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Prevalence of Gastrointestinal Helminthes among Goats in and around Ranchi, Jharkhand, India

Anurag Jena[1*], Asit Ranjan Deb[1], Lalita Kumari[1], Subhranshu Sekhar Biswal[2] and S.K. Joshi[3]

[1]Department of Veterinary Parasitology, Ranchi Veterinary College, Kanke, Ranchi, Jharkhand, India
[2]Department of ARGO, CVSc. & A.H., Bhubaneswar – 751003, India
[3](Animal Science), KVK, Jharsuguda, OUAT, Bhubaneswar – 751003, India

**Corresponding author*

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A B S T R A C T

In this present study, a total of 930 goats with symptoms of gastrointestinal infection were examined for the presence of gastrointestinal helminths of which 801 (86.13%) were found to be positive. The different gastrointestinal helminths those were observed are *Fasciola* spp. and *Paramphistomum* spp. in trematodes; only *Moniezia expansa* and *Moniezia benedeni* in cestodes and among nematodes, *Strongyloides* spp., *Trichostrongylus* spp., *Haemonchus* spp., *Trichuris* spp., *Oesophagostomum* spp., *Bunostomum* spp., *Ostertagia* spp., *Cooperia* spp. and *Marshallegia* sp. Highly significant (P<0.01) relationships were recorded between season, age and sex wise variations with helminth prevalence. The present study provides the epidemiological pattern and risk factors associated with gastrointestinal helminth infection in goats in and around Ranchi, Jharkhand.

Introduction

In rural areas of our country, goat farming is one of the most important sources of livelihood of the farmers (Jithendran, 2000 and Bandyopadhyay *et al.,* 2010). India ranks second in goat production with a population of 135.17 million goats and Jharkhand accounts to 6.58 million of goats (http://www.dahd.nic.in/documents/statistics/livestockcensus).

Reduction in productivity (body weight, milk and meat), increased mortality and morbidity leads heavy economic losses in goat production (Jithendran, 2000). This problem has been neglected time and again due to its chronic and insidious nature (Sanyal, 1998), although the losses are in millions of rupees (Shan and Chaudhry, 1995). It has always been a major impediment in small ruminant production and this problem is severe in

tropical and sub-tropical climates due to favorable ecological factors available for transmission of helminth parasites (Gupta *et al.,* 2013). Epidemiological pattern of gastrointestinal helminth parasites would shed some light for evolving strategic tactical control of these parasites (Jithendran, 2000). There is none to very little study in this sector in goats of Jharkhand. So, this study of prevalence of gastrointestinal helminths in goats in and around Ranchi has been designed to provide us with a clearer understanding of its epidemiological status.

Materials and Methods

No ethical committee approval was needed as this present study was conducted on fecal sample basis and fecal samples were collected from freshly void or directly from the animals' with prior permission of their owners.

Ranchi covers a geographical area of 175.12 Km^2 with dense tropical forest and hilly topography. It's located in southern part of Chota Nagpur plateau nearer to Tropic of Cancer and lies at 23˚22'N 85˚20'. Ranchi has an average elevation of 651m above sea level. An annual rainfall of 1430mm is recorded at Ranchi with minimum and maximum ambient temperatures ranging from, 0 to 25˚C in winter and 20 to 42˚C in summer, respectively (https://www.weather-forecast.com/locations/Ranchi).

The present study was conducted from November, 2011 to October, 2013. Animals showing gastrointestinal symptoms were taken in this study for fecal sample examination. The helminth ova were detected by Modified Sheather's Sugar floatation technique and Formal ether acetic acid technique was used for detecting eggs of trematodes (Sloss *et al.,* 1984 and Zajac and Conboy, 2011). Fecal culture was conducted by modified Baermann's technique to identify the infective larval stages of helminths (Sloss *et al.,* 1984 and Zajac and Conboy, 2011).

Results and Discussion

Out of 930 samples collected and examined from goats in and around Ranchi, 801 were recorded to be positive for gastrointestinal helminths (Table 1and Figure 1). Thus, the Overall prevalence was found to be 86.13%. The different GI helminths those were observed are *Fasciola* spp. and *Paramphistomum* spp. in trematodes; only *Moniezia expansa* and *Moniezia benedeni* in cestodes and among nematodes, *Strongyloides* spp., *Trichostrongylus* spp., *Haemonchus* spp., *Trichuris* spp., *Oesophagostomum* spp., *Bunostomum* spp., *Ostertagia* spp., *Cooperia* spp. and *Marshallegia* sp. were recorded. The factors that could affect the prevalence are managemental practices, anthelmintics used, grazing habitat, economic strata of the farmer, farmer's educational background, climatic conditions, age and sex of the animals examined (Shan and Chaudhry, 1995; Sanyal, 1998 and Ahmed *et al.,* 2017). This higher prevalence of gastrointestinal helminths is in accordance with other workers in India (Velusamy *et al.,* 2015; Molla and Bandyopadhyay, 2016; Sanalkumar, 2017 and Jena *et al.,* 2018) and abroad (Raza *et al.,* 2014; Yeasmin *et al.,* 2015, Ahmed *et al.,* 2017 and Dabasa *et al.,* 2017), in different climatic conditions. Nematodes were recorded to be of highest prevalence (62.37%) followed by trematodes (56.02%) and cestodes (47.63%) (Table 1 and Figure 1). Similar findings were reported by Gupta *et al.,* in 2013; Poddar *et al.,* Islam *et al.,* Ahmed *et al.,* Sanalkumar *et al.,* and Sohail *et al.,* in 2017 and in 2018 by Jena *et al.,* The higher prevalence of gastrointestinal parasites in tropical, subtropical and also temperate climates could be attributed to their wide range of adaptability (Soulsby, 1966; Sanyal, 1998 and Poddar *et al.,* 2017).

Table.1 Prevalence of gastrointestinal helminthes of goats in and around Ranchi

		Overall G.I. helminths		Trematodes		Cestodes		Nematodes		X^2
Group	N	P	PR%	P	PR%	P	PR%	P	PR%	41.09**
	930	801	86.13	521	56.02	443	47.63	580	62.37	
Season										
Rainy	310	294	94.84	235	75.81	223	71.94	261	84.19	
Winter	310	269	86.77	169	54.52	119	38.39	206	66.45	
Summer	310	238	76.77	117	37.74	101	32.58	113	36.45	
X^2		42.50**		91.58**		112.18**		153.83**		
Age										
0-3 month	241	229	95.02	171	70.95	146	60.58	192	79.67	
4 to 9 month	355	319	89.86	241	67.89	199	56.06	263	74.08	
>9 month	334	253	75.75	109	32.63	98	29.34	125	37.43	
X^2		50.21**		116.25**		71.10**		140.03**		
Sex										
Male	281	222	79.00	111	39.50	96	34.16	124	44.13	
Female	649	579	89.21	410	63.17	347	53.47	456	70.26	
X^2		17.11**		44.60**		29.29**		57.06**		

N- Total no. of goat examined; P -Total no. of goat positive; PR% - Prevalence rate (%); X^2 - Chi Square value; ** - Highly significant relationship

Fig.1 Overall Prevalence of GI helminths in goats in and around Ranchi

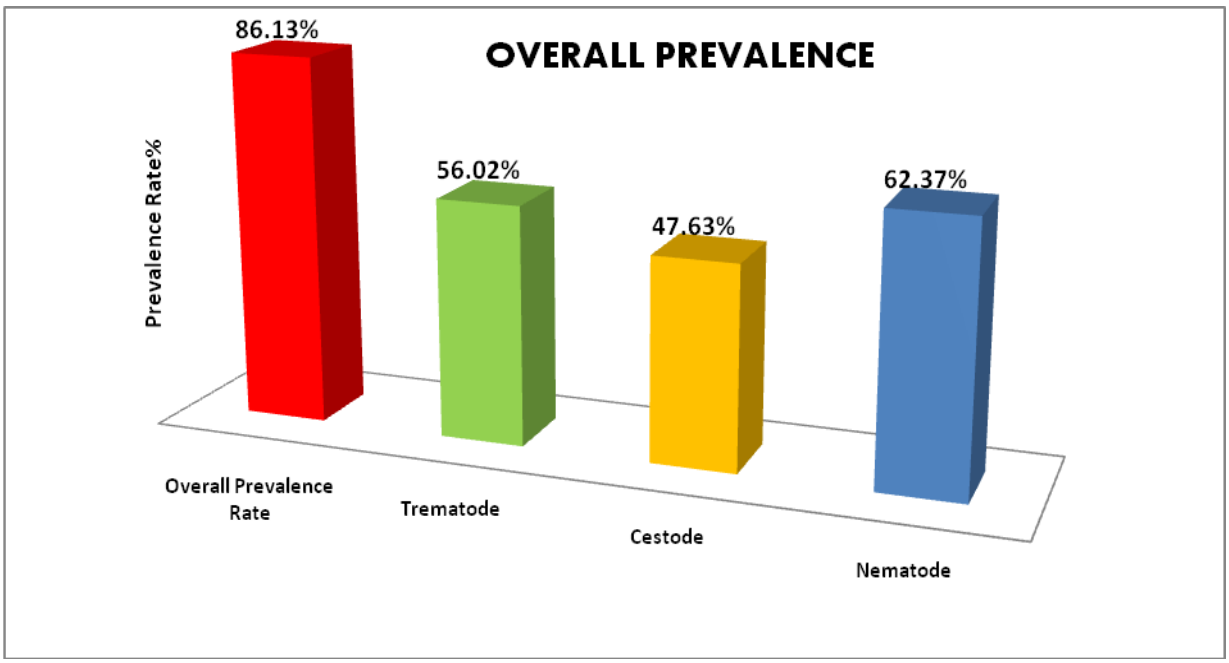


Fig.2 Seasonal Prevalence (%) of GI helminths in goats in and around Ranchi

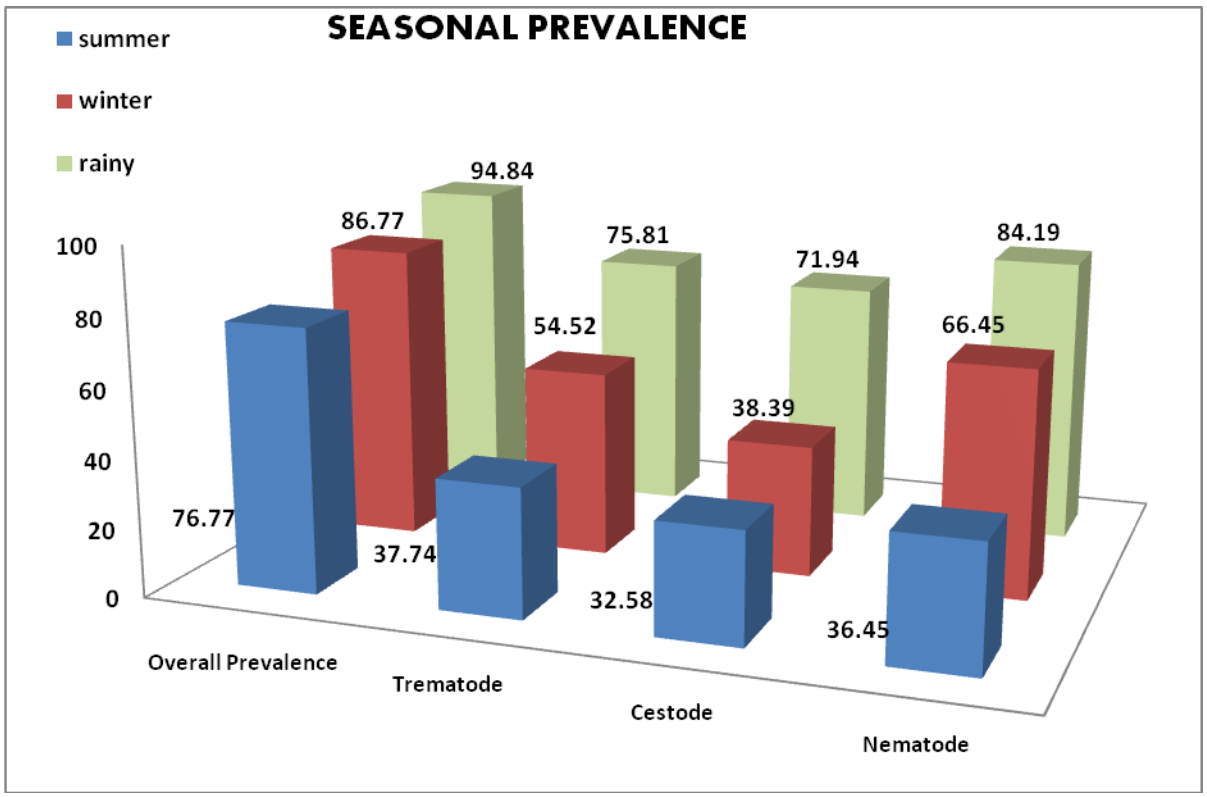


Fig.3 Age wise prevalence (%) of GI helminths in goats in and around Ranchi

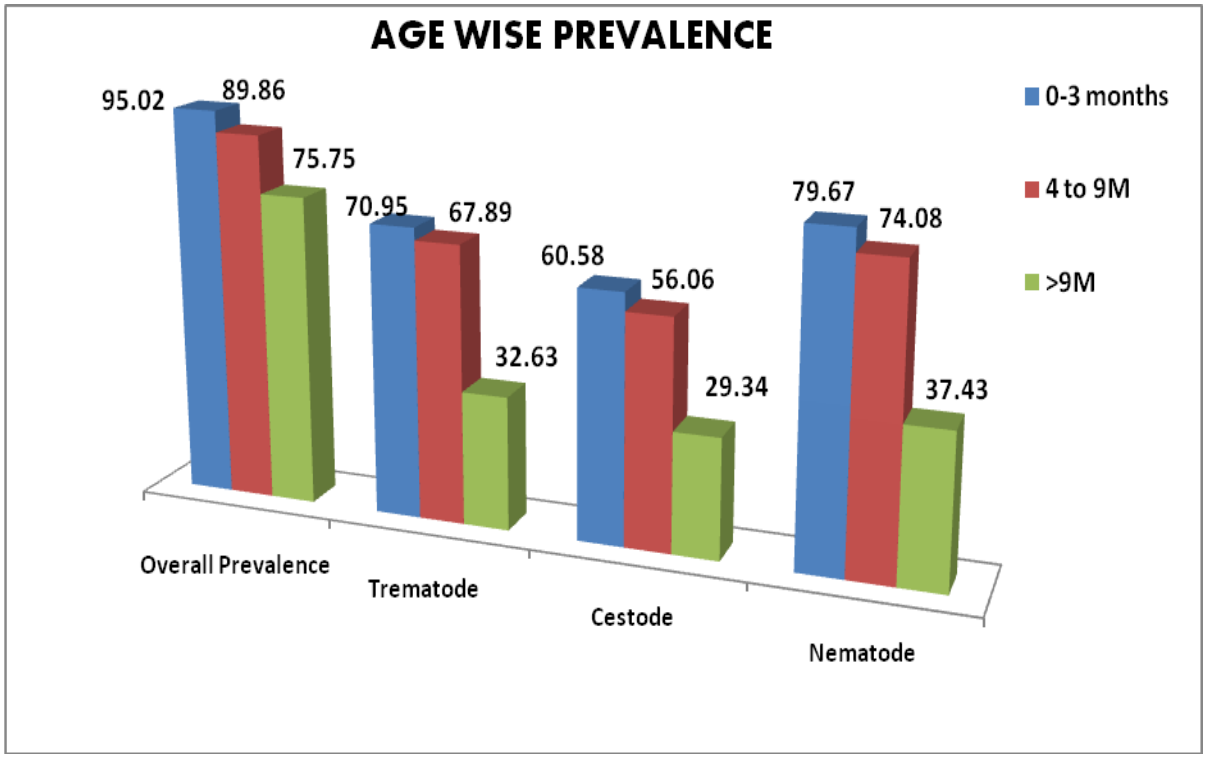
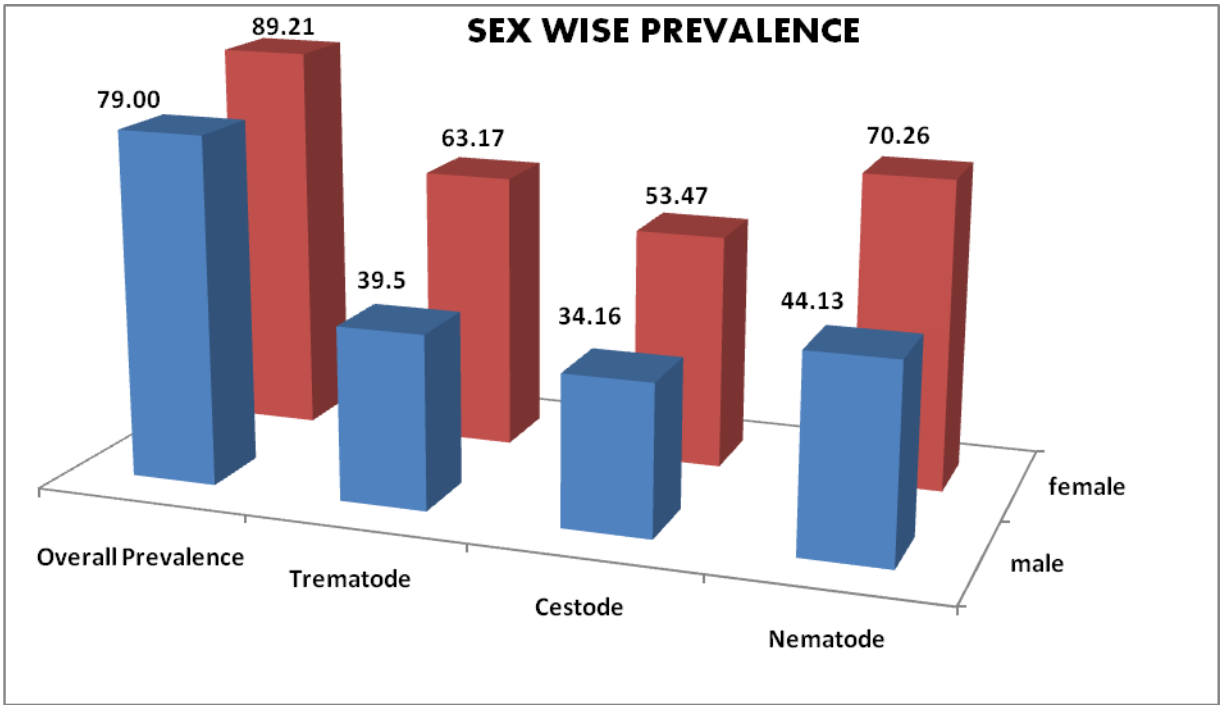


Fig.4 Sex wise prevalence (%) of GI helminths in goats in and around Ranchi



Rainy season was recorded to have highest overall prevalence of 94.84% followed by 86.77% in winter and the lowest being recorded at 76.77% in the summer months (P<0.01) (Table 1and Figure 2). The relationship between season and infection was found to be highly significant (P<0.01). Among all the GI helminths *viz.* trematodes, cestodes and nematodes, it was observed that higher prevalence was being recorded in Rainy season at 75.81%, 71.94%, and 84.19% respectively. In winter nematodes were recorded to have highest prevalence (66.45%) followed by trematodes (54.52%) and cestodes (38.39%). Summer was found to be with least prevalence rate, *viz.* trematodes, cestodes and nematodes at 37.74%, 32.58% and 36.45%, respectively (Table 1and Figure 2). Similar findings were also recorded by Gaherwal *et al.*, (2016), Sanalkumar *et al.*, (2017) and Jena *et al.*, (2108). In rainy season, the higher prevalence of gastrointestinal helminths can be accredited to a number of favorable climatic conditions such as high relative humidity, rainfall, soil salinity, ambient temperature. These climatic conditions help in adequate growth and development of the infective larval stages in rainy season. It's also well documented that larval availability and pasture contamination is directly related to helminth infection (Soulsby, 1966 and Sanyal, 1998). Comparatively lower infection rate in winter can be a result of arrested development of larval stages due to cold stimuli and stall feeding practices in the winters as reported by Hutchinson and coworkers in 1972.

Age wise prevalence showed strong statistical evidence (P<0.01) of relationship between different age groups and gastrointestinal helminths infection. Younger animals (0 to 3 months at 95.02%) showed higher infection rate in comparison to adults' *viz.* 4 to 9 months at 89.86% and more than 9 months at 75.75% (Table 1and Figure 3). Molla and Bandyopadhyay (2016), Poddar *et al.*, (2017) and Jena *et al.*, (2018) found similarly higher

and lower rate of prevalence among younger age groups and adult animals, respectively. 0-3months age group was also recorded to have highest prevalence (79.67%) of nematode infection. The lowest infection was recorded in >9 month age group of cestodes (29.34%) (Table 1and Figure 3). The reason for kids (0-3 month age group) harboring significantly higher infection may be since previous infections and age of the animals provide protection against recurrent infections as a result younger animals most commonly suffer from acute infections, as opined by Soulsby in 1966.

Females (89.21%) were recorded with higher prevalence rate in comparison to males (79%) and the relationship was highly significant ($P<0.01$) (Table 1and Figure 4). Similarly higher prevalence among trematodes, cestodes and nematodes was recorded in females' *viz.* 63.17%, 53.47% and 70.26% whereas lower prevalence was recorded in males *viz.* 39.50%, 34.16% and 44.13%, respectively (Table 1and Figure 4). This was evident among all the GI helminths as shown in Table 1. Similar findings were also reported by Islam *et al.,* at Mymensingh, Bangladesh in 2017, Dabasa *et al.,* at Bale zone of south eastern Ethiopia in 2017, Rizwan *et al.,* (2017) at Sialkot district of Punjab, Pakistan and recently by Jena and co-workers in 2018 in and around Ranchi. Other workers like, Asif *et al.,* (2007) and Raza *et al.,* (2014) reported inconsistent results in prevalence of gastrointestinal parasite infection. The females might be more susceptible gastrointestinal infections due to high stress and low immunity status in female animals during lactational period, post parturient period and also when the animal is pregnant (Islam *et al.,* 2017; Dabasa *et al.,* 2017; Jena *et al.,* 2018).

This present study observed very high prevalence of gastrointestinal helminths infection in goats of Ranchi and its surrounding locality. This epidemiological study can be used in formulation of a strategic gastrointestinal helminth management.

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