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Neelam Kumari Faran
Department of Veterinary Parasitology of Veterinary and Animal Sciences, Navania, Udaipur, Rajasthan, India

Sanweer Khatoon
Department of Veterinary Parasitology College of Veterinary and Animal Sciences, Navania, Udaipur, Rajasthan, India

Vikas Kumar
Department of Veterinary Anatomy, Arawali Veterinary College, Sikar, Rajasthan, India

Jitendra Kumar
Department of Veterinary Parasitology College of Veterinary and Animal Sciences, Navania, Udaipur, Rajasthan, India

Surendra
Department of Veterinary Public Health and Epidemiology, Arawali Veterinary College, Sikar, Rajasthan, India

Avinash Meena
Department of Veterinary Parasitology of Arawali Veterinary College, Sikar, Rajasthan, India

Corresponding Author:
Neelam Kumari Faran
Department of Veterinary Parasitology of Veterinary and Animal Sciences, Navania Udaipur, Rajasthan, India

Studies on haematological changes in helminth infection in goat in Udaipur district (Rajasthan)

Neelam Kumari Faran, Sanweer Khatoon, Vikas Kumar, Jitendra Kumar, Surendra and Avinash Meena

Abstract
Goat 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 goat in relation to age, sex, seasonal, tehsil and month wise was studied at Udaipur district, Rajasthan from May 2016 to January 2017 by haematological parameters such as Haemoglobin (Hb), Packed Cell Volume (PCV), Erythrocyte Sedimentation Rate (ESR), Total Leucocyte Count (TLC), Differential Leucocyte Count (DLC) by Sahli's method. There is reduction in haemoglobin concentration in the helminth infected goats (7.2±0.239) as well as in packed cell volume in the helminth infected goats (19.5±1.128). There was normal value for all haematological parameters in non-infected group. In the Infected goat lymphocytes (57.5±1.43), eosinophills (5.3±0.4419), monocytes (5.25±0.5888) were showed increased. Whereas in infected goat neutrophils (33.9±1.447) was reported decreased. In non-infected goat neutrophils (38.3±1.521), lymphocytes (52.1±1.588), eosinophils (4.3±0.6333) and monocytes (4.9±0.5467) were showed normal.

Keywords: Haematological parameter, helminth infected, goat

Introduction
Goat 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 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. Parasitism in goat is a substantial problem plaguing farmers across the nation. As gastrointestinal parasite infection is the most important limiting factor of goat 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 helminthes in goat causes adverse effects on the host like haematological, loss of body weight and huge economic losses. Blood is an important and reliable medium for assessing the health status of individual animals. Hematological analysis has been found to be important and reliable means for assessing an animal's health status and might give an indication of the degree of damage to host tissue as well as severity of infection. So, in the present study on haematological changes in helminth infected in goat of Udaipur region.

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

Goat was randomly selected and blood sample were collected and subjected to helminth parasitism on hematological parameters such as Hemoglobin (Hb), Packed Cell Volume (PCV), Erythrocyte Sedimentation Rate (ESR), Total Leucocyte Count (TLC), Differential Leucocyte Count (DLC) by Sahli's method. A total of 20 infected and 10 non- infected goats were taken, 5 ml of blood was collected from the jugular vein of both infected and non-infected animals, in clean sterile vials containing 5% EDTA solution as anticoagulant and then taken to the laboratory for routine examination. The hematological parameters of infected and non-infected goats were analyzed by using two sample t-test.

Results and Discussion

The reduction in Haemoglobin concentration in the helminth infected goats (7.2±0.239). The reduction in packed cell volume in the helminth infected goats (19.5±1.128). The reduction in Hb and PCV may be due to acute loss of blood by sucking activity and haemorrhages caused by various parasites (Bhat *et al*., 2014 and Amulya *et al*., 2014) [6, 5]. helminth infected goats are in accordance with Teleb *et al*., (2007) [20]; Bordoloi *et al*., (2012) [7], Sulaiman *et al*., (2010) [22], Ahmad *et al*., (2006) [4] and Matanovic *et al*., (2007) [15] also showed decrease in Hb concentration in helminth infected ruminants. Coles (1986) [8]; Kaneko *et al*., (1997) [12]; Kramer (2000) [13]; El-Sayed *et al*., (2003) [10]; Lotfy *et al*., (2003) [14]; Omran and El-Kholany (2003) [17] reported that the severe anemia may be due to a chronic liver inflammation, which causes depression of erythrogenesis. The decrease in value of Hb and PCV might be due to the presence of strongyle infection, which had been recognized as active blood sucker in stomach and intestine and also been observed in present studies. Haematological findings of affected sheep with significant decrease hemoglobin, packed cell volume, suggested anemia condition in comparison with healthy sheep, which substantiate the findings of anaemic condition by Sangwan and Sangwan (2000) [19]. The observed significant haematological changes in affected goats reflects the hypersensitivity to parasites.

In the Non-Infected goat, the normal value was showed in hemoglobin concentration, packed cell volume.

Table 1: Hematological Parameters of helminth infected and non-infected goat

Parameter	Goat	
	Infected	Non-Infected
	(n=20)	(n=10)
Hb (g/dl)	7.2±0.239	8.88±0.5185
PCV (%)	19.5±1.128	26.5±1.939
ESR (mm/hr)	0.28±0.6266	0.28±0.6266
TLC (X10^3/cumm)	9.97±0.7486	11.58±0.9255

n-no. of observation

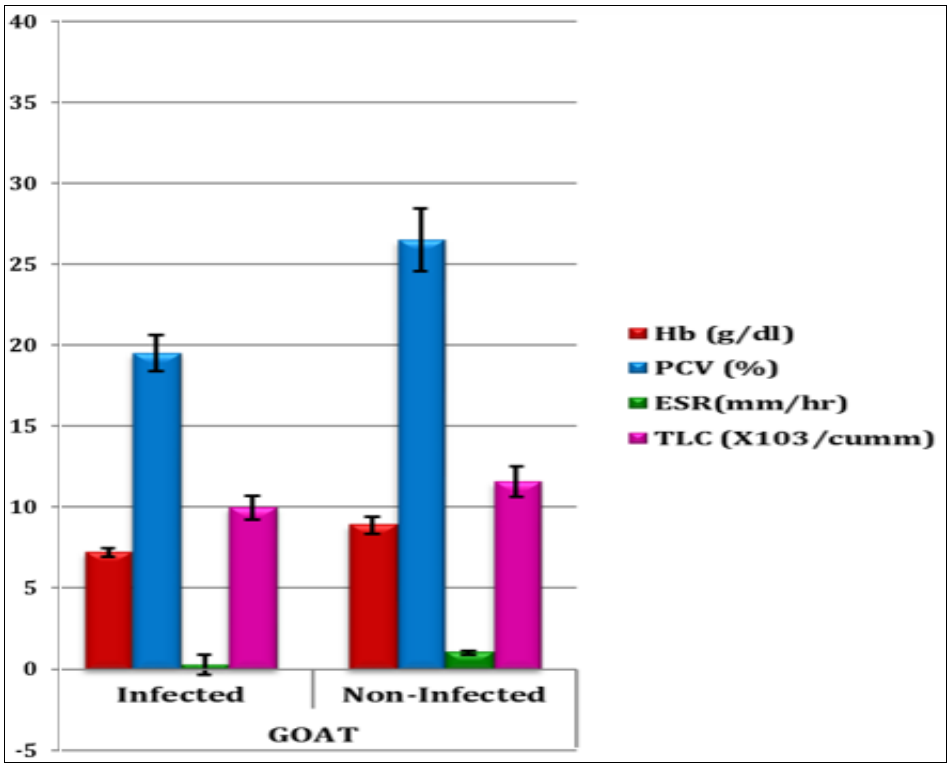

Fig 1: Haematological parameters of helminth infection of infected and non-infected goat.

In the Infected goat lymphocytes (57.5±1.43), eosinophils (5.3±0.4419), monocytes (5.25±0.5888) were showed increased. The increase in monocytes and eosinophils are caused due to phagocytic activity of the cell digesting the particulate matter and debris of parasites as an effect of cell mediated immune immune response. Increase in level of lymphocytes is associated with an increase in cell-mediated immunity and antibody-mediated immunity. Leukocytes and eosinophils detected in the present study were similar to those previously reported by Amulya *et al*., (2014) [5] and Ahmed *et al*., (2006) [4], eosinophilia has been reported to be proportional to the degree of antigenic stimulation or parasitic burden in helminthes infections (Ackerman *et al*., 1981) [1]. This is normally linked to antigen antibody reaction which occurred when the sensitivity to the protein of the parasites has developed or when the secretory products were released within the blood (Jain, 1993) [11]; associated with cellular-mediated immunity (Duffus *et al*., 1980) [9]. Leukocytosis and eosinophilia detected in the present study were similar to those previously reported by Sykes *et al*., (1980) [23]; Zhang *et al*., (2005) [21] and Ahmed *et al*., (2006) [4].

In non-infected goat neutrophils (38.3±1.521), lymphocytes

(52.1±1.588), eosinophils (4.3±0.6333) and monocytes (4.9±0.5467) were showed normal value.

Table 2: Differential Leucocyte count of helminth infected and non-infected goat

Parameters	Goat	
	Infected (n=20)	Non-Infected (n=10)
Neutrophils	33.9±1.447	38.3±1.521
Lymphocytes	57.5±1.43	52.1±1.588
Eosinophils	5.3±0.4419	4.3±0.6333
Monocytes	5.25±0.5888	4.9±0.5467
Basophils	0±0	0±0

n-no. of observation

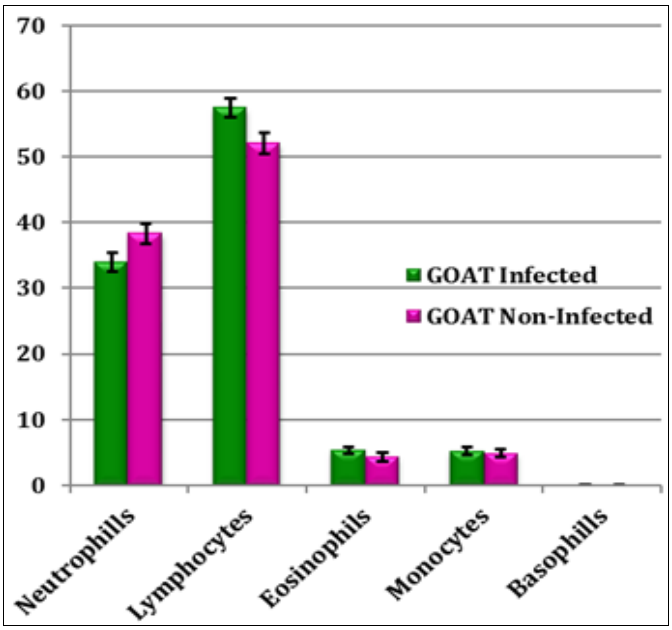

Fig 2: Haematological parameters of helminth infection of infected and non-infected goat.

Conclusion

Hematological studies revealed significant decrease in hemoglobin concentration and packed cell volume in the helminth infected goats. The study also showed that the young animals are more prone to infection than the adult ones. Therefore, young animals need special attention because of their high susceptibility to infection. They should be included in deworming programming. The study also revealed that maximum helminth infection was observed in males as compared to females. The influence of sex on the susceptibility of animals to infections could be attributed to genetic predisposition and differential susceptibility owing to hormonal control. Hematological studies revealed significant decrease in hemoglobin concentration, packed cell volume and total erythrocyte count in the helminth infected goats. Whereas erythrocyte sedimentation rate and total leukocyte count showed significant increase in the helminth infected goats. In the Infected goat lymphocytes, eosinophills, monocytes were showed increased.

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