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ASSESSMENT OF GUT HELMINTH OF BLACK BENGAL GOAT SLAUGHTERED AT KOLKATA MARKET, WEST BENGAL, INDIA

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AUTHORS' CONTRIBUTIONS

This work was carried out in collaboration among all authors. Author SM designed the study, created photographs using microscope and managed the analyses of the study. Author IB managed the literature searches, wrote the protocol and performed the experiment. Author DA created photographs using microscope. All authors read and approved the final manuscript.

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ABSTRACT

The present study was conducted to isolate and examine the different parasitic helminths, their distribution and prevalence in stomach and intestine of adult Black Bengal Goat during six months' time interval of the year 2017-2018. Goat organs were collected from Garfa urban local market of Kolkata and after parasitological study, they were mainly found to be infested with cestodes and nematodes. The most prevalent parasites were *Choanotaenia* sp*., Trichuris* sp*., Ostertagia* sp., *Strongyloides* sp., *Dictyocaulus* sp*., Haemonchus* sp*., Trichostrongylus* sp. The seasonal study revealed the maximum parasitic prevalence during pre and post winter season. The month November and April of a particular period studied exhibits most parasitic abundance and prevalence in relation to mixed infection. Histopathological study of the infected tissue revealed cellular damage, infiltration and disintegration.

Keywords: Helminth; infection; goat.

ABBREVIATIONS

GI : Gastrointestinal;
AFA :Alcohol Formalin Acetic acid

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1. INTRODUCTION

The ruminant farming is an important activity for subtropical countries like India. Goats are infected with gastrointestinal cestode and nematode species, which provoke similar pathological changes and economic consequences [1,2]. The parasitic infection of helminths and particularly nematodes of the gastrointestinal tract is a major threat for ruminant's production, health and welfare associated with outdoor breeding [3]. Gastrointestinal parasites are one of the main constraints to small ruminant production in India. The present study is aimed to examine the prevalence of helminthiasis in gastrointestinal tract of marketable goat along with detailed histopathological study of selected tissue.

2. MATERIAL AND METHODS

2.1 Sample Collection

The intestines and stomach of total fifty (50) adult goats were collected from Garfa urban local market of Kolkata during the time period of November to April, of the year 2017-2018. The collected tissues were dissected longitudinally and screened for the infection of helminth parasites. After collection of parasites, each of the gastrointestinal tracts was examined thoroughly from the outer surface, to detect the gross pathological changes.

2.2 Analysis of Parasitological Sample

The gastrointestinal tract was subjected to routine examination to collect the gastrointestinal parasites, according to the procedure as described by Boes [4]. Internal surface of the intestinal tracts was investigated carefully and thoroughly to detect any gross pathological changes. From the suspended viscera, mucosal scrapping was taken and examined under microscope to detect any tiny parasites which deeply burrow in to the mucosa. Parasites of the gastrointestinal (GI) tract were separated with forceps from the intestinal content by repeated sedimentation and gentle washing with phosphate buffered saline (PBS) to collect cestodes and nematodes by the help of curved needle and kept in glycerine alcohol. The cestodes and nematodes were collected by the help of curved needle and preserved in 10% formalin for identification. The helminthic parasites were kept in lactophenol for 5-7 days for visibility of the internal organs. The collected parasites were fixed in Alcohol Formalin Acetic acid (AFA) for a few minutes and preserved in 70% ethyl alcohol in vials for prolonged storage [5]. The recovered cestode and nematode as well as smeared slide were stained with borax carmine for one and half to two hours, dehydrating in alcohol graded series of 50%, 70%, 90%, 100%, cleaned with xylene and mounted in Canada balsam.

2.3 Analysis of Parasitic Infestation

The analyses of parasitic infestation for prevalence were carried out by the following the method of [6] as

$$\text{Prevalence} = \frac{\text{Total No Of Hosts Infected}}{\text{Total No Of Hosts Examined}} \times 100$$

2.4 Histopathology

Tissue samples for histology were obtained from goat and routine histopathological study was carried out following the method of Butchiram [7].

3. RESULTS AND DISCUSSION

Among fifty (50) adult goats, forty-five (45) are found positive of gastrointestinal parasites by gross infection of gastrointestinal tract (Fig. 1A&1B).Out of forty-five (45) parasite infected goats, fifteen (15) were found positive for cestode, twenty (20) harbour nematode and ten (10) had mixed infection. Among twenty (20) parasite infected goats, the nematodes include *Trichuris* sp. (Fig. 2A&2B), *Ostertagia* sp. (Fig. 3), *Strongyloides* sp. (Fig. 4A&4B), *Dictyocaulus* sp. (Fig. 5). The prevalence of helminth parasite species of cestode during the study was *Choanotaenia* sp. (Fig. 6). The nematodes collected from stomach include *Haemonchus* sp. (Fig. 7A & 7B, 9 & 10) and *Trichostrongylus* sp. (Fig. 8). November, March and April have shown most prevalence for nematode infection in both intestine and stomach (Fig. 11). For both cestode and mixed infection November and April have shown most prevalence in intestine infection and November and March have shown most prevalence in stomach infection (Figs. 12 & 13). Transmission of these parasites may be through the ingestion of parasitic eggs and infective larvae on contaminated pasture, water, soil, human hands or tissues of infected vertebrate intermediate hosts, skin penetration, transplacental as well as arthropod and gastropod intermediate hosts [8]. The prevalence of gastrointestinal helminths are related to the agro-climatic conditions like quantity and quality of pasture, temperature, humidity and grazing behaviour of the host [9]. The present study is indicative of seasonal prevalence of cestode and nematode infection that is higher during pre and post dry-cold season of December to February. This might be related to the availability of browse and a longer browsing time that increases the chance of contact

between the host and parasites. Sufficient moisture and temperature prevails during pre and post dry-cold season of December to February which creates favourable conditions allowing for the larval development, oocyst sporulation and survival of the infective stage larva.

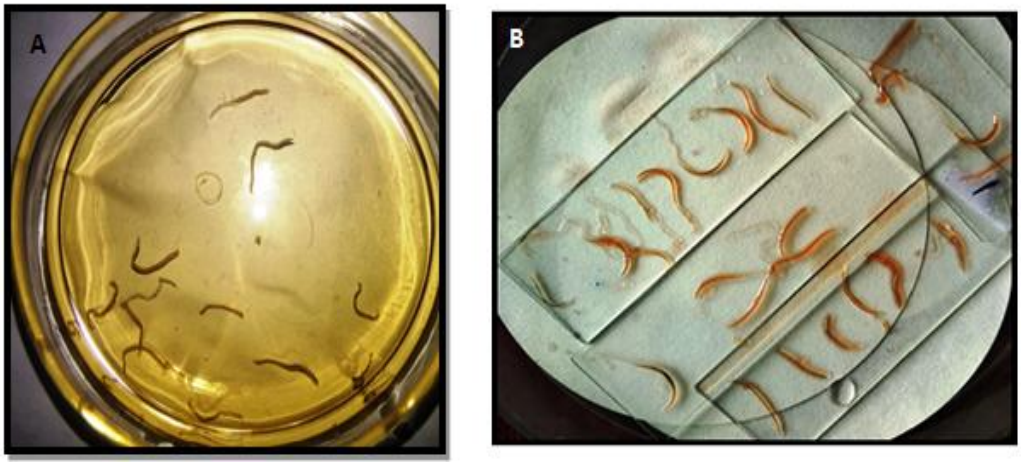

Fig. 1(A)&(B). Parasites (helminths) collected from intestine of goat.

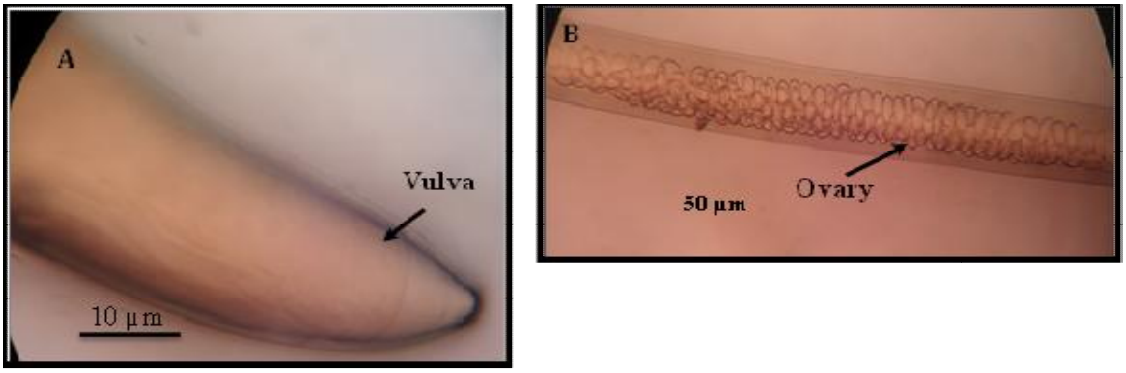

Fig. 2. (A) Photomicrograph of posterior portion of *Trichuris* sp. collected from intestine of goat x1000.
(B) Photomicrograph of reproductive organ of *Trichuris* sp.x400.

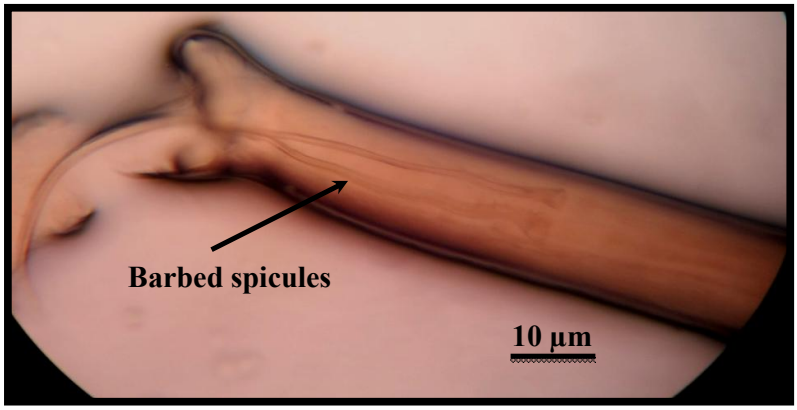

Fig. 3. Photomicrograph of *Ostertagia* sp. (posterior end of male) collected from intestine of goat. x1000.

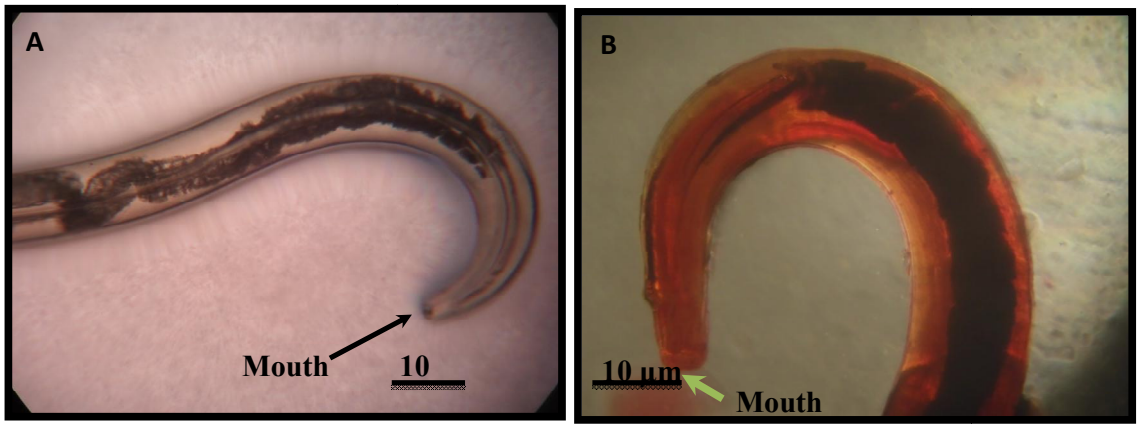

Fig. 4. (A) & (B). Photomicrograph of *Strongyloides* sp. (anterior part) collected from intestine of goat. x1000

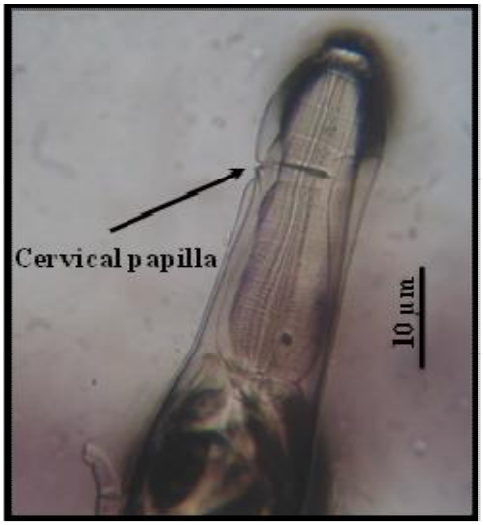

Fig. 5. Photomicrograph of *Dictyocaulus* sp. (anterior portion) collected from intestine of goat. x1000

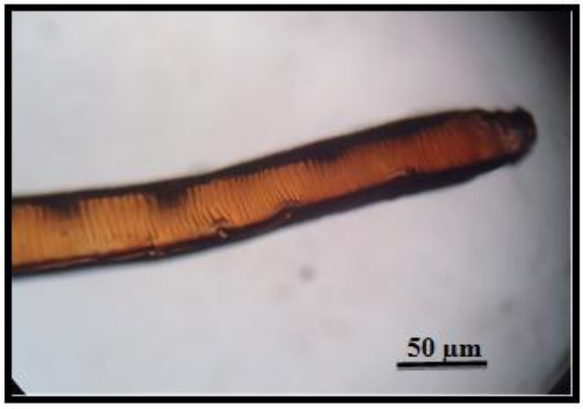

Fig. 6. Photomicrograph of *Choanotaenia* sp. (anterior portion) collected from intestine of goat. x400

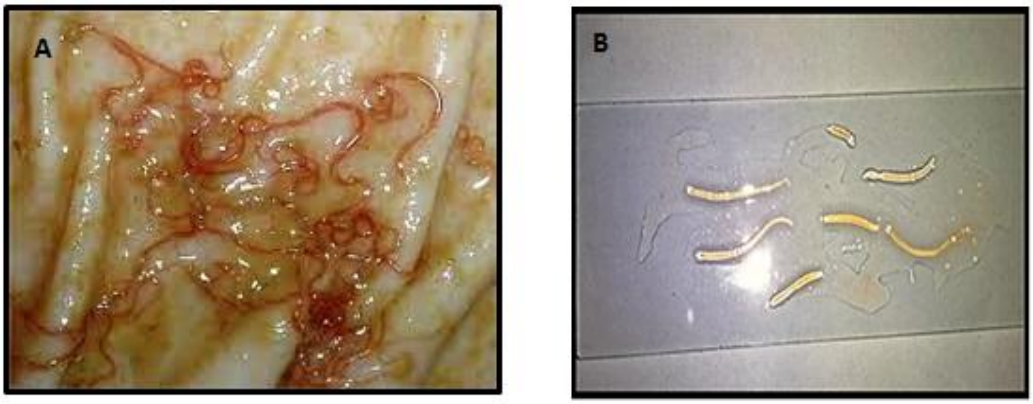

Fig. 7. (A) & (B). Whole parasites (*Haemonchus* sp.) collected from abomasum of goat

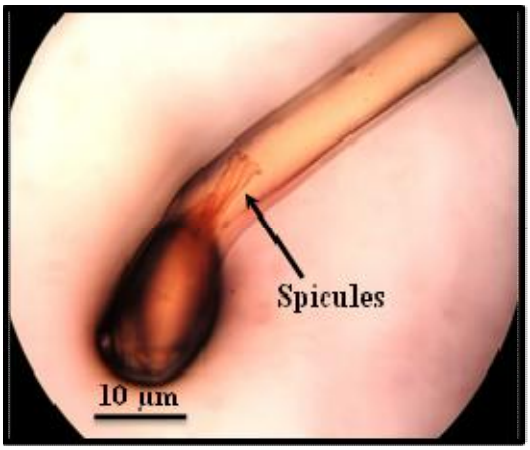

Fig. 8. Photomicrograph of posterior end of *Trichostrongylus* sp. (male) collected from abomasum of goat. x1000

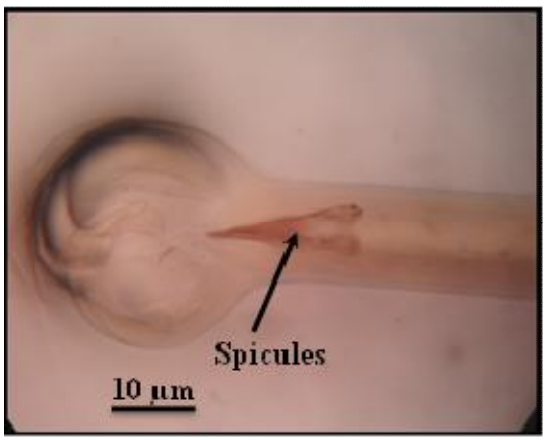

Fig. 9. Photomicrograph of posterior end of *Haemonchus* sp. (male) collected from abomasum of goat. x1000

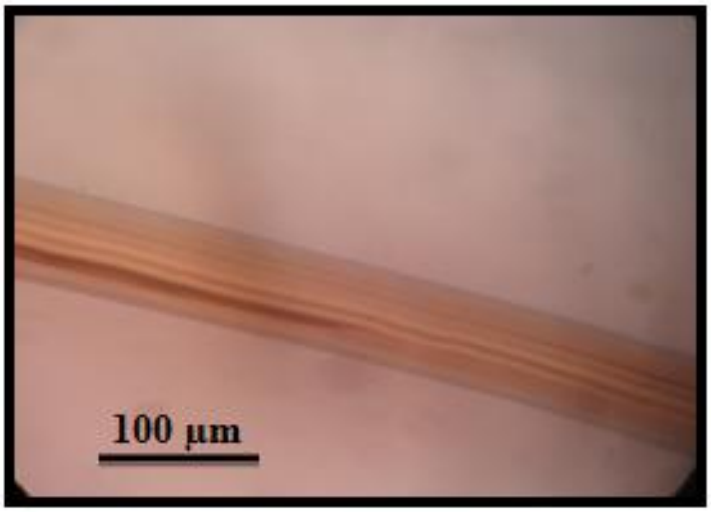

Fig. 10. Photomicrograph of *Haemonchus* sp. (ventral view) collected from abomasum of goat. x100

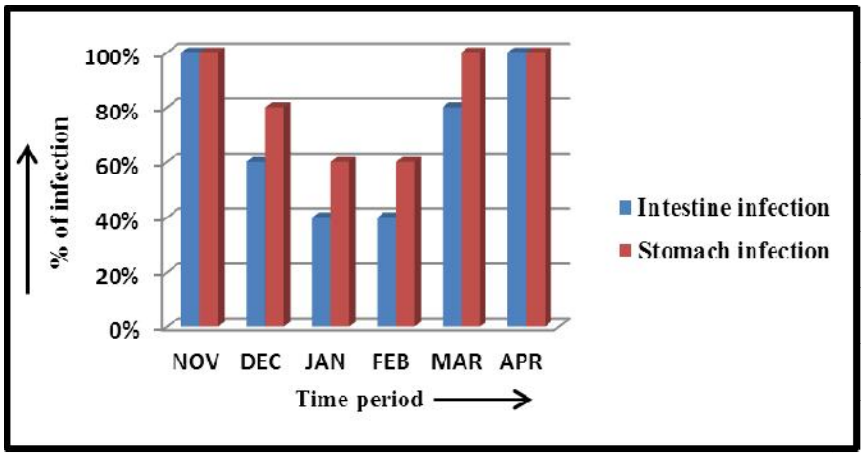

Fig. 11. Prevalence of nematode infection in goat over six month's period.

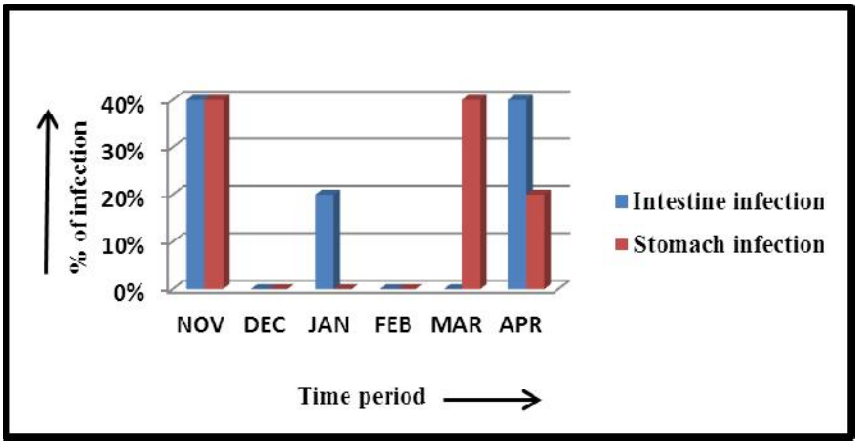

Fig. 12. Prevalence of cestode infection in goat over six month's period

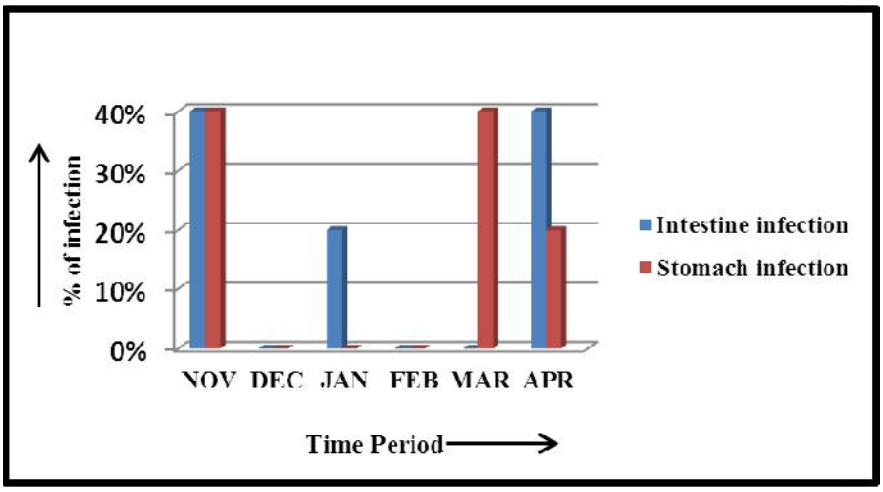

Fig. 13. Prevalence of mixed infection in goat over six month's period

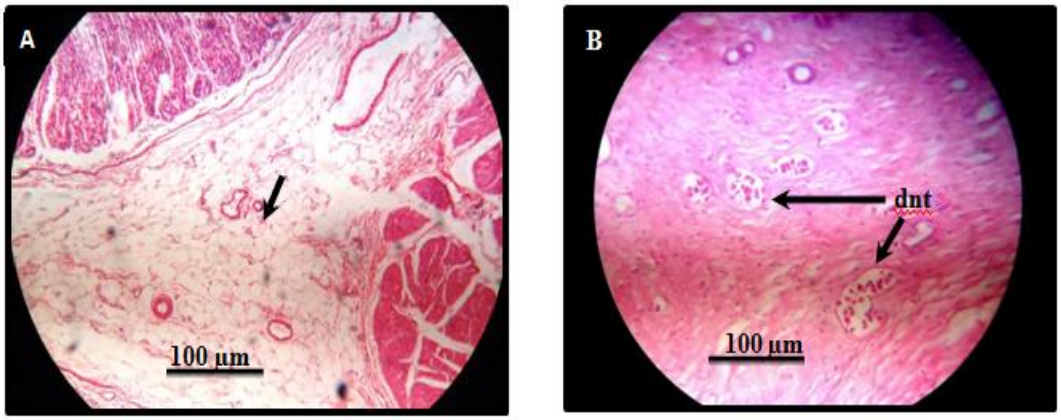

Fig. 14. Histopathological section of intestine (A). Intestinal Lumen. (B). Intestinal mucosal membrane exhibiting disintegration (dnt). x400

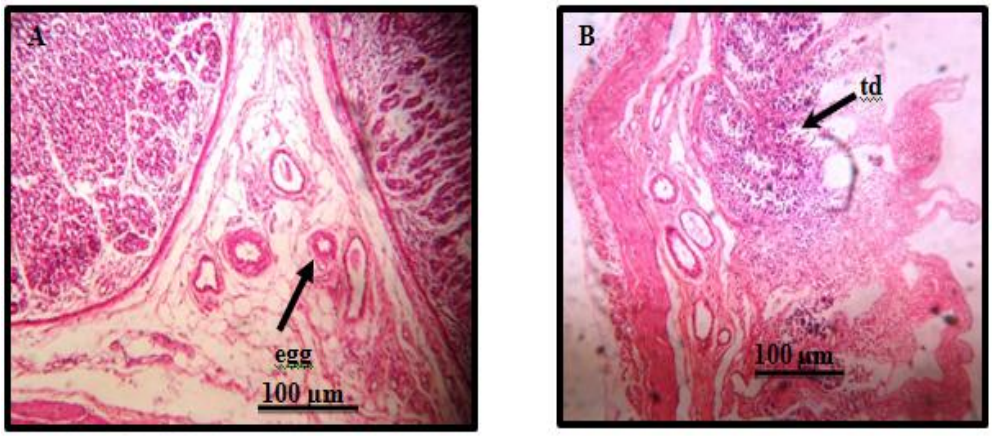

Fig. 15. Histopathological section of abomasum. (A). Abomasum parasitized with egg (B). Tissue debris (td) in parasitized infection. x400

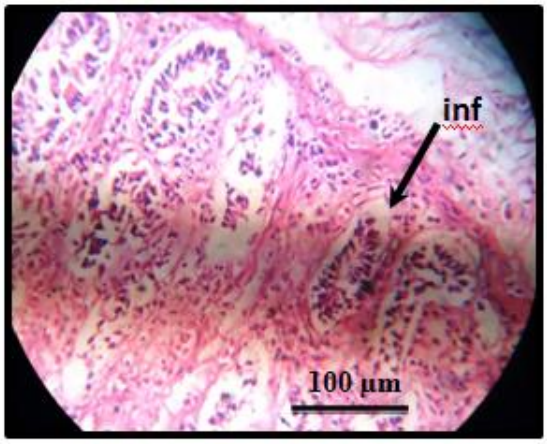

Fig. 16. Histopathological section of parasite infected intestinal mucosa exhibiting oedema, inflammation (inf) with infiltration of mononuclear phagocyte. x400

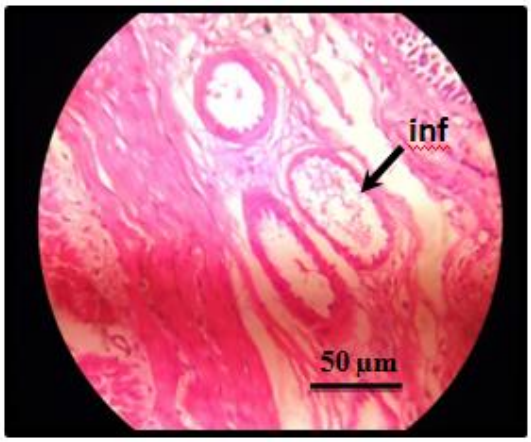

Fig. 17. Histopathological section of parasite infected abomasum exhibiting oedema, inflammation (inf) and congested blood vessels. x1000

The pathology is a consequence of the host immune response which is assumed to be generated to eliminate invading pathogen [10]. During this process of penetration, mild to moderate degree of damages in the intestinal surface were found by helminthic infection (Fig. 14B) compare to uninfected tissues (Fig. 14A). Microscopic observation of egg parasitized abomasum (Fig, 15A) and subsequent study revealed excess mucus secretion, development of oedematous folds and formation of tissue debris (Fig. 15B). Due to the continuous irritation of the parasites on the intestinal wall, inflammation occurs (Fig. 16). Damage of epithelial lining of tissue along with inflammation in gastric glands was observed in infected stomach (Fig. 17).

In the present study the high prevalence of single or mixed infection parasitic infections is not unexpected as keeping pastures and watering systems free of contamination with parasites and opportunistic pathogen remains a major problem for many farmers in the tropical countries like India. Poor hygienic condition and management procedure become a common practise in livestock management that affect productivity which manifest in low fertility, reduction in food intake, low weight gain, high treatment cost and high mortality [9,11].

4. CONCLUSIONS

In the present study the marketable goats were screened for the presence of gastrointestinal parasites. Especially gastrointestinal (GI) parasites are one of the main constraints to small ruminant production in many countries and may account to loss for marketable products [12]. The prevalence of

helminthic infection recorded in the study may be due to overcrowding poor management and hygiene which greatly encourage the spread of these parasites as these animals become carriers of gastrointestinal parasites and continually contaminate the environment with eggs and oocytes of the parasites. It is important that some control measures for gastrointestinal parasites in goat be under taken to reduce parasite burden. Grazing field should be kept free from contamination with faeces and urine of animals. Another option to prevent parasite infections is to leave at least three inches of forage in the fields when animals move to the next field. Producers should keep records that identify when they treat animals for parasites. Education of goat owner on method of transmission and effect of parasites as the productivity of the animals should be carried out from time to time.

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COMPETING INTERESTS

Authors have declared that no competing interests exist.

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