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Biochemical changes in Helminth infection in sheep in Udaipur district (Rajasthan)

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Abstract
Small ruminants farming is an important source of livelihood for upliftment of economy of India in general and Rajasthan in particular. A study on prevalence of helminths of sheep in relation to age, sex, seasonal, tehsil and month wise was studied at Udaipur district, Rajasthan from May 2016 to January 2017 by biochemical parameters such as Serum Total Protein Serum, Albumin, Serum Globulin. The mean total protein was found to be in infected sheep 5.38±0.3905 and in non-Infected sheep 6.39±0.5336. The mean Albumin was found to be in infected sheep 1.93±0.2653 and in non-Infected sheep 3.2±0.3084. The mean globulin was found to be in infected sheep 3.45±0.4646 and in non-Infected sheep 3.19±0.6353. The results showed globulin was not significant for infected and non-infected sheep. Among biochemical parameters, total protein and albumin showed the significant decrease and globulin showed slight increase in the helminth infected sheep and goats.

Keywords: Biochemical, livelihood, economy, Protein Serum

Introduction
Sheep farming is an important source of livelihood for small and marginal farmers and landless labourers as it plays an important role in providing food, fibre, manure etc. Rearing of sheep 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. Parasitism in sheep is a substantial problem plaguing farmers across the nation. As gastrointestinal parasite infection is the most important limiting factor of sheep productivity, parasitism has a highly detrimental effect on the sheep industry. 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 remain one of the major constraints to small ruminant 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 small ruminants get cumulative infection throughout the year due to their specific grazing habit. Prevalence of helminths in small ruminants causes adverse effects on the host like biochemical disturbances, loss of body weight and huge economic losses. Blood is an important and reliable medium for assessing the health status of individual animals.

Materials and Methods
The study was conducted from the month of May 2016 to January 2017 in villages of Udaipur district in southern Rajasthan. Sheep was randomly selected and blood sample was collected and subjected to helminth parasitism on biochemical parameters.
To study the effect of helminth parasites, the biochemical parameters were studied. The blood was collected from 20 infected and 10 non-infected sheep from jugular vein. Blood samples were collected in vials without anticoagulant and were kept undisturbed. The serum was separated and stored at –20 ºC 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 sheep 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 colored complex having absorption maximum at 650 nm.

Table 1: Procedure of Estimation of Total Protein:

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

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	1.0ml	1.0ml	1.0ml
Distilled Water	0.01ml	-	-
Serum (Sample)	-	0.01ml	-
Standard	-	-	0.01ml

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 4gm/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).

Results and Discussion

For biochemical parameters, in infected sheep there was significant decrease in total protein (5.38) as well as albumin (1.93). 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 Farafra sheep experimentally infected with Fasciola gigantica. The decrease in total protein is due to haematophagous parasites especially Haemonchus contortus and Ostertagia ostertagi which suck 0.05ml 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) [4]; Mohamed (2000) [8] and Matanovic *et al.,* (2007) [7]. 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 sheep (3.45) was in consonance with finding of Maiti *et al.,* (1999) [6], Pandit *et al.,* (2009) [9], Dhanlakshmi *et al.,* (2012) [3] 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].

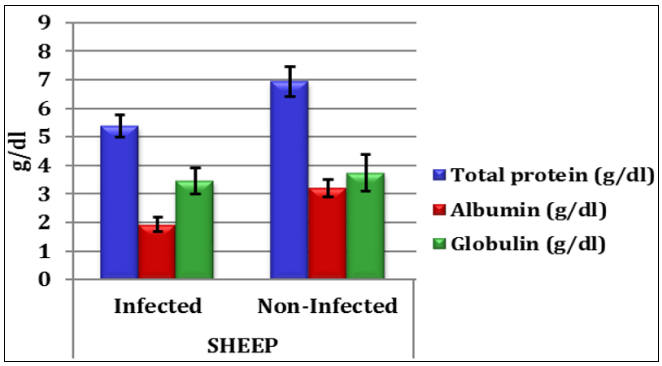

Fig 1: Biochemical parameters of helminth infection of infected and non-infected sheep

Table 3: Biochemical parameters for helminth infected and non-infected sheep

Parameter	SHEEP	
	Infected (n=20)	Non-Infected (n=10)
Total protein (g/dl)	5.38±0.3905	6.39±0.5336
Albumin (g/dl)	1.93±0.2653	3.2±0.3084
Globulin (g/dl)	3.45±0.4646	3.19±0.6353

n= no. of observation

Values are expressed as Mean± SEM

Conclusion

Among biochemical parameters, total protein and albumin showed the significant decrease and globulin showed slight increase in the helminth infected sheep an.

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