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Pathomorphological and Haemato-biochemical study of Oesophagostomiasis in Goats

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Abstract
The present study was carried out from May 2022 to October 2022. During this period a total number of 154 specimens of intestine of goats showing gross changes were collected irrespective of age, sex and breed from slaughter houses in Bikaner district and also from the carcasses submitted to the Department of Veterinary Pathology for routine post-mortem examination. Overall prevalence of GI parasites was 7.79%. Out of which, oesophagostomiasis was 4.54%. Haematological parameters indicated a significant increase in TLC, neutrophil and eosinophil count while a decrease in Hb, PCV, lymphocyte and TEC. Biochemical parameters revealed a significant decrease in total serum protein and albumin. The levels of AST and Glucose increased non-significantly while ALT levels and globulin increased significantly.

Keywords: Oesophagostomiasis, GI parasites, haemato-biochemical parameters

Introduction
Traditionally goat has served as source of livelihood and financial security to large section of society, mainly comprising of resource-poor people. Goat husbandry provides nutritional security and prosperity to the millions of small and marginal farmers and glimpses of future hope for employment generation in the country (National Action Plan on Goat, 2022) [8].
The incidence of diseases and parasitic infestations is one of the major constraints in the development of goat enterprise leading to substantial economic losses to the goat keepers. These diseases accounted for about 82.7 per cent of the total losses in goats in India (Singh and Prasad, 2008) [12]. Parasitic enteritis is also one of the major and underestimated factors limiting the successes of small ruminant productivity worldwide (Sultan *et al.*, 2016) [13].
Among GI parasites, *Oesophagostomum columbianum* and *O. venulosum* occurs in small ruminants and are responsible for hypoproteinemia, anaemia, protein-losing enteropathy and death (Chiejina, 1987) [3].

Materials and Methods
A. Collection of Samples
(a) Collection of samples for histopathology
For the proposed investigation 154 specimens of intestine of goats showing gross changes were collected irrespective of age, sex and breed from slaughter houses in Bikaner district and also from the carcasses submitted to the Department of Veterinary Pathology for routine post-mortem examination.

(b) Collection of blood samples for Haemato-biochemical study
Blood samples were collected from diseased goats on the basis of history and clinical symptoms. Blood samples from apparently healthy goats were also taken and used as control. The blood samples were collected from the slaughter house and goats presented in Veterinary Clinical Complex, CVAS, Bikaner by jugular venepuncture in two vials, one with EDTA and another without EDTA for serum separation. The collected blood was taken or discarded after the confirmation of the lesion. Serum was separated by making the blood slant. Blood clot was broken and tubes were centrifuged at 2500 rpm for 30 minutes. Serum was pipetted out in small Pyrex tube and kept at -20 °C for biochemical analysis.

B. Pathological Examination

1. **Gross examination:** The pattern and morphology of the gross lesions, wherever possible, were noted. All the samples were properly preserved in 10 percent formalin. The part of affected tissues measuring 2-5 mm thickness, presenting the lesions with normal tissue were used for fixation and further histopathological examination.
2. **Histopathological examination:** The formalin preserved tissues were histopathologically examined by the processing of tissue with paraffin embedding by acetone and benzene technique (Lillie, 1965) [5]. The section of 4-6-micron thickness were cut and stained with routine staining method by haematoxylin and eosin (Luna, 1968) [6].

C. Haemato-Biochemical study

1. **Haematological study:** Blood samples were analysed for estimation of Haemoglobin (Hb), Packed Cell Volume (PCV), Total Erythrocyte Count (TEC), Total Leucocyte Count (TLC) and Differential Leucocyte Count (DLC). The estimations were done manually and analysed as per the standard method described by Jain (1986). All the haematological studies were made within six hours of blood collection.
2. **Biochemical Study:** Serum samples were analysed for biochemical estimation *viz*. Total Serum Protein, Serum Albumin, Serum Globulin, Serum Glucose, Serum Aspartate Transaminase (AST) and Serum Alanine Aminotransferase (ALT) by using the IDEXX Vet Test Chemistry Analyzer.

D. Statistical Analysis

The data obtained from both apparently healthy and diseased goats were analysed by using 'independent student t-test' method using SPSS -20 software version.

Results

Oesophagostomiasis was reported in 07 (4.54%) cases. Grossly, most of the cases had thickened and oedematous mucosa of the intestine with various size and number of yellow to greenish colour of nodules (Fig. 1). On cutting open the intestine adult parasites were seen in the lumen (Fig. 2). Microscopically, oesophagostomum nodule with necrotic mass and granulomatous inflammation was observed (Fig. 3). The cellular and architectural details were lost in the nodular area (Fig. 4). The area of necrosis was surrounded by a zone of inflammatory cells, eosinophils and encapsulated by fibroblasts (Fig. 5).

Haematological parameter indicated a significant increase ($p \leq 0.01$) in TLC and neutrophil and eosinophil count while a decrease ($p \leq 0.01$) in Hb, PCV, lymphocyte and TEC. Biochemical parameters revealed a significant decrease ($p < 0.01$) in total serum protein and albumin. The levels of AST and Glucose increased non-significantly while ALT levels and globulin increased significantly.

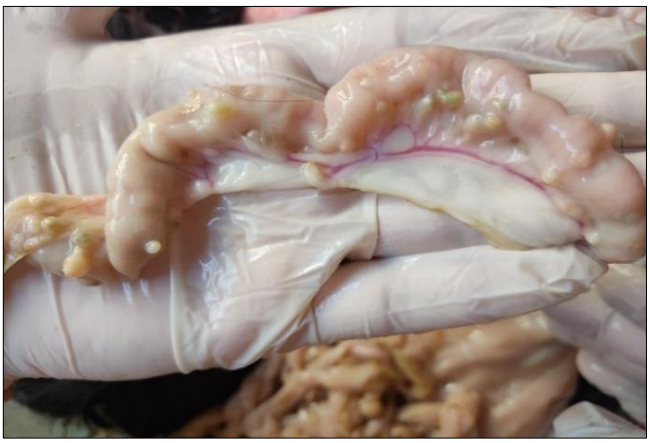

Fig 1: Photograph depicting greenish-white nodules along with congestion in the affected part of the intestine

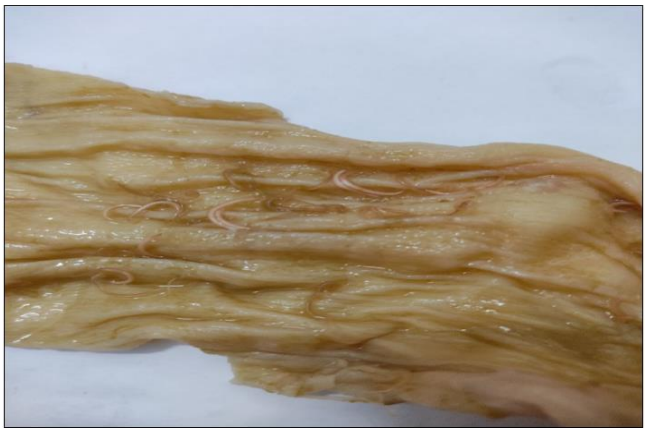

Fig 2: Photograph of intestine showing *Oesophagostomum* embedded in the mucosa along with parasitic nodule

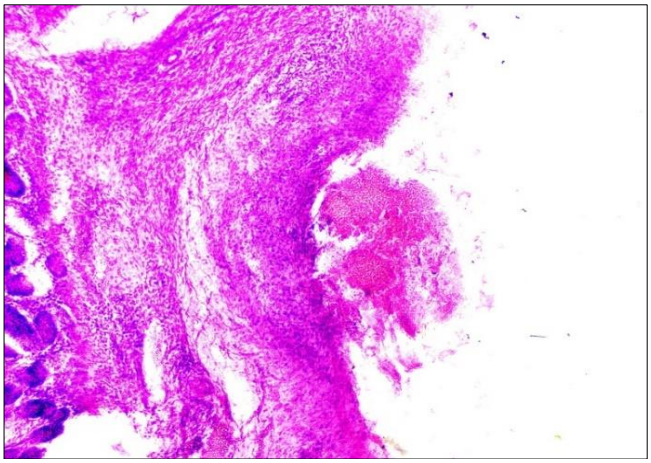

Fig 3: Microphotograph of intestine showing *Oesophagostomum* nodule with necrotic mass and granulomatous inflammation in the submucosa. H&E, 100X.

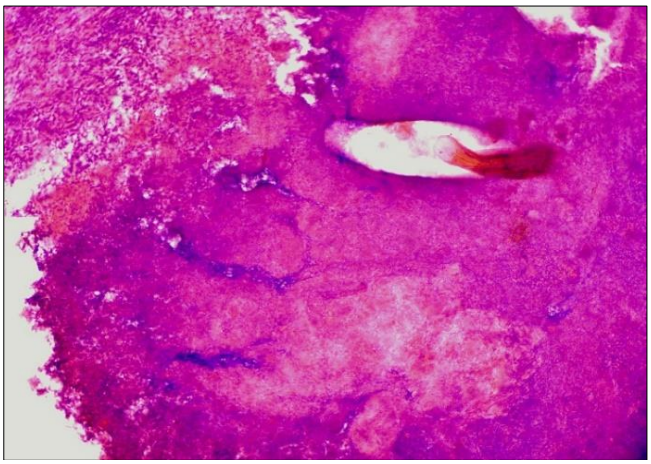

Fig 4: Microphotograph of intestine showing Baso-eosinophiic necrotic area surrounding *Oesophagostomum* with loss of histologic structures. H&E, 100X

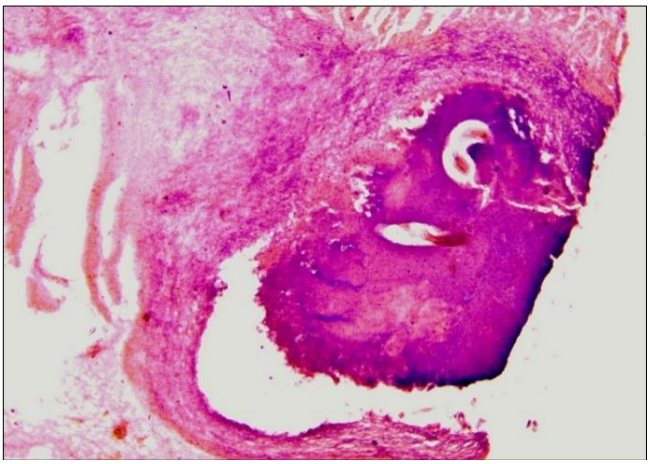

Fig 5: Microphotograph of intestine showing segments of *Oesophagostomum*surrounded by a zone of inflammatory cells, eosinophils and encapsulated by fibroblasts. H&E, 40X.

Table 1: Haemato-biochemical parameters of apparently healthy group (Control) and Oesophagostomiasis affected group (Mean± SE): level of significance

Parameters	Control group (n=07)	Diseased group (n=07)	Level of significance
Hb (g%)	10.98±0.10	8.69±0.35	**
PCV (%)	32.42±0.38	28.79±0.68	**
TEC (million/ µl)	13.62±0.05	5.37±0.033	**
TLC (10^3/ µl)	11.37±0.07	16.71±2.47	**
Neutrophils (%)	40.52±0.26	61.80±1.01	**
Lymphocyte (%)	53.96±0.24	31.10±0.31	**
Eosinophils (%)	2.97±0.10	4.60±0.54	**
Monocyte (%)	1.93±0.12	2.90±1.37	*
Basophils (%)	0.60±0.16	0.70±0.15	NS
TP (g/dl)	6.60±0.05	4.40±0.04	**
Albumin (g/dl)	3.20±0.04	1.69±0.09	**
Globulin (g/dl)	3.71±0.08	2.73±0.13	**
Glucose (mg/dl)	55.44±0.08	56.77±0.94	NS
AST(IU/L)	66.49±5.12	79.78±4.40	NS
ALT(IU/L)	23.93±0.32	36.70±1.59	**

** Highly Significant, *Significant, NS-Non Significant

Discussion

This condition was reported in 07 (4.54%) cases. A similar incidence was recorded by Akhter *et al.* (2011) [1] as 5.35% and a higher incidence of 17% by Satish *et al* (2018) [10].

Grossly, most of the cases had thickened and oedematous mucosa of the intestine with various size and number of yellow to greenish colour of nodules located in different coats of the intestine. These findings associate with those of Chawla (2002) [2] and Mohanta *et al.*, (2007) [7]. Microscopically, nodules with necrotic mass, granulomatous inflammation and loss of cellular and architectural details in the nodular areas surrounded by a zone of inflammatory cells, eosinophils; encapsulated by fibroblasts. These findings are similar to those of Satish *et al* (2018) [10].

Haematological parameters indicated a significant a decrease (p<0.01) in Hb, PCV, and TEC while an increase (p<0.01) in TLC and neutrophil count was observed which might be a result of secondary bacterial infection associated with parasitic infection. Eosinophilia seen may be due to response of the body to the foreign protein of the parasite. Biochemical parameters revealed a significant decrease (p<0.05) in total serum protein and albumin. This might be due to mixed infection with other parasites. The above findings are in agreement with those of Rajpoot *et al.*, 2017 [9]. The levels of AST and Glucose increased non-significantly while ALT levels and globulin increased significantly indicating chronicity or increased gamma globulins.

Conclusion

In this experimental design, overall prevalence of GI parasites was 7.79%. Out of which, oesophagostomiasis was 4.54%.

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Credit to Author Statement

Archana Choudhary: Necropsy, histopathology, in the writing of the manuscript, methodology, data curation.

Satish Nain: Writing, reviewing, editing and formal analysis.

Data Availability Statement

The data that support the findings of this study are available on request from the corresponding author.

Conflict of Interest Statement

The authors declared no potential conflicts of interest with respect to the research, authorship or publication of this article.

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