

Parasitological and Histological Studies on Gastrointestinal Parasites in Slaughtered Goats

Maneesh Jatav, Yamini Verma and Preeti Verma

Department of Veterinary Pathology, College of Veterinary Science and Animal Husbandry, Jabalpur, Madhya Pradesh INDIA

*Corresponding Author: maneeshsingh2@gmail.com

How to cite this paper:

Jatav, M., Verma, Y., & Verma, P. (2022). Parasitological and Histological Studies on Gastrointestinal Parasites in Slaughtered Goats. *International Journal of Livestock Research*, 12(9), 16-21.

Received : Aug 25, 2022
Accepted : Sept 24, 2022
Published : Sept 30, 2022

Copyright © Jatav *et al*, 2022

This work is licensed under the Creative Commons Attribution International License (CC BY 4.0).
<http://creativecommons.org/licenses/by/4.0/>



Open Access

Abstract

Small ruminant farming, mostly sheep and goats, is one of the most important agri-based activities that are being done by many marginal farmers in developing countries like India. Adverse conditions make animals more susceptible to gastrointestinal parasites considered one of the most important production-limiting diseases in the world. These gastrointestinal parasitic infections reduce food intake and feed conversion efficiency because of disturbances in protein metabolism, reducing absorption and retention of minerals. Seventy slaughtered goats from the Jabalpur region of Madhya Pradesh were examined. The faecal samples and intestine were examined for parasites using microscopic concentration techniques and histological processing techniques, respectively. The gastrointestinal tracts (n = 70) for the presence of parasites and pathological lesions. In the present study, the prevalence of common gastrointestinal parasite infection was 74.28 (52/70). The prevalence of parasites was higher in females as compared to males. The coprological examination revealed various kinds of eggs of Moniezia sp. Trichuris sp, Strongyle, Strongyloides sp., and the various stages of Eimeria spp. were also identified in the faecal smears. The intestines infected with parasitism showed hard nodules surrounded by a zone of inflammatory cells and characterized by catarrhal inflammation along with petechial hemorrhages on the mucosa where parasites were firmly attached. The Haematoxylin & Eosin (H&E) stained tissue sections revealed catarrhal inflammation and desquamation of intestinal villi. The study indicates that goats in the area are positive for gastrointestinal helminths, which are associated with the production of variable degrees of pathological lesions.

Keywords: Gastrointestinal Parasites, Goats, Histological, Jabalpur, Parasitological

Introduction

Small ruminant farming, mostly sheep and goats, is one of the most important agri-based activities that are being done by many marginal farmers in developing countries like India. Goats play an important role in income generation for about 40 percent of the rural population that lives below the poverty line and improve household nutrition. The total goat population in India is 148.9 million as per the 20th livestock census (Livestock Censuses, Department of Animal Husbandry, Dairy & Fisheries, Ministry of Agriculture & Farmers' Welfare, Government of India). Unlike large ruminants, goat husbandry is easy, less laborious, less expensive, and highly profitable

Due to its capability of adaptability to diverse environments, goat husbandry has a remarkable impact on the income of farmers. Adverse conditions make animals more susceptible to gastrointestinal parasites (GIP). GIP in small ruminants is considered one of the most important production-limiting diseases in the world (Jamra *et al.*, 2017). These gastrointestinal parasitic infections reduce food intake and feed conversion efficiency, cause disturbances in protein metabolism, and reduce absorption and retention of minerals. Chronic GIP infections rarely cause mortality, but indirect production and productivity losses are more pronounced. The clinical signs produced due to parasitism are reduced live weight gain, reduced milk production, and poor reproductive performance (Sutherland *et al.*, 2010). This may eventually lead to insidious and important economic losses (Taylor, 2009). GIP prevalence in ruminants, particularly sheep and goats, ranges from 25 to 88 percent in India (Bandyopandhyay *et al.*, 2010). Several authors have reported the prevalence of various GIPs in sheep and goats from Madhya Pradesh (Chedge *et al.*, 2013, Chourasiya *et al.*, 2021). The majority of the published reports on the incidence of GIP in small ruminants are based on coprological analysis. However, there is no previous study conducted on the histopathological examination of gastrointestinal helminthic infections in Madhya Pradesh. So, the present study was carried out to focus on the occurrence of enteric helminths in goats based on coprological and histological examinations in the Jabalpur region.

Materials and Methods

The work was conducted at the Department of Veterinary Pathology, College of Veterinary Science and Animal Husbandry (CoVSc & A.H.), Nanaji Deshmukh Veterinary Science University (NDVSU), Jabalpur, Madhya Pradesh (M.P.). In the present study, a total of seventy goats were classified according to age and sex. The study included 23 male and 47 female goats. During the study period, each carcass was examined carefully. Detailed information such as age, sex, breed, and external appearance of individual goats was observed and recorded during the post-mortem examination for external parasitism before slaughter. All major visceral organs and regional lymph nodes were examined and incised. The presence of gross lesions and different parasites in different parts of the gastrointestinal tract was noted.

Collection of Faecal Samples: During the study period, about 2–5 gm of faecal samples were collected directly from the rectum of goats by using sterile gloves and placed in sterile zipped polythene bags which were sealed properly and labeled for identification of animals. All faecal samples were transported to the laboratory.

Collection of Tissue Samples: From each goat, representative intestinal tissue samples were collected and transported to the laboratory under refrigerated conditions (4°C). For histopathology, tissues were preserved in 10 percent neutral buffered formalin.

Processing of Samples: The gastrointestinal tract was examined grossly and processed separately after a longitudinal cut and carefully examined for parasites. Faeces recovered from the rectum were examined macroscopically for consistency and the presence of abnormalities such as blood, mucus, adult parasites, and segments of parasites. Faecal samples were analyzed using a direct smear method and a further qualitative concentration by floatation technique with sugar/salt solution to detect helminth eggs and protozoan/coccidian oocysts. In addition, the concentration by sedimentation technique was performed to identify trematode eggs. Microscopic examination was done using saline preparation using x10 and x40 objective lenses for confirmation of morphology and identity of parasites.

Histopathology: All formalin-fixed tissue samples of the gastrointestinal tract, mainly the intestine, were processed for histopathological studies. Five-micron sections will be taken and stained with Hematoxylin and Eosin (H&E) for detailed pathomorphological studies as per the method of Gridley (1960).

Results and Discussion

The present slaughter-based investigation showed that the overall prevalence of gastrointestinal parasite (GIP) infection was 74.28% (52/70). This prevalence was higher than the 21.3% recorded by Mbah *et al.* (2018). A higher prevalence (89.33%) of GIP in goats was recorded by Hassan *et al.* (2019). Nwoke *et al.* (2015) reported a prevalence rate (73.8%) close to our study. In coprological examination various kinds of eggs were found, comprised mainly of *Moniezia* sp. *Trichuris* sp., *Strongyle*, *Strongyloid* sp. and the various stages of *Eimeria* spp. were also identified in the faecal smears (Figure 2). Nwoke *et al.* (2015), Mbah *et al.* (2018), and Hassan *et al.* (2019) also reported similar findings in faecal samples collected from slaughter houses. Among gastrointestinal parasites maximum prevalence was recorded of Strongyles (55.76%), followed by coccidia (26.92%), *Monieziaexpansa* (11.53%), *Trichuris* spp. (3.84%) and *Strongyloides* spp. (1.92%). In accordance to our study, Lata *et al.* (2017) also observed similar prevalence pattern whereas Singh *et al.* (2015) coccidia was predominant (82.4%) followed by Strongyles (68.27 %) and amphistomes (22.71 %). The observed difference in prevalence between the present and previous studies could be mainly due to variations in geographical and climatic conditions.

Gross Pathological Findings

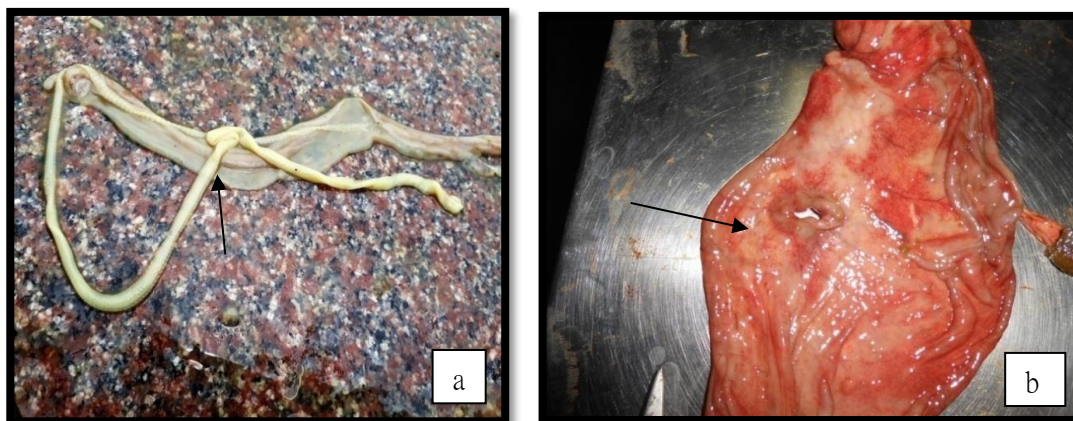


Fig: 1. (a) *Moniezia* sp. (tapeworm) present in the lumen of the intestinal tract (b) Catarrhal inflammation due to continuous irritation and thickened oedematous wall of the large intestine with around the nodule.

Coprological Findings

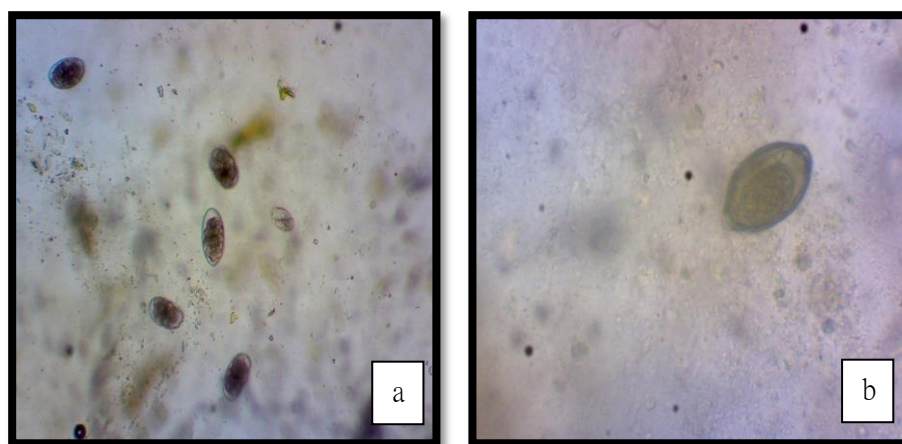


Fig: 2. (a) showing eggs of *strongyle* and *strongyloides* sp. (X10) (b) Eggs of different stages of *Trichuris* sp. (X40)

Histopathological Findings

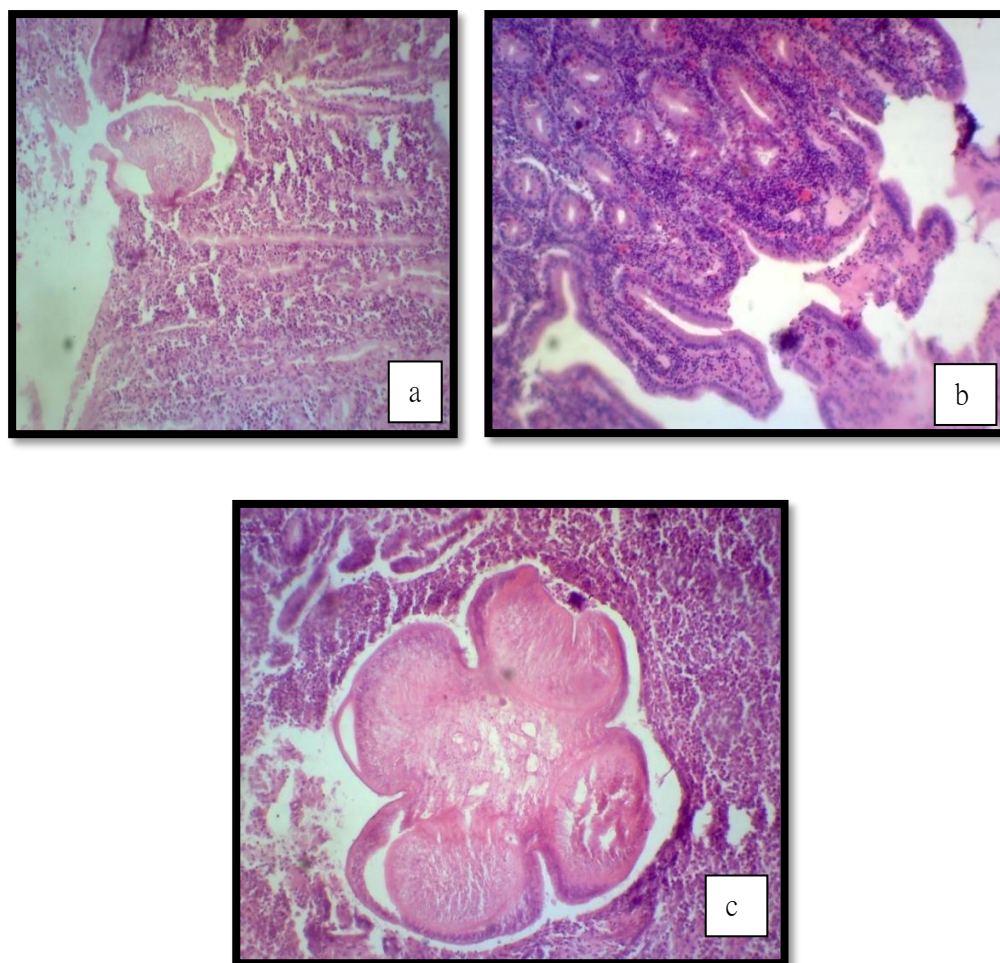


Fig: 3. (a) Section of intestine showing segment of *Monizia* Sp. (b) Cellular infiltration of the submucosa along with villous atrophy, diffuse desquamation of the intestinal epithelium (c) Section of intestine demonstrating adult Tapeworm with infiltration of mono nuclear cells in H & E (X40).

In our investigation, the prevalence of GIP was higher in females (89.36%) as compared to males (56.52%), and these findings correlate with Mbah *et al.* (2018) Hassan *et al.* (2019) and Chaurasiya *et al.* (2021). This high prevalence rate in females is due to stress and immunity compromised during the lactation, pre and postparturient period. Contrary to this, Hassan *et al.* (2019) reported a higher prevalence of gastrointestinal parasites in males as compared to females, whereas Nwoke *et al.* (2015) reported there is no significant difference between the rate of infection in males and females.

Pathological Findings: Multiple parasitic infections in the presented goats could have caused serious symptoms and pathological changes in various organs, and resultant anaemia and dehydration would have led to the death of goats, which may be due to concurrent secondary bacterial infections. Gross lesions in the intestine of goats due to parasitic infection consisted of many small to large, round to irregular, hard, fibrotic, raised nodules of yellowish pus along with caseous material, and the wall of the large intestine was thickened and oedematous around the nodule (Figure 1b). *T. ovis* penetrates the wall of intestinal mucosa and infection is characterised by catarrhal enteritis and petechial haemorrhage present at the site of penetration. Microscopically, H and E stained sections showed, rupture and desquamation of villi, proliferation of goblet cells along with cellular infiltration, predominantly mononuclear cells (Figure 3b). Gross lesion comprised of congestion, catarrhal enteritis and oedema in intestine infected with *Trichostrongylus* spp. and histologically thickening of intestinal wall and oedematous folds, infiltration of eosinophils, moderate chronic inflammatory cellular infiltration with mucoid degeneration. The gross changes in *Moniezia* spp. infection in goats included a dehydrated carcass, a hydrothorax and an intestine infected with tapeworm, necrosis, and petechial haemorrhages in the intestinal wall (Figure 1a). Nodules were observed where

the parasite invades the intestine (Figure 1b). The histopathological changes observed were diffused areas of necrosis, sloughing of epithelial cells of villi, as well as accumulation of cellular debris with catarrhal exudates in the intestinal lumen. Infiltration of lymphocytes and macrophages into the intestinal mucosa. The findings conformed to the observations of Smith *et al.* (1992), Sharma *et al.* (2015), Satish *et al.* (2019). Continued irritation of the intestinal wall by adult parasites can cause catarrhal inflammation and an increase in the number and size of goblet cells (Soulsby, 1982). The present study suggests that goats are susceptible to GIP and that these are associated with the production of variable pathological changes. In our study, prevalence of *Eimeria* spp. was recorded and this high prevalence rate of coccidia infection was due to the overcrowding and poor hygienic practices, which greatly encouraged the transmission of parasites. These infected animals become carriers and contaminate the healthy environment.

Conclusion

It is concluded that the present study provides parasitological and histological observations of common GI parasites in the Jabalpur region. Goats are brought to the slaughterhouses of Jabalpur City from different parts of the surrounding region. Animals that are heavily infected with GI parasites can have high morbidity and mortality. Parasite loads have adverse effects on small animals, especially the goat industry and public health concerns. Some control measures for GI parasites in small ruminants must be undertaken to reduce the parasitic burden.

Acknowledgments

The present work is part of research for a post-graduate thesis. The facilities and funds provided by the Head of the Department and the Dean of the College are thankfully acknowledged. The authors acknowledge the help rendered by persons working in slaughterhouses in collecting the material to carry out the present work.

Contribution by authors

All the authors contributed equally to writing the manuscript. The final manuscript was read by all others and consented to publication.

Conflict of Interests

There is no conflict of interest.

Publisher Disclaimer

IJLR remains neutral concerning jurisdictional claims in published institutional affiliation.

References

1. Bandyopadhyay, S., Mandal, S., Datta, K. K., Devi, P., De, S., Bera, A. K., & Bhattacharya, D. (2010). An economic analysis of the risk of gastrointestinal parasitic infection in cattle in the North Eastern States of India. *Tropical animal health and production*, 42(7): 1481-1486.
2. Bhat, S. A., Mir, M. U. R., Qadir, S., Allaie, I. M., Khan, H. M., Husain, I., and Sheikh, B. A. (2012). Prevalence of gastro-intestinal parasitic infections in Sheep of Kashmir valley of India. *Veterinary World*, 5(11): 667-671.
3. Chaurasiya, R., Dixit, P., Dixit, A. (2021). Prevalence of Gastrointestinal Parasites in Goats in and around Rewa, India. *International Journal of Livestock Research*, 11(2): 150-154.
4. Chedge, R., Dixit, A. K., and Dixit, P. (2013). Prevalence of gastrointestinal parasites in goats at Adhartal, Jabalpur. *Ruminant Science*, 2: 155-156.
5. Hassan, N. M., Farag, T. K., El Ezz, N. M. A., & Abou-Zeina, H. A. (2019). Prevalence assessment of gastrointestinal parasitic infections among goats in Giza Governorate, Egypt. *Bulletin of the National Research Centre*, 43(1): 1-7.
6. Gridley, M.F. (1960). Manual of histological & special staining technique. McGraw-hill book Company, New York Toronto, London. 202 p
7. Mbah, M., Akpan, S. S., & Egbe, C. (2018). A parasitological and histological survey on common gut

- parasites of goats slaughtered in Calabar Metropolis. *International Journal of Medical Evaluation and Physical Report*, 3(1): 27-34.
8. Nwoke E. U., Odikamnoro O.O, Ibiam G. A., Umah O. V. & Ariom O. T. 2015. A survey of common gut helminths of goats slaughtered at Ankpa abattoir, Kogi State, Nigeria. *Journal of Parasitology and Vector Biology*, 7(5): 89-93.
 9. Satish, A. C., Nagarajan, K., Balachandran, C., Soundararajan, C., & Legadevi, R. (2019). Gross and histopathology of Coccidiosis in Small Ruminants in Tamil Nadu. *International Journal of Livestock Research*, 9(2): 225-235.
 10. Sharma, S., Patel, P. V., Choudhary, D., Asopa, S. and Manohar, M. S. (2015). Pathological changes due to helminth infestation in goats in Anand district of Gujarat. *The Indian Journal of Veterinary Sciences and Biotechnology*, 10 (4): 23-26.
 11. Smith HA, Jones TC and Hunt RD (1992). *Veterinary Pathology*. 4th Edn, Lea and Febiger, London, UK.pp 743-744.
 12. Soulsby, E. J. L. (1982). *Helminths. Arthropods and Protozoa of domesticated animals*, 291.
 13. Jamra, N., Das, G., Agrawal, V., Jayraw, A. K., Jamra, M. S., Jatav, G. P. (2017). Gastrointestinal parasitism in buffaloes from Nimar region of Madhya Pradesh. *Ruminant Science*, 299.
 14. Sutherland, I., Scott, I., Armour, J. (2010). *Gastrointestinal nematodes of sheep and cattle: biology and control* (Vol. 5). Chichester: Wiley-Blackwell.
 15. Taylor, M. (2009). Changing patterns of parasitism in sheep. *In Practice*, 31(10): 474-483.
 16. Singh, A.K., Das, G., Roy, B., Nath, S., Naresh, R. and Kumar, S. (2015). Prevalence of gastrointestinal parasitic infections in goat of Madhya Pradesh, *Indian Journal of Parasitic Disease*, 39(4):-,716-719.
