

Gross and Histopathological Lesions in Intestine of Goats Affected with Parasitic Diseases in Eastern Plain Zone of Uttar Pradesh

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ABSTRACT: Present study was conducted to explore the gross and histopathological lesions in intestine of goats naturally affected with parasitic infections in eastern plain zone of Uttar Pradesh. The post-mortem examination of dead goats was conducted for any gross lesions in intestine and samples showing lesions suggestive of parasitic infections were collected and preserved in 10% buffer formalin saline solution for histopathological study. Grossly, haemorrhagic and erosive lesions along with sloughed ruminal mucosa and papilla, severe to moderate haemorrhages and thickened mucosal wall, blood mixed faeces or intestinal contents were noticed in the intestine. Microscopically, intestine showed congestion of vessels, haemorrhages, necrosis of intestinal epithelium, blunting of intestinal villi with desquamation of epithelium from mucosal surface. Hyperplasia of goblet cell, necrosis and replacement of glands of Lieberkuhn's by inflammatory cells mainly mononuclear cells were also noticed. Lesions were more common in jejunum and ileum except in *Trichuris* infection in which lesion was common in caecum. Affected villi and crypts of intestine also revealed different developmental stages of coccidian oocyst infiltration of mononuclear cells (monocytes and lymphocytes) in cases of coccidiosis.

Keywords: Pathomorphological changes, goat, parasitic diseases, Eastern Uttar Pradesh.

INTRODUCTION

The importance of goat is increasing day by day in developing countries like India where central government policy is to double farmers' income. The livestock play an important role in generating rural income in which goat rearing has more economical impact. (Singh *et al.*, 2022, Jaiswal *et al.*, 2023). Gastrointestinal parasites (GIPs) in small ruminants, sheep and goats, are considered as one of the most important production-limiting diseases in the world (Jamra *et al.*, 2017). GIPs infections are common due to grazing on pastures contaminated with infective larval stage of parasites. These gastrointestinal parasitic infections reduce food intake and feed conversion efficiency because of disturbances in protein metabolism, reducing absorption and retention of minerals (Jatav *et al.*, 2022). Reduced live weight gain, milk production, and poor reproductive performance are common clinical signs in parasitism (Sutherland *et*

al., 2010). GIPs that cause diarrhoea in goat are *Eimeria*, *Strongyles*, *Cooperia*, and *Nematodirus* etc. The common helminth species causing infection are *Haemonchus* sps., *Trichostrongylus* sps., and *Oesophagostomum* sps. etc. *Haemonchus contortus infectionis* most common which is characterized by anaemia, pale mucous membrane, generalized oedema, weakness, dark coloured faeces, thickened abomasal wall, petechial and ulcerative haemorrhages in abomasal mucosa, hepatomegaly and loss of subcutaneous and visceral fat (Parmar *et al.*, 2019; Singh *et al.*, 2020). Intestinal trichostrongylosis manifested as anorexia, persistent diarrhoea, and weight loss is often encountered in goats. Atrophy of intestinal villi results in impaired digestion and malabsorption, leading to protein loss. Coccidiosis is another important major problem in goats with worldwide distribution characterized grossly by red mucosa along with necrotic patches mainly in small intestine and microscopically by congestion, haemorrhages, necrosis

desquamation of mucosal epithelium resulting into necrotic haemorrhagic enteritis with presence of developmental stages and infiltration of lymphocytes in epithelial cells of small and large intestine (Jolhe *et al.*, 2019; Subhash *et al.*, 2021).

It is obvious that confirmation of various infection in diarrheic dead goats is very important but use of different confirmatory diagnostic tests like ELISA and RT-PCR are not economical. Therefore, the objective of this study was to identify gross and microscopic lesions of parasitic infections in dead goats through postmortem examination.

MATERIALS AND METHODS

Sample Area. For the present study, the postmortem examination of dead goats was conducted for any gross lesions in intestine on goat farm of ANDUAT, Kumarganj, Ayodhya, organized and unorganized farms of Eastern Plain zone of Uttar Pradesh (Ayodhya, Ambedkar Nagar, Azamgarh, Mau, Ballia, Ghazipur, Jaunpur and Varanasi). Samples were collected for one year (September, 2021 to August, 2022).

Collection and processing of samples: Faecal samples were collected during postmortem examination and transported to the parasitology laboratory on ice (refrigerated conditions- 4°C). Faecal samples were subjected to standard parasitological examination for the detection of helminths eggs and protozoan cyst/ oocysts (Soulsby, 1982) and characteristics ova of particular parasite was the basis of confirmation of

parasitic infections. Intestinal tissue samples showing lesions suggestive of parasitic infections were collected and preserved in 10% buffer formalin saline solution for histopathological study. Samples which were positive in faecal examination, histopathology was done only for that tissue sample of same animal.

Histopathological Study: The collected tissue samples were examined for histopathological investigation following standard protocol. The formalin fixed representative tissue pieces will be processed for paraffin block and sectioning into 3-5micron thickness by microtome machine and will be stained with Hematoxylin and Eosin (H&E) stain for histopathological examination (Luna, 1968). Then slides were dried at room temperature and examined under light microscope at low (10x) and high (40x, 100x) magnification.

RESULTS AND DISCUSSION

Faecal samples were subjected to parasitological examination to detect helminths eggs and protozoan cyst/ oocysts. The results are given as Fig. 1-4. Histopathological studies of those intestinal samples were done whose sample was positive for parasites.

Coccidiosis: Grossly, severe to moderate haemorrhages and thickened mucosal wall were observed in intestine on post-mortem examination. The blood mixed faeces or intestinal contents were noticed in the intestine (Fig. 5).

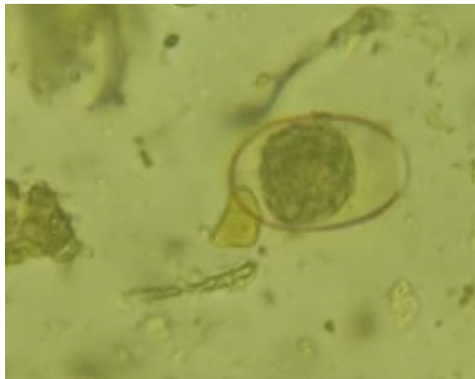


Fig. 1. Eimeria egg.

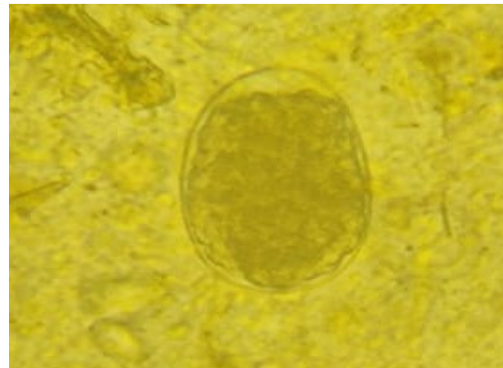


Fig. 2. Strongyle egg.



Fig. 3. Amphistome egg.

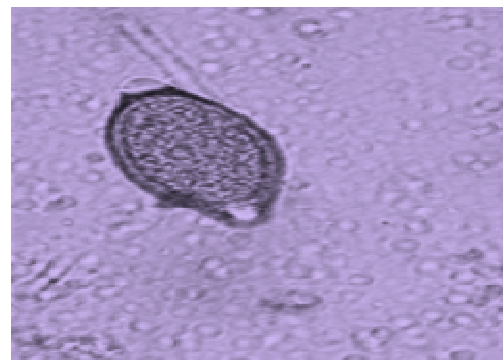


Fig. 4. Trichuris egg.

The most characteristic lesions were white plaques or nodules on intestinal mucosa in three cases out of five. Microscopically, intestine showed congestion of vessels, haemorrhages, necrosis of intestinal epithelium, blunting and blurring of intestinal villi with desquamation of epithelium from mucosal surface (Fig. 9). Lesions were more common in jejunum and ileum. Affected villi and crypts of intestine also revealed different developmental stages of coccidian oocyst (Fig. 9). The present findings were in agreement with the findings of Jolhe *et al.* (2020) who reported that epithelial cells of crypts and villi were full of developmental stages of *Eimeria*, presence of inflammatory cells mainly lymphocytes. They also reported proliferative enteritis resulting in nodule formation in the mucosa of the jejunum, ileum, caecum. The presence of inflammatory cells might be a part of immune response that result in destruction of infected epithelium (Jolhe *et al.*, 2020). The Gross and microscopic changes of this study also corroborated with the earlier findings of Subhash *et al.* (2021); Limbat *et al.* (2022); Jatav *et al.* (2022).

Strongylosis: Thread-like worms adhered to the abomasal and intestinal wall with congestion, petechial haemorrhages and mucus like fluid were seen on post-mortem examination (Fig. 6). Histopathological lesions observed were congestion and haemorrhages with oedema in mucosal wall of small intestine. Desquamation of mucosal epithelium, hyperplasia of goblet cell, necrosis and replacement of glands of Leiberkuhn's by inflammatory cells mainly

mononuclear cells were also noticed (Fig. 10). The present study findings corroborated with the findings of Kumar *et al.* (2015); Dutta *et al.* (2017); Singh *et al.* (2020); Limbat *et al.* (2022). Severity of this disease depend intensity of worms and death of the animal is attributed to the blood sucking nature of worms and migration pattern resulting into haemorrhagic anemia and haemorrhagic enteritis which lead to dehydration (Limbati *et al.*, 2022; Parmar *et al.*, 2019).

Gross changes in cases where amphistomes were seen in rumen revealed amphistomes were attached to ruminal wall, congested, haemorrhagic and erosive lesions along with sloughed ruminal mucosa and papilla and same lesions were extended to the abomasum and duodenum also (Fig. 7). Microscopically, intestine showed congestion of mucosa and submucosa, haemorrhage, proliferated goblet cells, villous atrophy, severe infiltration of eosinophils and mononuclear cells, relative increase of mucosal cells (Fig. 11). Similar pathological changes were observed by Tehrani *et al.* (2015); Nayak *et al.* (2021); Limbat *et al.* (2022) as they reported congestion, haemorrhage, mononuclear cell infiltration, necrosis and degeneration in duodenal glands. Paraamphistomes, generally, produces no pathological lesion in rumen and reticulum but their larva in intestine produces different lesions during the migration by mechanical irritation (Tehrani *et al.*, 2015). Mature and immature amphistomes causes mechanical obstruction in rumen resulting into bloating (Nayak *et al.*, 2021).



Fig. 5. Blood mixed faeces.



Fig. 6. Bulk presence of Strongyles in abomasums.



Fig. 7. Haemorrhagic abomasums.



Fig. 8. Congestion and Haemorrhage in intestine.

Trichuris infection: Grossly intestine (caecum) showed thickened wall, catarrhal enteritis, petechial haemorrhage (Fig. 8). Histopathological slides revealed goblet cell proliferation, ruptured and desquamated villi, infiltration of inflammatory cells and thickening of intestinal wall (Fig. 12). Similar pathological changes

were observed by other researchers (Jatav *et al.*, 2022). Diarrhoea occurs in *Trichuris* infection as a result of thickening of the wall which prevent that region from absorption of fluids in case of heavy infection (Gul and Tak 2016).

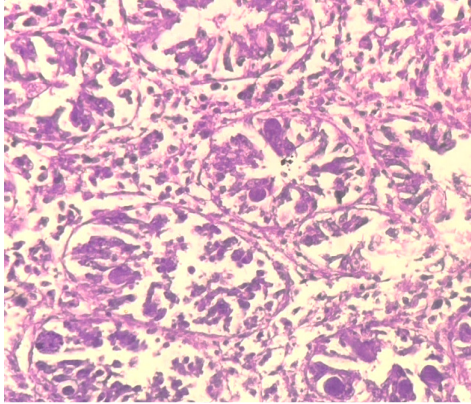


Fig. 9. Developmental stages of *Eimeria* with infiltration of inflammatory cells.



Fig. 10. Congestion, haemorrhage, oedema with desquamated cells in mucosal layer.

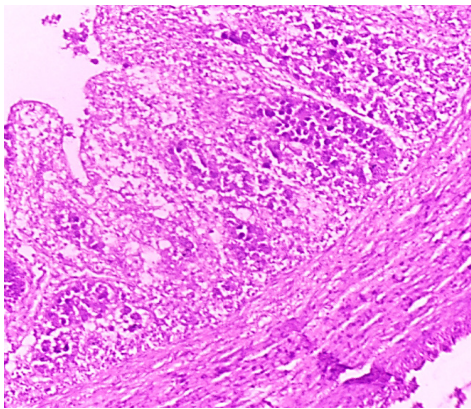


Fig. 11. Desquamated epithelium, shortened villi along with thickening of serosal layer and inflammatory cells in mucosal and submucosal layer.

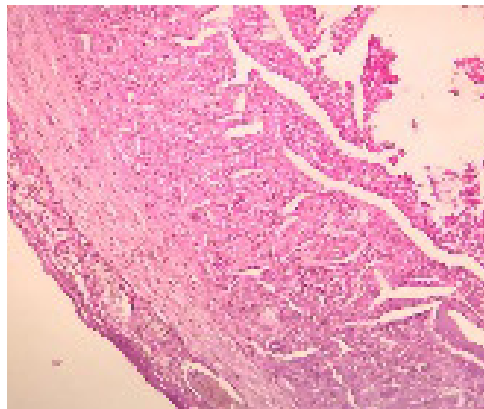


Fig. 12. Ruptured and desquamated villi, haemorrhage with thickening of intestinal wall.

CONCLUSIONS

It may be concluded from gross and histopathological study of intestine in goats died due to diarrhoea that major changes occur in small intestine and are characterized by congestion, haemorrhages, necrosis of crypts, desquamation of epithelial cells, blunting of villi with infiltration of inflammatory cells mainly mononuclear cells. Developmental stages are also found in affected tissues in case of coccidiosis. The pathological changes observed in cases of coccidiosis, amphistomiasis, strongyles and *Trichuris* infections might help in differential diagnosis with other infections *viz.*, salmonellosis, giardiasis, coronavirus infections, tapeworm infections, cryptosporidiosis. In field condition, post-mortem examination provides correct and rapid diagnosis on the basis of characteristics and pathognomic lesions.

FUTURE SCOPE

Diagnosis of gastrointestinal diseases on the basis of characteristics eggs, gross and histopathological findings is only limited to field conditions. Immunohistochemical staining, ELISA, PCR and other molecular techniques are required in laboratory in order to confirm the parasitological agent and to identify species specific lesions.

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