHD, 2013)<sup>[1]</sup>. India ranks second in goats population in the world. Gastrointestinal tract (GIT) disorders are the most important causes of suboptimal productivity in goat rearing, that often occurs concurrently with other problems. Gastrointestinal parasitism is also considered as a major challenge for the health and the welfare of goats. Parasitism, especially by helminthic parasites, impairs health by causing inappetance, diarrhoea, anaemia and, in severe cases, death. The nematode parasite, *Haemonchus contortus*, is singly the most important nematode pathogen of small ruminants (sheep and goats) throughout the world. Although considered to be the greatest problem in the tropics/subtropics, this parasite has shown a definite trend of increasing prevalence and economic importance in small ruminants. Current study was planned on the pathomorphological investigation of GIT disorders in goats.

### Materials and Methods

19 carcasses of goats were received for the postmortem constituted the material of this study. A through post-mortem examination was conducted as early as possible taking usual aseptic precautions to avoid the extraneous contamination. All the tissues/organs of the carcasses were examined critically for the presence of gross pathological alterations and the lesions so detected were recorded.

Small size of organs showing lesions like abomasum, intestine, mesenteric lymph nodes, liver, spleen, heart, lungs and kidneys were collected in 10 percent buffered formalin for histopathological studies. The fixed tissues were washed in running tap water overnight, dehydrated in acetone, cleared in benzene and embedded in paraffin wax (melting point 60-62 °C). Paraffin sections were cut at the thickness of 4-5 $\mu$  and staining is done using Lily Mayer's haematoxylin and 2 percent water soluble eosin. (Luna, 1968) [6].

## Results

### Gross changes

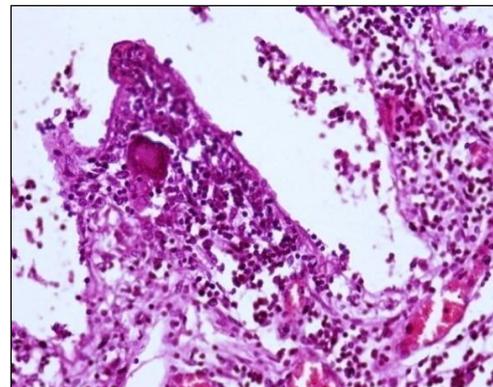
In abomasum, the most prominent change was congestion (7 cases) and necrotic foci were also revealed in 2 cases due to massive infestation of *Hemonchus contortus*. In intestine, major changes observed were congestion (8 cases) followed by catarrhal (7 cases) and haemorrhagic enteritis (4 cases). In one case intestine was congested, thickened and studded with segments of tapeworm (Figure 1). Major gross changes in lymph node were oedema and enlargement (2 cases). In liver, most prominent change was congestion (5 cases) followed by necrotic foci (2 cases), fibrosis (4 cases) along with enlarged gall bladder due to thick bile and hepatomegaly (2 cases) was also noticed. In lungs, major gross lesion was congestion (8 cases), haemorrhage (3 cases) followed by emphysema (4 cases) and consolidation (4 cases). In heart, major changes observed were hydropericardium (4 cases) followed by congestion (2 cases) and haemorrhages in endocardium (1 case). Spleen revealed congestion (2 cases) and petechial haemorrhages in parenchyma (2 cases). In kidneys, gross lesions observed were congestion (3 cases) haemorrhages (2 cases), subcapsular abscess in kidney (1 case). In pancreas, major change observed was congestion. (2 cases). Four cases also revealed ascites and hydropericardium.

### Histopathological findings

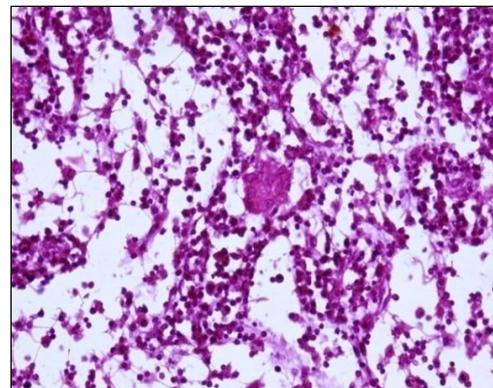
In abomasum, major histopathological changes were oedema, congestion and mononuclear cells infiltration in mucosa. Intestine revealed oedema in intestine, congestion in mucosa and submucosa and infiltration of mononuclear cells in mucosa. In one case, there was presence of Langhan's type giant cells in the mucosa (Figure 2). There was desquamation and degeneration of epithelial cells. Mesenteric lymph nodes when examined microscopically revealed oedema, depletion of lymphocytes in germinal centres of cortex, excess of mononuclear cells in medullary sinuses of medulla and presence of giant cells (Figure 3). Impression smear of the lymph node revealed acid fast bacilli in macrophages. (Figure 4). In the liver, major microscopic lesions were congestion in portal triad area with mononuclear cells infiltration with mild bile duct hyperplasia. Hepatocytes revealed degenerative changes like cloudy swelling, hydropic changes and fatty changes. Spleen revealed mild to severe depletion of lymphocytes in white pulp area and haemorrhage in red pulp and haemosiderosis. In heart, oedema and congestion were seen in myocardium along with focal area of necrosis and leucocytic infiltration in some cases. In lungs, histopathological lesions revealed oedema, congestion, emphysematous alveoli, mononuclear cell infiltration, thickening of interlobular septa by serofibrinous space and fibrosis around blood vessels. In kidneys, there was congestion of intertubular blood vessels and focal areas along with hyaline materials in tubules and interstitial nephritis with infiltration of mononuclear cell. Pancreas revealed congestion and focal area of infiltration of mononuclear cells.



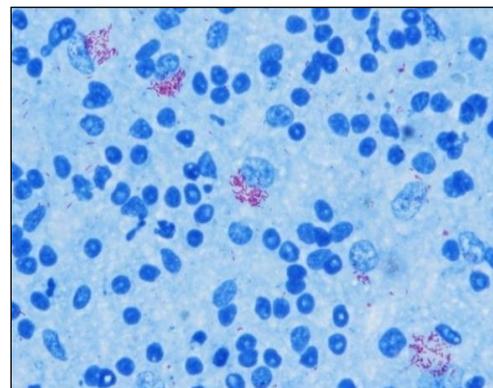
**Fig 1:** Cut section of intestine of a goat showing congested and thickened mucosa and lumen studded with segments of tape worm



**Fig 2:** Intestine of a goat: Chronic enteritis showing congestion in mucosa, degeneration of glands and Langhan's type giant cell (arrow) in mucosa. H. & E.  $\times 400$



**Fig 3:** Lymph node of a goat: Congestion and infiltration of lymphocytes in medulla (arrow). H. & E.  $\times 400$



**Fig 4:** Impression smear of mesenteric lymph node of goat showing acid fast bacilli in macrophages. H. & E.  $\times 1000$

## Discussion

In intestine, major gross changes observed were congestion followed by catarrhal and haemorrhagic enteritis. Haemorrhagic enteritis may be because of simultaneous infection of rotavirus and *E. coli*. Rotavirus damages microvilli of small intestine which causes reduced starch digestion, results in promotion of excess bacterial (*E. coli*) growth simultaneously. It induces an osmotic effect resulting in diarrhoea. In lambs, rotavirus enteritis is more severe when complicated by simultaneous infection with enterotoxigenic *E. coli*. (Snodgrass *et al.*, 1984) [12]. In abomasum, congestion was the most prominent change. Major gross changes in lymph node were oedema and enlargement. In liver, most prominent change was congestion followed by necrotic foci, there was fibrosis of liver, enlargement of gall bladder due to thick bile and abscess in liver. However, in goats/kids hepatomegaly was evidenced instead of abscess. Spleen revealed congestion and petechial haemorrhages as the major change. These findings are in agreement with Saleim *et al.* (2004) [11]. In lungs, most prominent change was congestion followed by emphysema and consolidation. In heart, major changes observed were hydropericardium followed by congestion and in few cases mild haemorrhages were also revealed. Hydropericardium and ascites observed in sheep and goats can be correlated with heavy infection of blood sucking stomach worms (strongyles) resulting in excessive loss of serum albumin decreasing the osmotic pressure of plasma which forces fluid to move out of blood to tissues and accumulation of fluid in pericardial sac resulting in hydropericardium (Kumar *et al.*, 2011) [4]. Kidneys revealed congestion as the major change.

Histopathological lesions in various visceral organs were in general, similar in both species. Major histopathological changes observed in abomasum were oedema, congestion and leucocytic infiltration in mucosa and submucosa with tendency to lymphoid follicle formation. These findings are in agreement with earlier report of Hajimohammadi *et al.* (2010) [3]. In intestine, major microscopic lesions were oedema, mild congestion in mucosa and submucosa and severe infiltration of mononuclear cells in mucosa. Other changes were goblet cell hyperplasia, necrosis and replacement of glands of Lieberkuhn's by mononuclear cells and desquamation of mucosal epithelium. These findings were in general, agreement with those reported by Panisup (1974) [8, 9], Valente *et al.* (1985), Saleim *et al.* (2004) [11] and Tariq *et al.* (2008) [13]. However, one confirmed case of Johne's disease among goats was reported which was characterized by degeneration of epithelial cells of intestine, degeneration of intestinal glands and infiltration of mononuclear cells like lymphocytes, macrophages, epithelioid cells and Langhan's type giant cells in mucosa. (Reddy *et al.*, 2012) [10]. Mesenteric lymph nodes when examined microscopically revealed congestion in cortex and depletion of lymphocytes in germinal center of lymphoid follicle in cortex of lymph gland (Panisup 1974) [8, 9]. However, in one case of goat, impression smear of mesenteric lymph node revealed acid fast bacilli in foamy macrophages and histopathologically it also revealed giant cells. (Reddy *et al.*, 2012) [10]. Histopathologically, liver revealed congestion of blood vessels, degenerative changes in hepatocytes including cloudy swelling, fatty changes, congestion in sinusoids, dilatation of sinusoids leading to atrophy of hepatocytes. There were focal areas of coagulative necrosis in parenchyma along with leucocytic infiltration in portal triad area and initiation of lymphoid follicle formation in

parenchyma and bile duct hyperplasia along with fibroblast proliferation which were similar to findings of Saleim *et al.* (2004) [11] and Kumar *et al.* (2011) [4]. Lesions in heart included oedema and congestion in myocardium along with leucocytic infiltration and sarcocystosis. Similar lesions have been evidenced by Deepti *et al.* (1999) [2]. In lungs, changes including oedema, congestion, emphysema, serous inflammation and thickening of interlobular septa were observed. Similar lesions have been reported by Panisup (1974) [8, 9], Saleim *et al.* (2004) [11] and Uzal *et al.* (2004) [14]. In kidneys, lesions were congestion, focal interstitial nephritis, hyaline degeneration, coagulative necrosis and infiltration of leucocytes predominantly mononuclear cells. Similar lesion had been evidenced by Saleim *et al.* (2004) [11].

## Conclusions

GIT disorders in goats causes pathomorphological effects on various cadaver organs *viz.* abomasum, intestine, liver, mesenteric lymph nodes along with lesions on lungs, spleen, kidneys and heart.

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## Competing Interests

The authors declare that they have no competing interests.

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