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Study on prevalence of intestinal parasitic infection in goat in Durg (C.G.)

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Abstract

Goats are powerful source for production of meat in India, whose meat (chevon) is one of the choicest meats and has huge domestic demand. Besides meat, other products like milk, skin, fibre and manure are also provided by goats. Hence, Goat is often regarded as poor man's cow.

Parasitic diseases are a world wide problem and considered as a copacetic obstacle in the health and products performance of animals. Internal parasitism is one of the global problems in the small ruminant industry. Endoparasite infections responsible for major health issues, cause adverse effect on the animal's performance and cause great economic loss to the producer. Gastrointestinal parasitism is an also important cause of death in goats.

The faecal samples were collected for a period of one year from July 2015 to June 2016, covering all the three seasons of the year. The samples were collected on monthly basis. The total 1200 faecal samples taken from July 2015 to June 2016. The faecal samples collected from the goats were processed by using differential floatation techniques, sedimentation techniques and McMaster counting method.

The overall prevalence of intestinal parasites viz. nematodes, trematodes, cestodes and protozoa was found to be 1134 (94.50%), 684 (57%), 84 (7.0%), and 1066 (88.83%) respectively. The peak month was July whereas depression month was February and the prevalence was highest in monsoon whereas least in winter.

Keywords: Cestodes, goat, nematodes, protozoa, small intestine and trematodes

Introduction

Gastrointestinal parasitic nematodes are regarded as one of the important factors of goats leading to loss of overall production ^[1]. Small ruminants are impressed by multifarious gastrointestinal parasites such as nematodes, trematodes and cestodes ^[2]. The most important and widely prevalent nematodes are the Trichostrongyle group (*Haemonchus* spp., *Ostertagia* spp., *Trichostrongylus* spp., *Mecistocirrus* spp., *Cooperia* spp. and *Nematodirus* spp.), *Oesophagostomum* spp. and *Bunostomum* spp. These nematodes in the small intestine may cause severe damage to the intestinal mucous membrane ^[3].

Cestodes group comprises of the genus *Moniezia* spp. which is commonly found in the small intestine but infestation is normally not a major problem or concern since these parasites are relatively nonpathogenic ^[4].

Trematodes commonly known as flukes are mostly found in the small intestine of goats. These especially include *Fasciola* spp., *Schistosoma* spp. and *Paramphistomum* spp. ^[5]. Most infections of adult fluke are harmless although large number of flukes can cause a chronic ulceration and atrophy. Migrating immature paramphistomes can cause duodenitis ^[6].

Protozoa includes *Eimeria* spp. which causes coccidiosis, parasitic enteritis of small and large intestines of goats ^[6].

This study is an effort to determine the overall prevalence, monthly prevalence, seasonal prevalence, class wise prevalence of intestinal parasites in goats and the rate of infection in them.

Materials and Methods

The study of the prevalence of parasitic infection in goats in Durg was carried out by the collection of faecal samples from the government slaughter house situated at Supela, Bhillai. Local goats maintained in the Goat Unit, College of Veterinary Science and Animal Husbandry, Anjora, Durg also maintained local goats in goat form.

The faecal samples were collected for a period of one year from July 2015 to June 2016, covering all the three seasons of the year. The samples were collected on monthly basis.

The total 1200 faecal samples taken from July 2015 to June 2016. The fecal samples about 5-6 gram were collected from the rectum of live goats directly in the morning hours during the time of sale of goats in the slaughter house and goat unit of college of Veterinary Science & A.H. Anjora, Durg (C.G.). These samples were store in the Department of Veterinary Pathology for the laboratory diagnosis. If more than 24 hours were required for processing then faecal samples were preserved in adequate quantity of 10% formalin.

According to Soulsby (1982) [7] the faecal samples collected from the goats were processed by using differential floatation techniques, sedimentation techniques and McMaster counting method.

The data on prevalence of intestinal parasites were subjected

to statistical analysis by using analysis of variance (ANOVA) [8].

Result and Discussion

In the present investigation, faecal samples were collected from rectum of 1200 goats and examined for intestinal parasitic infections. Total 1134 (94.50%) goats were found to be infected with different types of intestinal parasites in out of 1200 goats examined. Nematodes were found in 1134 (94.50%) faecal samples, 684 (57%) for trematodes, 84 (7%) for cestodes and 1066 (88.83%) for protozoa (Table 1 and Fig.1). Some goats had mixed infection with intestinal parasites.

Table 1: Overall prevalence of different class of intestinal parasites in goats

S. No.	Types of Intestinal Parasites	No. of parasitized goats	Prevalence (%)
1	Nematodes	1134	94.50
2	Trematodes	684	57
3	Cestodes	84	7
4	Protozoa	1066	88.83

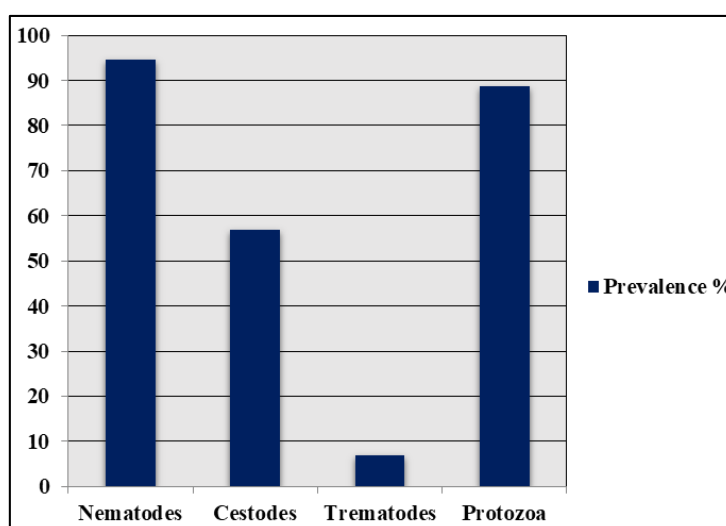


Fig 1: Graph showing the overall prevalence (%) of different class of intestinal parasites in goats.

The faecal sample examination of goats revealed the presence of a variety of intestinal parasites in goats. A total of 11 genera of intestinal parasites were observed during the faecal sample examination - 6 nematodes, 3 trematodes, 1 cestodes, and 1 protozoa. The general and overall prevalence percentage of each species is shown in Table 2 and Fig.2. *Eimeria* spp. (88.83%) showed the highest prevalence whereas lowest prevalence was shown by *Bunostomum* spp. (5.34%).

In the present research, the prevalence of nematodes was found to be 94.50%. with highest prevalence of *Haemonchus* spp. (49.34%) and lowest *Bunostomum* spp. (5.34%).

The prevalence of trematodes in the present research was found to be 53%. *Paramphistomum* spp. showed the highest (53%) prevalence among trematodes while *Cotylophorum cotylophorum* showed the lowest (10%).

The prevalence of cestodes in the present experiment was found to be 7%. *Monezia* spp. was the only species observed among cestodes.

The prevalence of protozoa in the present data was found to be 88.83%. Among protozoa, *Eimeria* spp. was the only

species found to be prevalent.

Pathak and Pal (2008) [9] reported that the overall prevalence of gastrointestinal parasitosis in goats was 85.22% in Durg District. A total of 10 genera of gastrointestinal parasites were found and prevalence of *Paramphistomum* spp. was the highest among all. Singh *et al.* (2015) [10] too found coccidia (82.4%) predominant in his prevalence study on gastrointestinal parasites of goat in Madhya Pradesh followed by strongyles and amphistomes.

Prevalence of gastrointestinal parasites in both sheep, goats and cattle was studied by Gupta *et al.* (1987) [11] in Haryana, Jithendran *et al.*, (2001) [12] in Himachal Pradesh, Yadav *et al.*, (2005) [13], Muraleedharan (2005) [14] in Karnataka, Yadav *et al.*, (2006) [15] in Jammu, Lone *et al.* (2012) [16] in Kashmir, Singh *et al.* (2013) [17] in Mathura, Varadharajan and Vijayalakshmi (2015) [18] in Tamil Nadu.

These differences in the prevalence of different intestinal parasites in goats were possibly due to varied local, geographical, climatic factors, management and husbandry practices [19].

Table 2: Overall prevalence (%) of different genera of intestinal parasites of goats

S. No.	Class	Genera	Total Samples Positive	Prevalence (%)
1	Nematoda	<i>Haemonchus</i>	592	49.34
2		<i>Bunostomum</i>	64	5.34
3		<i>Trichostrongylus</i>	392	32.67
4		<i>Oesophagostomum</i>	84	7
5		<i>Trichuris</i>	176	14.67
6		<i>Strongyloides</i>	124	10.34
7	Trematoda	<i>Fasciola</i>	200	16.67
8		<i>Paramphistomum</i>	636	53
9		<i>Cotylophorun cotylophorum</i>	120	10
10	Cestoda	<i>Moniezia</i>	84	7
11	Protozoa	<i>Eimeria</i>	1066	88.83

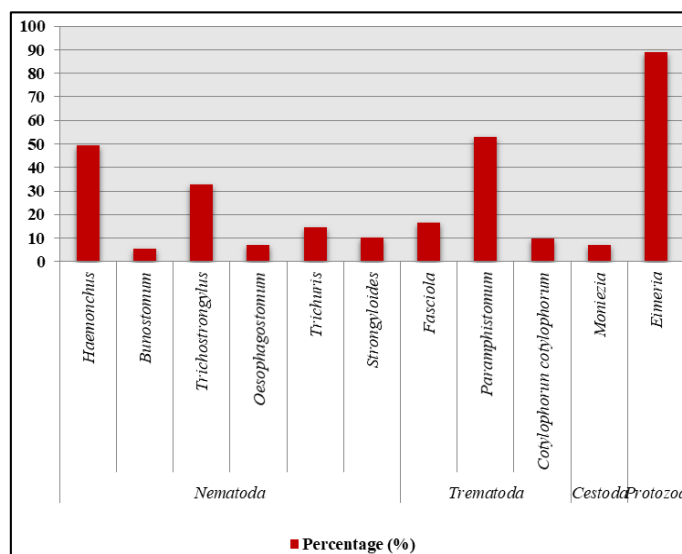


Fig 2: Graph showing the overall prevalence (%) of different genera of intestinal parasites of goats

Monthly Prevalence

The monthly prevalence observed during the present study, showed peak prevalence in the month of July whereas the lowest prevalence was noticed in the month of February (Table 3 and Fig.3).

The prevalence of nematodes was noticed to be highest in July (98%) and lowest in February (84%). For trematodes, the peak month was July (96%) and depression month was December and January (16%). For cestodes, the peak month was August (24%) while in the month of December, January, and February no cestode infection was found. Protozoa were more prevalent in the month of May and June (97%) and

showed the lowest prevalence in the month of January (68%). (Table 3 and Fig.3).

Similar studied the epidemiology of gastrointestinal nematodes and gastrointestinal nematodes were predominant from July to November reported by Gupta *et al.* (1987) [11]. Yadav and Tandon (1989) [20] observed the maximum value for prevalence (92%) in October. Nwosu *et al.* (2007) [21] found the peak prevalence of gastrointestinal parasites in September. Dhara *et al.* (2015) [22] noticed that the prevalence rate of gastro-intestinal parasites was highest in November (96.70%).

Table 3: Monthly prevalence (%) of intestinal parasites of goats

S. No.	Month	Samples examined	Number Positive	Number Positive for			
				Nema-todes	Trematodes	Cestodes	Protozoa
1	July	100	98	98 (98%)	96 (96%)	8(8%)	92 (92%)
2	August	100	97	97 (97%)	88 (88%)	24(24%)	84 (84%)
3	September	100	97	97(97%)	88 (88%)	12(12%)	88 (88%)
4	October	100	96	96 (96%)	84 (84%)	8(8%)	92 (92%)
5	November	100	95	95(95%)	64 (64%)	8(8%)	92 (92%)
6	December	100	93	93(93%)	16 (16%)	-	80 (80%)
7	January	100	88	88(88%)	16 (16%)	-	68 (68%)
8	February	100	84	84 (84%)	24 (24%)	-	84 (84%)
9	March	100	96	96(96%)	32 (32%)	4(4%)	96 (96%)
10	April	100	96	96(96%)	44 (44%)	4(4%)	96 (96%)
11	May	100	97	97(97%)	64 (64%)	8(8%)	97 (97%)
12	June	100	97	97(97%)	68 (68%)	8(8%)	97 (97%)
	Total	1200	1134	1134	684	84	1066

*Figures in the parenthesis indicate percentile value

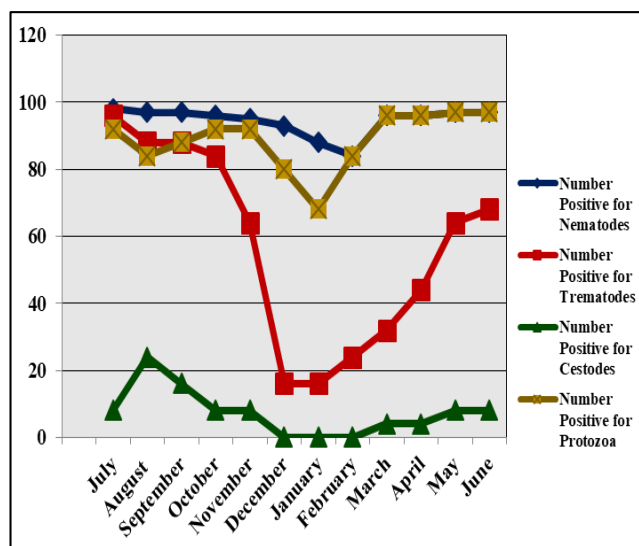


Fig 3: Graph showing the monthly prevalence (%) of intestinal parasites of goats

The tropical type climate was observed in Durg. Hence, the incidence of different intestinal parasites in an area is directly related to the ability of their pre-parasitic stages to withstand the environmental conditions. The summers season are much rainier than the winters in Durg. The Durg has average annual temperature is 26.7 °C. The temperature begins increase from the month of March to May and May is the hottest month of the year. In Durg District, summer months (high temperature

and rapid evaporation) have a deleterious effect on the translation and transmission of infective stages. Durg district's has annual rainfall ranges from 1000-1500 mm. During the year, most rainfall occurs during the monsoon months from June to September and July is the month of highest rainfall. A high frequency of overall nematode infections in goats were observed in the months of rainfall which is due to high humidity and moderate temperature in the environment. Such a climate is favorable for intestinal parasites [23]. Katoch, *et al.*, (2000) [24] observed lowest average temperatures in the year occur in December and January. Least prevalence observed in winter season was due to reduction in the grazing hours of the animals, which in turn reduced the chances of contact between host and parasites [24].

Seasonal Prevalence

The different parasites found in the faecal samples collected during monsoon, winter and summer is shown in Table 4 and Fig 4.

Class wise seasonal prevalence

During examination of the samples overall 12 genera were observed. But on seasonal basis, all the 11 (100%) genera were recorded during monsoon and summer whereas 10 (90.9%) genera were recorded only in winter. In monsoon, Nematodes (97%) Trematodes (89%) Cestodes (52%) was found to be most predominant while protozoa (96.5%) was most prevalent in the summer season. (Table 4 and Fig 4.)

Table 4: Seasonal prevalence (%) of intestinal parasites of goats.

S. No.	Season	Months	Total No. of Sample	Nema-tode	Trema-tode	Cestode	Protozoa
1	Monsoon	July	400	388 (97%)	356 (89%)	52 (13%)	356 (89%)
2		August					
3		September					
4		October					
5	Winter	November	400	360 (90%)	120 (30%)	8 (2%)	324 (81%)
6		December					
7		January					
8	Summer	February	400	386 (96.5%)	208 (52%)	24 (6%)	386 (96.5%)
9		March					
10		April					
11		May					
12		June					
		Total	1200	1134	684	84	1066

*Figures in the parenthesis indicate percentile value.

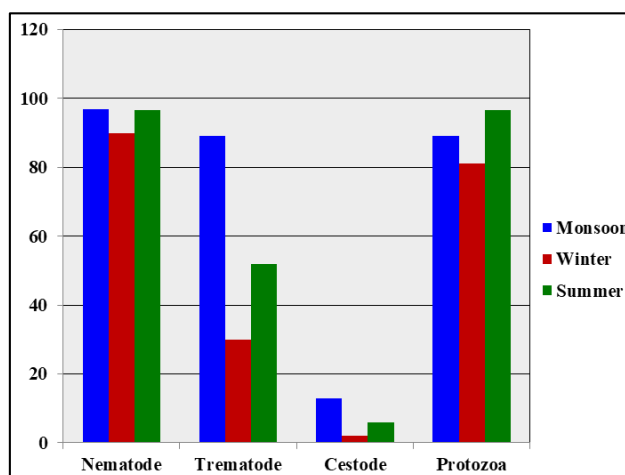


Fig 4: Graph showing the seasonal prevalence (%) of intestinal parasites of goats

a. Seasonal prevalence of nematodes of goat

In monsoon, *Haemonchus* spp. (86%) was found to be most prevalent whereas *Bunostomum* spp. (7%). In winter, *Haemonchus* spp. (20%) was found to be most prevalent

whereas *Bunostomum* spp was absent. *Trichostrongylus* spp. (40%) was found to be more prevalent whereas both *Bunostomum* spp. (9%) and *Oesophagostomum* spp. (9%) were least prevalent during summer. (Table 5 and Fig.5).

Table 5: Seasonal prevalence (%) of intestinal nematodes in goats

S. No.	Nematode genera	Number positive (%)		
		Monsoon	Winter	Summer
1	<i>Haemonchus</i> spp.	344 (86%)	80 (20%)	156 (39%)
2	<i>Trichostrongylus</i> spp.	164 (41%)	68 (17%)	160 (40%)
3	<i>Bunostomum</i> spp.	28 (7%)	-	36 (9%)
4	<i>Oesophagostomum</i> spp.	44 (11%)	4 (1%)	36 (9%)
5	<i>Trichuris</i> spp.	88 (22%)	32 (8%)	56 (14%)
6	<i>Strongyloides</i> spp.	48 (12%)	36 (9%)	40 (10%)

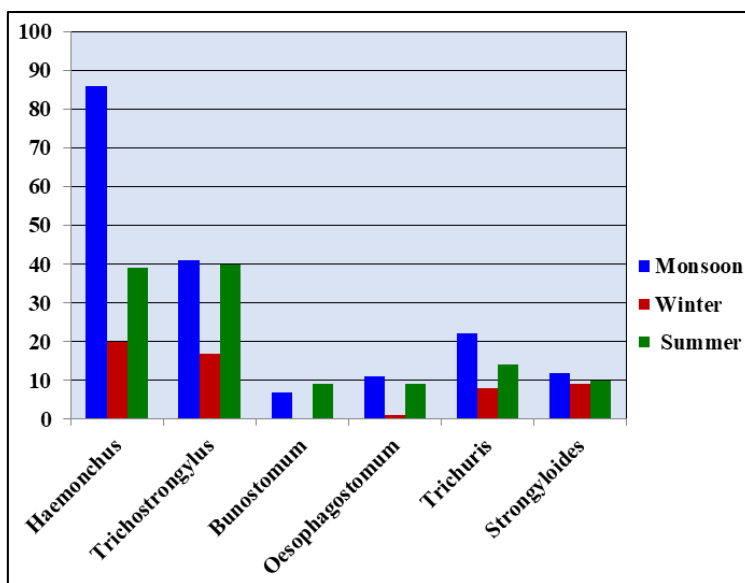


Fig 5: Graph showing the seasonal prevalence (%) of intestinal nematodes in goats

b. Seasonal prevalence of trematode of goat

Three genera of trematodes viz. *Paramphistomum*, *Fasciola* spp. and *Cotylophorun cotylophorum* were found in all the three seasons. *Paramphistomum* was found to be predominant in all the three seasons. *Fasciola* spp and *Cotylophorun cotylophorum* was least prevalent in winter whereas predominant in manson. (Table 6 and Fig.6)

Table 6: Seasonal prevalence (%) of intestinal trematodes in goats

S. No.	Trematodes genera	Number positive (%)		
		Monsoon	Winter	Summer
1	<i>Paramphistomum</i> spp.	356 (89%)	96 (24%)	184 (46%)
2	<i>Fasciola</i> spp.	144 (36%)	4 (1%)	52 (13%)
3	<i>Cotylophorun cotylophorum</i>	68 (17%)	16 (4%)	36 (9%)

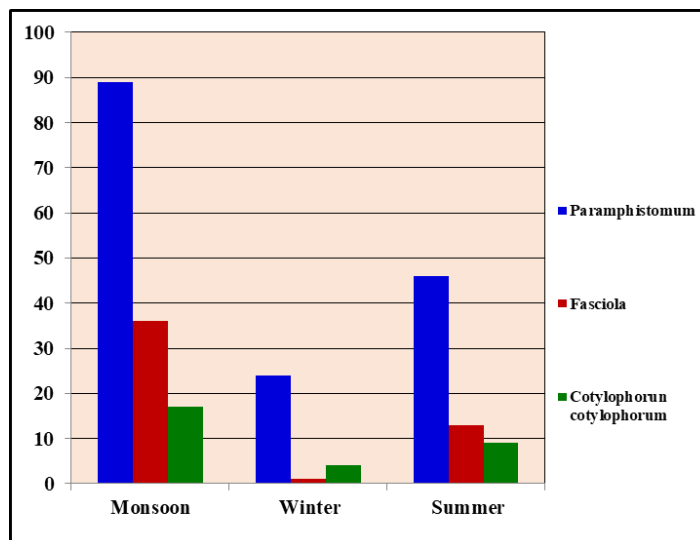


Fig 6: Graph showing the seasonal prevalence (%) of intestinal trematodes in goats

c. Seasonal prevalence of cestode of goat

Moniezia spp. had the peak prevalence in monsoon whereas least prevalence in winter (Table 7 and Fig.7).

Table 7: Seasonal prevalence (%) of intestinal cestodes in goats

S. No.	Cestode genera	Number positive (%)		
		Monsoon	Winter	Summer
1	<i>Moniezia</i> spp.	52 (13%)	8 (2%)	24 (6%)

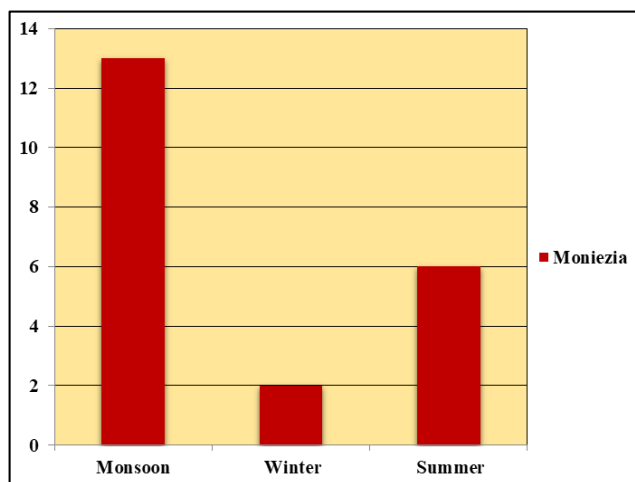


Fig 7: Graph showing the seasonal prevalence (%) of intestinal cestodes in goats

Seasonal prevalence of Protozoa of Goat

Eimeria spp. was most prevalent in monsoon and least prevalent in winter. (Table 8 and Fig. 8).

In case of helminthes, our findings are in agreement with others who have reported their seasonal in goats in India and from other parts of the world. Pathak and Pal (2008) [9] reported that the highest seasonal prevalence of gastrointestinal parasites was in monsoon (94.60%), moderate in summer (87.50%) and lowest in winter (63.15%). Similar observations were made by Yadav and Tandon (1989) [20], Katoch *et al.* (2000) [24], Muraleedharan (2005) [14], Yadav *et al.*, (2006) [15], Sutar *et al.* (2010) [25], Bandyopadhyay *et al.* (2010) [26] and Singh *et al.* (2015) [10]. However, Varadharajan and Vijayalakshmi (2015) [18] and Dhara *et al.* (2015) [22] have reported the highest prevalence in monsoon and lowest prevalence in summer in their study area.

The highest incidence of intestinal parasitic infection during monsoon may be correlated with the seasonal/climatic pattern and conditions. This season provides the optimum conditions for

Table 8: Seasonal prevalence (%) of intestinal protozoa of goats

S. No.	Protozoa genera	Number positive (%)		
		Monsoon	Winter	Summer
1	<i>Eimeria</i> spp.	356 (89%)	324 (81%)	392 (96.5%)

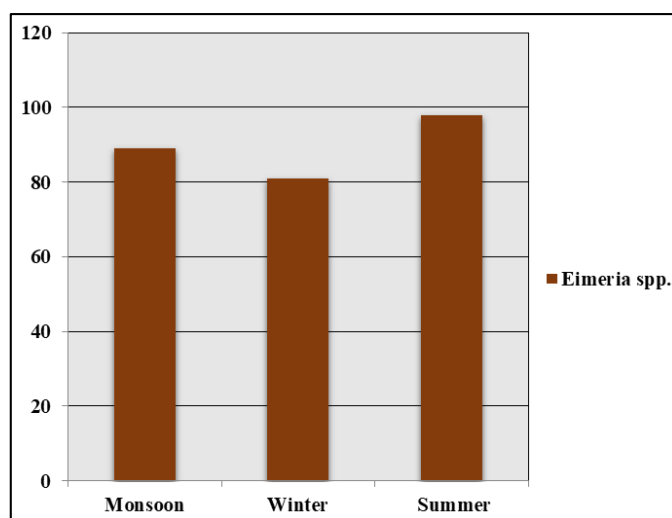


Fig 8: Graph showing the seasonal prevalence (%) of intestinal protozoa in goats

Herbage growth in this region and the required moisture is maintained on the grasslands. As a result, the peak infections occur in the months of monsoon. Relatively lowest rate of infection and worm burden in respect of all intestinal parasites during winter months may be because of minimum temperature and dry conditions which might be inhibiting the development of eggs and larvae. Besides weather conditions, the self cure phenomenon [27, 28] may also be the reason for the decrease in infection during colder months. However, *Eimeria* spp. showed different pattern with highest prevalence in summer followed by monsoon. This was probably due to stressful conditions caused by extremes of temperature and weather conditions, changes in environment, severe concurrent infection, dietary changes, poor nutrition, limited water resources and overcrowding which bring about the onset of this disease [29; 30; 31].

Faecal Egg Counts

In this study, EPG (Egg per gram of feces) estimated through McMaster’s egg counting technique was used to determine the degree of infection. The EPG showed variations and was within a range of 1300-20900. The faecal egg counts recorded in each month are detailed in (Table 9 and Fig. 9) showing the highest EPG in the month of August and lowest in the month of January. The mean egg per gram of feces was significantly ($p < 0.05$) highest in monsoon and lowest in winter (Fig.34) Faecal egg counts have also been reported by Dhara *et al.* (2015) [15] and Yadav and Tandon (1989) [20] in India. Yadav and Tandon (1989) [20] reported highest mean EPG of 4800 October and lowest mean EPG of 150 in May. Dhara *et al.* (2015) [15] reported highest mean EPG of 1324 in November and lowest mean EPG of 235 in May.

This high figure of EPG during monsoon months could be due to the higher fecundity of nematode parasites in the goats [15]. The minimum value of EPG and prevalence was observed during January to March as observed. The low EPG count from the end of winter to summer season (Table 9 and Fig. 10) might be related to a condition of hypobiosis that occurs during dry season which allows the intestinal parasites to survive in the host as arrested larvae or to survive as adults with a reduced fecundity [15]. The resumption of reproduction and development of parasites begins with the onset of monsoon. Variation was observed in the maximum and

minimum range of EPG count in a particular month without any clinical symptoms which might be associated with variation in individual nutritional status and physiological factors or goats developed tolerance to high level of EPG. A wide variation in the opinion of researchers has been observed about the levels of EPG to be considered as pathogenic and no firm limit has been fixed for lower and upper EPG range. The present study revealed that prevalence of intestinal parasitic infection was not associated with any clinical form though increase in the EPG count can be correlated with worm burden.

Table 9: Mean egg per gram (EPG) of faeces in goats

S. No.	Season	Month	EPG Monthly Mean	EPG Seasonal Mean	Range
1	Monsoon	July	11328.57±34.64 ^e	14546.39± 208.79 ^a	10600-12000
2		August	20300.00±36.60 ^a		19600-20900
3		September	16462.88±35.06 ^b		15800-17100
4		October	10081.25±37.93 ^d		9500-10900
5	Winter	November	6660.00±38.54 ^g	3717.50± 104.81 ^c	6100-7900
6		December	3978.49±49.42 ⁱ		3000-4700
7		January	1912.5±32.61 ^k		1400-2500
8		February	1991.67±38.50 ^k		1300-2800
9	Summer	March	3055.20±38.33 ^j	5898.64± 115.95 ^b	2400-4000
10		April	4638.54±41.33 ^h		4100-6100
11		May	6902.06±42.54 ^f		6100-7900
12		June	8957.73±41.70 ^e		8200-9900
Level of Significance			**	**	

Values bearing same superscript within a column do not differ significantly from each other. NS- No significance difference (**P < 0.05)

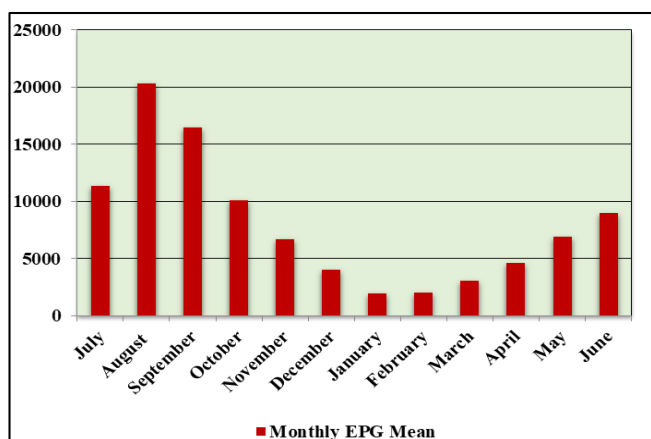


Fig 9: Graph showing the monthly mean egg per gram (EPG) of faeces of intestinal parasites in goats

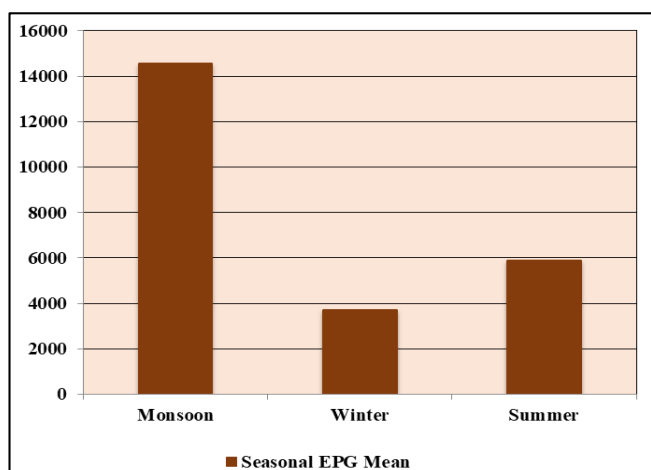


Fig 10: Graph showing the seasonal mean egg per gram (EPG) of faeces of intestinal parasites in goat

Conclusion

The present study confirms the prevalence of intestinal parasites of goat in faecal and intestine samples in Durg district. The overall prevalence of intestinal parasites viz. nematodes, trematodes, cestodes and protozoa was found to be 1134 (100%), 684 (57%), 92 (7.67%), and 1072 (89.34%) respectively. The peak month was July whereas depression month was January and the prevalence was highest in monsoon whereas least in winter.

A total of 11 genera of intestinal parasites were encountered which included 6 nematodes viz. *Haemonchus* spp., *Trichostrongylus* spp., *Bunostomum* spp., *Oesophagostomum* spp., *Trichuris* spp., *Strongyloides* spp., 3 trematodes viz. *Paramphistomum* spp., *Fasciola* spp., *Cotylophorun cotylophorum*; 1 cestodes viz. *Moneizia* spp., and 1 coccidia viz. *Eimeria* spp. *Eimeria* spp. showed the highest prevalence but lowest prevalence was exhibited by *Taenia* spp.

The mean faecal egg count was estimated to determine the degree of infection which ranged from 1300 - 20900. The highest monthly EPG was recorded in August whereas lowest in January and seasonal EPG was found to be the highest in monsoon and lowest in winter.

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