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Study on haemato-biochemical profile in goats suffering from gastrointestinal nematodiasis

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Abstract

This cross sectional study aims at determining the effect of gastrointestinal nematodes on haematological and biochemical parameters in goats. 368 goats that were presented to the Campus Veterinary Hospital and Ambulatory Clinical Services, Mylardevpally, College of Veterinary Science, Rajendranagar, Hyderabad, from December-2017 to June-2018. Out of which 140 goats (38.04%) were found positive for gastrointestinal nematodal infestation.

Ten apparently healthy goats (Group I) which were negative for gastrointestinal nematodal infestation were selected, subjected to haematological and biochemical investigations and they served as healthy control group. Goats positive for gastrointestinal nematodal infestation were randomly divided into two groups (II and III) with each group having 10 positive cases. There was significant ($p < 0.05$) decrease in the mean Haemoglobin (Hb), Packed cell volume (PCV), Total erythrocyte counts (TEC) and lymphocytes, Total serum proteins (TSP), Albumin levels whereas, significant ($p < 0.05$) increase in Total leucocyte counts (TLC), eosinophils, monocytes and Globulin and Alanine aminotransferase (ALT) counts in infested goats. It was concluded that decreased haemoglobin, total erythrocyte counts, total serum proteins, albumin were important indicators of gastrointestinal nematodiasis in goats.

Keywords: Goat, nematodes, haemato-biochemical profile, Hyderabad

1. Introduction

Gastrointestinal (GI) parasitism has been reported as major threat and a primary constraint to small ruminant industry causing production losses and even mortality in severe cases (Tariq *et al.*, 2010) [24]. The host-parasite relationship in case of Nematode parasites result into large scale damage at the site of attachment, which was characterized clinically by enteritis, anaemia, emaciation, dehydration and death. These changes are responsible to affect the growth, body weight, yield and reproductive performance of animal leading to economic loss to the farmer (Sharma *et al.*, 2014) [19]. In sub-clinical form worm sucks blood continuously (Maiti *et al.*, 1999) [11] resulting in anemia and hypoproteinemia. Serum biochemistry and haematological analysis have been found to be important and reliable indicators for assessing an animal's health status and might give an assessment of the degree of damage to host tissue as well as severity of infestation (Otesile *et al.*, 1991) [13].

The present study was conducted with the following objectives:

1. The effect of gastrointestinal nematodiasis on haematological and biochemical profile in goats.

2. Materials and Methods

The present investigation was carried out in the Department of Veterinary Medicine and collaboration with the Department of Veterinary Parasitology, college of Veterinary Science, Rajendranagar, Hyderabad. during December 2017 to June-2018 were randomly screened for gastrointestinal nematodal infestation and those positive for gastrointestinal nematodal parasites were selected for the present study.

2.1 Collection and analysis of faecal samples

Five grams faecal sample was collected directly from the rectum of each goat in a zip lock cover. The faecal samples were analyzed by Direct Smear Method and Sedimentation /Salt Flotation Technique for the presence of nematodal eggs. The goats found positive for nematodal eggs were subjected to quantitative evaluation by modified McMaster's technique for the determination of level of parasitic infestation as described by Eysker and Ploeger (2000). Ten apparently healthy goats (Group I) which were negative for gastrointestinal

nematodal infestation were selected, which served as healthy control group. Goats positive for gastrointestinal nematodal infestation were divided into two groups (II and III) with each group having 10 positive cases. These groups of goats were subjected to haematological and biochemical investigation.

2.2 Collection and analysis of haematological parameters

Blood samples were collected from goats that were positive for nematodal eggs in 4 ml EDTA vacutainers from jugular vein under aseptic conditions for estimating Haemoglobin (Hb) (g %), Packed cell volume (PCV) (%), Total erythrocyte count (TEC) ($\times 10^6 \mu\text{L}$), Total leucocyte count (TLC) ($\times 10^3 \mu\text{L}$) and Differential leucocyte count (DLC).

2.3 Collection and analysis of biochemical parameters

Blood was collected in 4 ml serum vacutainers with clot activators under aseptic conditions. After collection, blood was allowed to clot at room temperature and centrifuged for serum separation. Serum samples were then transferred into Eppendorf tubes and were maintained at 4°C till they reached the laboratory for estimation of Total serum protein (TSP) (g/dl), albumin (g/dl), globulin (g/dl) and Alanine aminotransferase (ALT) (μL). Data collected, was analyzed statistically as per the methods described by Snedecor and Cochran (1967).

3. Results and Discussion

Goats found positive for gastrointestinal nematodal infestation were selected and divided as group II and III and healthy animals were used as control (group I). In the present study it was noticed that the mean values of haemoglobin (9.73 ± 0.01 and 9.67 ± 0.01), PCV (26.59 ± 0.58 and 26.21 ± 0.33) and TEC (11.34 ± 0.01 and 11.23 ± 0.007) in goats infested with gastrointestinal nematodal parasites of group II and III, respectively, which were found significantly ($p < 0.05$) lower, when compared to goats which were negative (Healthy group) for gastrointestinal nematodal parasites. Similar findings of decrease in Hb, PCV and TEC were reported by Contreras *et al.* (1976) and Moudgil *et al.* (2017) [4, 12]. The reduction in Hb, PCV and TEC in the goats that were infested with nematodes, was due to their blood sucking ability and losses due to leakage on severe damage to gastrointestinal mucosa caused by the parasites (Soulsby, 1976 and Urquhart *et al.*, 1996) [21, 25].

In the present study, the mean values of TLC (11.09 ± 0.02 and 10.98 ± 0.02) in goats infested with gastrointestinal nematodal parasites of group II and III, respectively were found significantly ($p < 0.05$) higher when compared with healthy control goats. Similar findings were recorded by Ahmed *et al.* (2015) [1], Richard and Cabaret (1993) [17] and Jas *et al.* (2008) [9]. The increase in the levels of total leucocyte counts during the present study might be due to increased local immune responses by eosinophils and monocytes (Ahmed *et al.*, 2015) [1].

The present findings of significant ($p < 0.05$) decrease in lymphocytes (49.14 ± 0.95 and 49.42 ± 0.34) and increase in eosinophils (7.12 ± 0.17 and 6.97 ± 0.10) were in agreement with the findings of Richard and Cabaret (1993) [17], Sharma

et al. (2005), Ahmed *et al.* (2015) [1] and Qamar *et al.* (2012) [14]. Eosinophils were considered to be important elements that respond against nematodes infestations (Balic *et al.*, 2000) [2]. The animals infested with nematodes showed considerable degree of blood eosinophilia, when compared to the non-infested animals. The eosinophils mobilized against specific parasites were frequently found to cause immobility and death of larvae of homologous or heterologous parasites often in association with antibodies and/or other factors (Rainbird *et al.*, 1998) [15].

In the present study the mean values of monocytes (3.01 ± 0.03 and 2.96 ± 0.01) in goats infested with gastrointestinal nematodal parasites of group II and III, respectively, were found significantly ($p < 0.05$) higher when compared with healthy control goats. Similar findings were observed by Ahmed *et al.* (2015) [1]. The increase in monocytes was due to phagocytic activity of the cell digesting the particulate matter and debris of parasites as observed in cell mediated immune responses (Ahmed *et al.*, 2015) [1].

In the present study, biochemical analysis of serum infested with gastrointestinal nematodal parasites revealed significant decrease ($p < 0.05$) in the levels of total serum protein of 5.14 ± 0.03 and 5.31 ± 0.03 in goats of group II and III and albumin content of 1.92 ± 0.04 and 2.02 ± 0.04 g/dl in goats of group II and III, respectively. Similar findings were also reported by Hassan *et al.* (2012) [8], Qamar *et al.* (2012) [14] and Ahmed *et al.* (2015) [1]. The hypoproteinemia and hypoalbuminemia in the affected animals could be attributed to protein losing gastroenteropathy in nematodiasis (Soulsby, 1982) [22] and malabsorption of proteins from damaged intestinal mucosa in concurrent gastrointestinal infections (Ahmed *et al.*, 2015) [1]. The affected animal loose large amount of serum protein into the gut lumen and about 210-340 ml of serum protein were excreted through faeces per day in the affected animals (Bordoloi *et al.*, 2012 and Dargie *et al.*, 1975) [3, 5].

During the present study, a significant increase ($p < 0.05$) in the values of serum globulin in goats of group II (3.22 ± 0.03) and III (3.29 ± 0.05) were recorded, when compared with healthy control goats. Similar increase in the values of globulins were reported by Diogenes *et al.* (2010) [6] and Jas *et al.* (2010) [10]. The parasitic infestation was found to stimulate the host's immune system resulting in increased synthesis of gamma globulins (Tarazona *et al.*, 1982) [23].

In the present study, a significant ($p < 0.05$) increase in Alanine Aminotransferase (ALT/SGPT) values in group II and III (26.09 ± 0.33 and 24.19 ± 0.52 U/L, respectively) were recorded, which were in agreement with the findings of Moudgil *et al.* (2017) [12], Ratnesh *et al.* (2013) [16] and Hassan *et al.* (2012) [8].

The increased levels of alanine aminotransferase in the present study also corroborates with the findings of Sharma *et al.* (2001) [18]. The increase in the levels of alanine aminotransferase in affected animals was due to traumatic damage of abomasal and intestinal lining mucosa by the parasites. The nematodes larvae were found to cause damage to deep abomasal muscular layers (Sharma *et al.*, 2001) [18].

Table 1: Haematological profile of goats infestated with gastrointestinal nematodes and apparently healthy goats (n=10)

S. No.	Parameters	Healthy goats (Group I)	Infestated goats (Group II)	Infestated goats (Group III)	
		Mean ± SE	Mean ± SE	Mean ± SE	
1.	Haematological parameters	Hb (g %)	11.58±0.02	9.73 ± 0.01a	9.67 ± 0.01a
		PCV (%)	36.75±0.88	26.59 ± 0.58a	26.21 ± 0.33a
		TEC (x 106 µL)	14.02±0.07	11.34 ± 0.01a	11.23 ± 0.007a
		TLC (x 103 µL)	10.68±0.01	11.09 ± 0.02a	10.98 ± 0.02a
2.	Differential leucocyte counts (DLC)	Neutrophils (%)	39.45±0.15	40.22 ± 0.26	40.16 ± 0.25
		Lymphocytes (%)	53.51±0.42	49.14 ± 0.95a	49.42 ± 0.34a
		Eosinophils (%)	3.89±0.15	7.12 ± 0.17a	6.97 ± 0.10a
		Monocytes (%)	2.72±0.14	3.01 ± 0.03a	2.96 ± 0.01a
		Basophils (%)	0.43±0.02	0.51 ± 0.04	0.49 ± 0.04

^aSignificant at $P<0.05$

Table 2: Biochemical profile of goats infestated with gastrointestinal nematodes and apparently healthy goats (n=10)

S. No.	Biochemical Parameters	Healthy goats (Group I)	Infestated goats (Group II)	Infestated goats (Group III)	
		Mean ± SE	Mean ± SE	Mean ± SE	
1.	Biochemical parameters	TP (g/dl)	6.73±0.08	5.14 ± 0.03 a	5.31 ± 0.03 a
		Albumin(g/dl)	3.97±0.06	1.92 ± 0.04a	2.02 ± 0.04a
		Globulin (g/dl)	2.76±0.06	3.22 ± 0.03a	3.29 ± 0.05a
		Alanine aminotransferase (ALT) (µL)	16.19±0.36	26.09 ± 0.33a	24.19 ± 0.52a

^aSignificant at $P<0.05$

4. Conclusion

It is concluded that the haemato-biochemical parameters were altered in goats with gastrointestinal nematodes; therefore, those could be used as an important diagnostic tools to assess health and disease in goats suffering from gastrointestinal nematodes.

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