International Journal of Veterinary Sciences and Animal Husbandry

ISSN: 2456-2912
VET 2024; 9(1): 318-321

www.veterinarypaper.com
Received: 03-11-2023
Accepted: 10-12-2023

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Biochemical alterations and clinical manifestations of helminth infection in goat

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Abstract
Goat farming is the great economic importance as a major source of income for small and the landless farmers in rural areas. A study Observe various clinical manifestations and biochemical parameters associated with helminth infection in Goat studied at Udaipur district, Rajasthan from May 2016 to January 2017 by faecal examination. Various clinical manifestation was observed like, diarrhoea (16.50%), constipation (8.78%), bottle jaw (6.75%), fever (14.81%), Anemia/pale mucous membrane (10.81%), salivation (12.83%), lacrimation (9.12%), loss of appetite (8.44%), paralysis (0.33%), dyspnoea (3.71%), reduced milk yield (17.56%), and emaciation (10.47%). Biochemical parameters, total protein and albumin showed the significant decrease and globulin showed slight decrease in the helminth infected goats.

Keywords: Clinical, helminth parasites, Goat

Introduction
Goat farming is of great economic importance as a major source of income for small and the landless farmers in rural areas. Goat (Capra), a member of the Bovidae family and subfamily Caprinae is one of the oldest domesticated species. For thousands of years, they have been used for their milk, meat, hair and skin over much of the world. Goat is generally reared to procure meat, milk and skin. Goat is often regarded as poor man's cow. The milk of goat is quite similar to that of cow milk and it is more easily digested because of smaller globules. It is richer in milk content with a high amount of calcium, phosphorus and chlorine. Goat dung is a natural source of organic fertilizer with nitrogen and potassium contents double than that of cattle dung, so goat manure is preferable for increasing the fertility of soil. The rearing of goat had the added advantage of filling an important ecological niche, being able to graze land on which sheep and cattle simply cannot thrive. Rearing of goat plays an important role in the economy of Rajasthan for sustainable livelihood of poor people, because of inherent risk involved in the crop farming due to uncertainty of rainfall and occurrence of recurrent droughts. Helminthiasis, especially parasitic gastroenteritis, pose a serious health threat and a limitation to the productivity of small ruminants due to the associated morbidity, mortality, cost of treatment and control measures. Helminth infection remains one of the major constraints to goat production in tropics. Ecological conditions like weather, texture of soil, population density, type and amount of vegetation, management system, host species and age of the animals play an important role in the prevalence of parasites. In grazing animals, parasitic stages enter the body from the contaminated pasture and water. In western Rajasthan, where pasture is not luxuriant during all year goat get cumulative infection throughout the year due to their specific grazing habit, hence studies on seasonal fluctuation in egg output of gastrointestinal helminth parasites seem to be important. A study Observe various clinical manifestations and biochemical parameters associated with helminth infection in goat in Udaipur district of Rajasthan.

Materials and Methods
The study was conducted from the month of May 2016 to January 2017 in six different villages of Udaipur district in Southern Rajasthan.

The relevant information regarding place, rearing, age, sex, source of feed and water, deworming history, clinical signs etc. were also recorded.

To study the effect of helminth parasites, the biochemical parameters were studied. The blood was collected from 20 infected and 10 non-infected goats from Juglar vein. Blood samples were collected in vials without anticoagulant and were kept undisturbed. The serum was separated and stored at -20 °C for subsequent analysis. The following biochemical estimations were carried out. The serum parameters were as follows:

1. Serum Total Protein
2. Serum Albumin
3. Serum Globulin

i) Estimation of Total Protein

Total protein content of the serum of goat was estimated by Lowry method which is based on the principle that proteins and peptides containing at least two adjacent peptides bonds which react with cupric ions in alkaline solution formed violet coloured complex having absorption maximum at 650 nm.

Table 1: Procedure of Estimation of Total Protein

Reagent	Blank	Test	Standard
Total Protein Reagent	1 ml	1 ml	1 ml
Distilled Water	0.1 ml	-	-
Serum (Sample)	-	0.1 ml	-
Standard	-	-	0.1 ml
Alkaline Copper Reagent	5.0 ml	5.0 ml	5.0 ml
Folin Reagent	0.5 ml	0.5 ml	0.5 ml

The tubes labelled as Standard, Blank and Test were mixed well and incubated at 37 °C for 10 minutes and then the absorbance of all the tubes was measured at 650 nm against the blank.

Calculation: Concentration of total protein in g/dl = (absorbance of test/absorbance of standard) x Concentration of Standard

Where concentration of standard is 6.4 g/dl

ii) Estimation of Albumin

The serum albumin was estimated by BCG (Bromo Cresol Green) method which is based on the principle that serum albumin binds with certain dyes such as bromocresol green, forms coloured complex. The blue green complex has maximum absorption at 630 nm. The concentration of albumin in serum is estimated by comparing the colour intensity of test to the known albumin at 630 nm.

Table 2: Procedure of Estimation of Serum Albumin

Reagent	Blank	Test	Standard
Total Protein Reagent	1.0 ml	1.0 ml	1.0 ml
Distilled Water	0.01 ml	-	-
Serum (Sample)	-	0.01 ml	-
Standard	-	-	0.01 ml

The tubes were mixed well and then allowed to stand for five minutes at room temperature. The absorption of all the test tubes was measured at 630 nm against blank.

Calculation: Serum albumin = (absorption of test/absorption of standard) x 4 gm/dl.

iii) Estimation of Globulin

Globulin was estimated by subtracting the value of total albumin from the value of total protein as:

Globulin in g/dl = (Total Protein in g/dl - Albumin in g/dl)

Result and Discussion

The various Clinical manifestations observed (Table-1) in case of goat diarrhoea (16.50%), constipation (8.78%), bottle jaw (6.75%), fever (14.81%), Anemia/pale mucous membrane (10.81%), salivation (12.83%), lacrimation (9.12%), loss of appetite (8.44%), paralysis (0.33%), dysponea (3.71%), reduced milk yield (17.56%) and emaciation (10.47%).The findings of the present study are in agreement with the findings of Ijaz *et al.*, (2008) [4], who has reported similar clinical manifestations like reduced fertility, lowered milk production, reduction in feed intake, reduced work capacity, diarrhoea, anaemia and reduced weight gain, The reason of clinical manifestation is due to high helminthic load in the gastrointestinal tract.

Table 1: Clinical Manifestation of helminthoses of goat in Udaipur

S. No.	Symptoms	Total screened	Total no. of positive animals screened	Percentage
		Goat	Goat	Goat
		390	296	
1.	Digestive disturbance			
	a) Diarrhoea		68	16.50
	b) Constipation		26	8.78
2.	Bottle jaw		20	6.75
3.	Fever		42	14.18
4.	Anaemia/Pale mucous membrane		32	10.81
5.	Discharge from			
	a) Salivation		38	12.83
	b) lacrimation		27	9.12
6.	Loss of appetite		25	8.44
7.	Paralysis		1	0.33
8.	Dyspnea		11	3.71

9.	Reduced milk yield		52	17.56
10.	Emaciation		31	10.47

For biochemical parameters, (Table-2) in infected goat there was significant decrease in total protein (6.04) as well as albumin (1.36) in goat were noted decreased. Similar findings were observed by Rehman and Collins (1990) [13] who also reported the decrease in total protein content in goats. Teleb *et al.*, (2007) [17] reported the decrease in total protein content in serum of sheep experimentally infected with *Fasciola gigantica*. The decrease in total protein is due to haematophagous parasites especially *Haemonchus contortus* and *Ostertagia ostertagi* which suck 0.05 ml of blood/worm/day (Soulsby, 1986) [14]. The infection of liver and destruction of liver parenchyma also resulted in alteration in protein values (Ismail *et al.*, (1990) [3], Mohamed (2000) [8] and Matanovic *et al.*, (2007) [7]. Significant decrease in total protein and albumin level was observed in infected goat in comparison to healthy animals. The lower level of total serum protein and albumin observed in the present study corroborated with the earlier reports of Jas *et al*. (2008) [5] and Ashok Kumar *et al.*, (2005) [1]. The low level of protein in GI parasitism is attributed to increased plasma leakage through the injured gut caused by the parasites (Radostits *et al.*, 1994) [12]. This loss is predominantly due to selective loss of albumin having smaller size and osmotic sensitivity to fluid movement (Tanwar and Mishra, 2001) [15]. The fall in albumin might have been aggravated by increased catabolism of albumin and protein mal-absorption through the damaged intestinal mucosa.

The decrease in globulin levels in serum in the infected goat (4.68±0.4233) are in consonance with finding of Maiti *et al.*, (1999) [6], Pandit *et al.*, (2009) [9], Purohit *et al.*, (2003) [10] Bordoloi *et al.*, (2012) [2] and Qamar and Maqbool (2012) [11]. Inappetence with the resultant reduction in dietary protein, malabsorption and plasma losses from damaged intestinal mucosa might be the main cause for marked hypoproteinemia. The presence of infection stimulates the host's immune system resulting in increased synthesis of gamma globulin (Tarazona *et al.*, 1982) [16]. The results showed globulin was not significant for infected and non-infected goat.

Table 2: Biochemical parameters for helminth infected and non-infected goat

Parameter	GOAT	
	Infected (n=20)	Non-Infected (n=10)
Total protein (g/dl)	6.04±0.3896	7.97±0.416
Albumin (g/dl)	1.36±0.16	2.88±0.2719
Globulin (g/dl)	4.68±0.4233	5.09±0.4289

n= no. of observation
Values are expressed as Mean±SEM

Fig 1: Photomicrograph of pale mucuous membrane of helminth infected goat

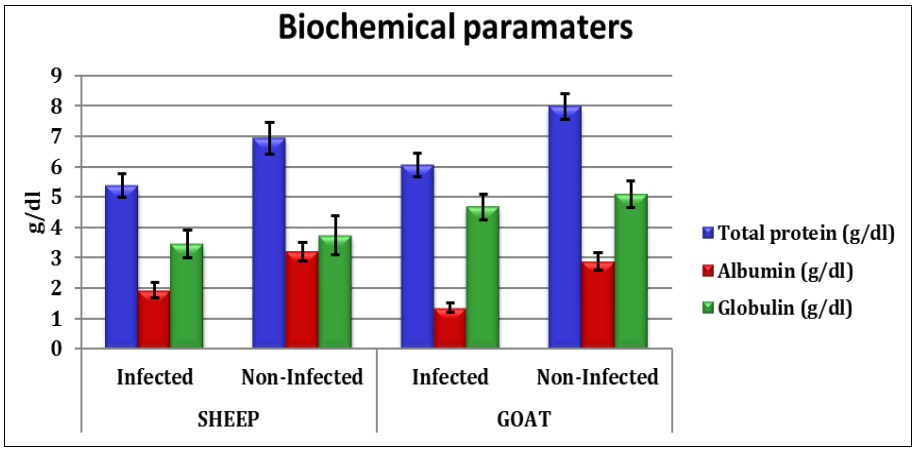

Fig 2: Biochemical parameters of helminth infection of infected and non-infected goat

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