Original Research

Study on Haemato-Biochemical Profile in Strongylosis Affected Goats

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Abstract

The present study aims at determining the effect of strongylosis on haematological and biochemical parameters in goats. Animals having eggs per gram (EPG) >2500 were selected and divided into three groups containing 30 goats in each group. Blood samples were collected from all the affected goats on the day of presentation. Results indicated that there was significant decrease ($p<0.05$) in the mean values of Hb, PCV, TEC, MCV, TSP, albumin, glucose and A:G ratio while globulin levels were non-significantly higher in all the infected goats. There was significant increase ($p<0.05$) observed in the levels of TLC, eosinophils and SGOT in infected goats.

Key words: Biochemical, EPG, Haematology, Goats, Strongylosis

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Introduction

Small ruminants play an important socioeconomic role within traditional farming system in many developed and developing countries including India. Goat constitutes an important species of livestock in Asia and contributes greatly to food, rural employment and the gross domestic product (GDP). Internal parasites represent an important cause of disease and loss of production in small ruminants. Most of these infections are sub-clinical and economic losses continuously occur if deworming is not practiced at the strategic time. The most commonly reported adverse effects of gastrointestinal nematodes in goats includes low productivity, decreased weight gain, delay in puberty, impaired digestive efficiency, organ condemnation at slaughter, poor reproductive performance and death of severely infected animals (Tembely *et al*., 1997). Serum biochemistry and haematological analysis of infected goats have been found to be

important and reliable indicator for assessing an animal's health status and give an assessment of the degree of damage to host tissue as well as severity of infection (Otesile *et al.*, 1991). Therefore, the present investigation was conducted to study the effect of strongylosis on haematological and biochemical profile in goats.

Materials and Method

The present investigation was carried out in the Department of Veterinary Medicine, Veterinary College, Bidar for a period of 12 months from April 2016 to March 2017. Animals were selected after initial screening and divided into 3 groups containing 30 animals in each group. Five grams of faecal sample was collected directly from the rectum of each goat in a clean polythene bag. The faecal samples were analysed by direct smear method for the presence of strongyle eggs. From each group faecal samples were pooled to count strongyle eggs per gram of faeces (EPG) by using Modified Gordon and Whitlock (1939) technique for the group using Mc Master slide. Animals having high level of infection i.e., eggs per gram (EPG) more than 2500 were considered as infected animal and apparently healthy animals in the flock were used as control for comparative haemato-biochemical study.

Blood was collected on the day of presentation from jugular vein in sodium EDTA (anticoagulant) vials for haematological investigation. Haematological parameters such as haemoglobin [Hb (g/dL)], total erythrocyte count [TEC(×106/µL)], total leucocyte count [TLC (×103/µL)], packed cell volume [PCV (%)], mean corpuscular volume [MCV (fL)], mean corpuscular haemoglobin [MCH (pg)] and mean corpuscular haemoglobin concentration [MCHC (g/dl)] were determined by utilizing fully automated blood cell counter (PCE-210 (N), ERMA INC, Tokyo, Japan). Differential leukocyte count [DLC (%)] was performed manually as per the procedure described by Coles (1986).

Four millilitre of blood for serum biochemical investigation was collected on the day of presentation with utmost precautions to avoid haemolysis as suggested by Alleman (1990). Serum was separated by centrifugation. Biochemical estimations of the following parameters were carried out by using Artos® semi-automatic biochemical analyser.

Statistical Method

Statistical analysis of data was carried out by employing ONE- and TWO-WAY ANOVA, as per Snedecor and Cochran (1994). Statistically significant difference was considered at 5 per cent level.

Result and Discussion

Haematological Parameters

There was significant decrease ($P \leq 0.05$) in haemoglobin, total erythrocyte count and packed cell volume levels whereas, there was significant increase in total leukocyte count and total eosinophil count ($P \leq 0.05$)

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in all the goats affected with strongylosis on the day of presentation in comparison to the healthy control group as enumerated in Table1.

Table 1: Mean ± SE values of haematological observations in goats affected with strongylosis in comparison with healthy control

Parameters	Healthy Control	Group I	Group II	Group III
Hb (g/dL)	9.01 ± 0.29b	6.60 ± 0.16a	6.62 ± 0.11a	6.64 ± 0.18a
PCV (%)	25.92 ± 0.59c	16.49 ± 0.33a	17.23 ± 0.21ab	18.23 ± 0.55b
TEC (× 106/ µL)	13.41 ± 0.14b	9.83 ± 0.21a	9.79 ± 0.16a	10.13 ± 0.23a
TLC (× 103/ µL)	10.33± 1.24a	14.38 ± 0.73b	13.97 ± 0.39b	12.74 ± 0.51b
Lymphocyte (%)	59.30 ± 1.33b	50.77 ± 1.39a	65.97 ± 1.53c	60.23 ± 1.19b
Neutrophil (%)	37.90 ± 1.14b	42.00 ± 1.30c	26.00 ± 1.44a	34.77 ± 1.42b
Eosinophil (%)	0.70 ± 0.21a	5.87 ± 0.72b	4.17 ± 0.65b	3.63 ± 0.72b
Monocyte (%)	2.10 ± 0.31a	1.37 ± 0.40a	3.87 ± 0.50b	1.37 ± 0.29a
MCV (fL)	19.84 ± 0.62b	16.86± 0.28a	17.79± 0.45a	17.90 ± 0.34a
MCH (pg)	6.91 ± 0.30a	6.72± 0.09a	6.75 ± 0.14a	6.61 ± 0.18a
MCHC (g/dL)	34.74 ± 0.5a	39.97 ± 0.40c	38.68 ± 0.94bc	36.78 ± 0.87ab

** Mean values bearing different superscript differ significantly (P≤0.05)*

The reduction in haemoglobin, packed cell volume and total erythrocyte count was suggestive of anaemia. The present findings were in accordance with the earlier reports of Sharma *et al.* (2014); Awad *et al.* (2016). Ability of strongyle worms to adhere to gastrointestinal mucosa and frequent detachments with blood sucking has been attributed as a major cause of blood loss and subsequent anaemia (Soulsby, 1996) which could be correlated to low haemogram values in present study. There was significant increase in total leukocyte count and total eosinophil count ($P \leq 0.05$) in strongylosis affected goats which is in agreement with Siddiqua *et al.* (1990); Blagoje *et al.* (2016). Increase in the TLC is attributed to an increase in local immune response as described by Ahmed *et al.* (2015). The rise in eosinophils counts might be due to phagocytic activity of the cell that digest the particulate matter and debris of the parasites as an effect of CMI response. Mean values of neutrophils, lymphocytes and monocytes in strongylosis affected goats showed significant difference compared to healthy control as enumerated in Table 1 but the values remained within normal physiological limits which coroborates similar earlier reports of Ameen *et al.* (2010); Sharma *et al.* (2014).

In the present study there was a significant decrease in Mean Corpuscular Volume in goats affected with strongylosis when compared to healthy control as shown in Table1 indicating microcytic anaemia which is in agreement with Nanev *et al.* (2013); Qasim *et al.* (2016). However, there was a significant difference in Mean Corpuscular Haemoglobin (MCH) and mean corpuscular haemoglobin concentration (MCHC) values in affected goats when compared to healthy control though the values remained within the normal physiological limits indicative of normochromic anaemia which is in agreement with Ameen *et al.* (2010); Kumar *et al.* (2015). MCV and MCHC in comparison to other erythrocytic indices have been

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considered as more sensitive parameters to detect anaemia which is hallmark finding in parasitic infections (Benjamin, 2010).

Biochemical Parameters

There was significant decrease ($P \leq 0.05$) in total protein and albumin levels in goats affected with strongylosis in comparison to healthy control group as depicted in Table 2. Lower levels of total serum protein and albumin observed in the present study corroborated with the earlier reports of Pandey *et al.* (2012); Awad *et al.* (2016). The low level of protein in gastrointestinal parasitism has been attributed to increased plasma leakage through the injured gut caused by the parasites (Radostits *et al.,* 2007). This loss is predominantly due to selective loss of albumin having smaller size and osmotic sensitivity to fluid movement. Increased catabolism of albumin and protein malabsorption through the damaged intestinal mucosa has been found to aggravate fall in albumin and subsequent decrease in total protein (Tanwar and Mishra, 2001). In infected goats, A: G ratio value was significantly lower and globulin levels were non significantly higher than the healthy animals which is in agreement with Ahmed *et al.* (2015). The presence of nematode infection stimulated the host's immune system resulting in increased synthesis of gamma globulin (Tarazona *et al.,* 1982) which was evident from a decrease in A: G ratio in infested goats in the present investigation.

Table 2: Mean ± SE values of biochemical observations in goats affected with strongylosis in comparison with healthy control

Parameter	Healthy Control	Group I	Group II	Group III
Serum total protein (g/dL)	6.68 ± 0.11b	5.50 ± 0.22a	5.55 ± 0.18a	5.58 ± 0.13a
Albumin (g/dL)	3.89 ± 0.11b	2.40 ± 0.09a	2.47 ± 0.07a	2.48 ± 0.09a
Globulin (g/dL)	2.79 ± 0.10a	3.10 ± 0.21a	3.08 ± 0.21a	3.10 ± 0.14a
A:G ratio	1.42 ± 0.08b	0.93 ± 0.10a	0.96 ± 0.09a	0.89 ± 0.08a
Glucose (mg/dL)	60.44 ± 1.91^{c}	31.05 ± 1.45^{a}	48.60 ± 1.13^{b}	50.49 ± 1.00^{b}
SGOT (U/L)	66.28 ± 2.36a	90.93 ± 4.56b	106.49 ± 5.56b	106.88 ± 5.80b

**Mean values bearing different superscript differ significantly (P≤0.05)*

Glucose levels were significantly decreased in infested goats compared to healthy control group as shown in Table 2 which is in agreement with Pandey *et al.* (2012); Kumar *et al.* (2015). Hypoglycaemia in parasitic gastroenteritis has been attributed to decreased appetite of animals, decreased absorption of glucose into the blood stream and rapid absorption and utilization of soluble carbohydrate and lipids from the gut by gastrointestinal nematodes (Arora *et al.,* 2003 and Radostits *et al.,* 2007) where as SGOT levels were significantly increased as depicted in Table 2 which corroborated with the earlier reports of Bordoloi *et al.* (2012); Kumar *et al.* (2015). Elevated transaminase levels are suggestive of hepatocellular damage which has been hallmark pathological changes in liver of strongylosis affected goats (Soulsby, 1976).

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Conclusion

Haemato-biochemical changes revealed anaemia, increased total leucocyte count with eosinophilia and decreased levels of total proteins, albumin, A: G ratio, serum glucose and elevated levels of globulin and SGOT on the day of presentation in all the goats affected with strongylosis.

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