Indian Journal of Animal Sciences **82** (4): 355–358, April 2012

Epidemiology of gastrointestinal parasitism in goats in Sikkim

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Received: 20 May 2011; Accepted: 29 October 2011

ABSTRACT

An epidemiological study on gastrointestinal parasitic infection in goats in 4 agro-climatic zones of Sikkim during 2001 to 2010 was conducted. Out of 12 604 animals examined, 7933 (62.94%) were found to be positive for different gastrointestinal parasites either single or mixed infection with mean egg per gram of faeces (epg) 1364.68. The prevalence of different parasites was strongyles (46.72%), *Strongyloides* spp. (31.57%), *Nematodirus* spp. (17.01%), *Eimeria* spp. (19.4%), *Moniezia* spp. (9.89%),*Trichuris* spp. (3.95%), *Toxocara* spp.(2.55%), amphistomes (2.27%) and *Dicrocoelium* spp. (1.07%). The infection was more in subtropical high humid zone (70.48%) as compared to temperate humid zone (60.09%), sub-alpine low humid zone (23.81%) and alpine dry zone (7.56%). The faecal egg count of nematodes were ranged from 100 - 8400 with higher load during the rainy and post rainy seasons. The infection was higher in summer (74.71%) and autumn (73.62%) as compared to spring (63.08%) and winter (37.0%). The coproculture of positive samples revealed that order of prevalence of nematode infection were *Haemonchus, Bunostomum*, *Oesophagostomum* and *Nematodirus* spp. The gastrointestinal nematodes isolated from intestine during necropsy were *Haemonchus contortus* (64.91%) followed by *Oesophagostomum columbianum* (43.74%), *Bunostomum trigonocephalum* (35.63%), *Nematodirus filicolis* (15.76%), and *Trichostrongylus colubriformes* (8.28%). *N. filicolis* was reported for the first time in goats of Sikkim.

Key words: Epidemiology, Gastrointestinal parasitism, Goat, Sikkim

The gastrointestinal parasitic infection is one of the most common health problems which severely limits the productivity of dairy animals and small ruminants in the Himalayan and other hilly regions of India. Prevailing diverse agroclimatic conditions, animal husbandry practices and pasture management largely determine the incidence of parasites in grazing animals (Joshi 1998, Jithendran and Bhat 1999). The epidemiological study from different parts of country revealed that the incidence of strongyle worm in small ruminants varied from 59–94% (Jithendran 1998, Balasubramaniam *et al*. 2001, Khajuria and Kapoor 2003, Nasreen *et al*. 2005). Although information regarding epidemiological pattern of the helminthic diseases in different climatic zones of the country provided the basis for evolving strategic and tactical control of these diseases, such systemic information was not available in Himalayan region of Sikkim (Pal and Bandyopadhyay 2004, Rahman *et al*. 2010). The present study was therefore undertaken to generate systemic epidemiological information regarding gastrointestinal parasitic infestation in goats of Sikkim.

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MATERIALS AND METHODS

The study was carried out during April 2001 to March 2010 in 16 villages covering 4 districts of different agroclimatic zones of Sikkim. Faecal samples of goats were subjected to qualitative and quantitative examination for the presence of gastrointestinal parasites using standard parasitological techniques. The faecal egg count i.e. eggs per gram of faeces (epg) was determined by modified McMaster technique (MAFF 1984) for nematode parasites and for that of fluke (amphistome and *Dicrocoelium*) epg was done by faecal sedimentation technique (Soulsby 1982). The representative number of faecal samples were pooled in equal quantities and used for coproculture. Larvae, which were isolated by coproculture were harvested and used for larval identification (Soulsby 1976). The gastrointestinal tracts of slaughtered animals were examined in the laboratory for different gastrointestinal parasites.

RESULT AND DISCUSSION

Out of 12 604 goats tested from 4 different agroclimatic zones of Sikkim, 7933 (62.94%) were positive for various gastrointestinal parasites either singly or in mixed infection (Table 1). The prevalence (positive samples) of gastrointestinal parasites was higher (70.48%) in animals reared at lower altitude of sub-tropical high humid zone as compared to animals of temperate humid zone (60.09%), higher altitude sub-alpine low humid zone (23.81%) and alpine dry zone (7.56%). The low rate of infection of gastrointestinal parasites was recorded in the alpine dry area which was not favourable for the propagation of the parasitic ova.

The most commonly occurring parasites in the region were strongyles (46.72%), *Strongyloides* spp. (31.57%), *Eimeria* spp. (19.4%), *Nematodirus* spp. (17.01%), *Moniezia* spp. (9.89%), Amphistome spp. (2.27%) and *Dicrocoelium* spp. (1.07%) (Table 2). The necropsy examination of gastrointestinal tract of slaughtered animals revealed the presence of nematode species, viz. *Haemonchus contortus* (64.91%), *Oesophagostomum columbianum* (43.74%), *Bunostomum trigonocephalum* (35.63%), *Nematodirus filicolis* (15.76%), *Trichuris globulosa* (10.05%), *Trichostrongylus colubriformes* (8.28%). *and T.ovis* (7.49%) (Table 3). Higher rate of infection could be possibly due to conducive agroclimatic conditions, constant exposure of infection and availability of infective stage larvae on the grazing ground by animals, which was also reported in sheep by Sharma *et al.* (2007) and Singh *et al.* (2005). On contrary, comparatively less prevalence of *Dicrocoelium* spp. could probably due to less availability of the intermediate host. The prevalence of strongyle infection was higher as compared to *Strongyloides* spp. and *Trichuris* spp. Among strongyle, *Haemonchus contortus* emerged as most prevalent species in the region, besides *Oesophagostomum*, *Bunostomum, Trichostrongylus* and *Nematodirus* spp. also being isolated from goats. Similar observation was also reported by Yadav *et al*. (2006) in sheep and goat from Jammu, India.

Table 1. Influence of altitude on prevalence of gastrointestinal parasites in goats

Agro-climatic zone (Altitude)	No. of animals examined	No. of animals found positive (%)
Subtropical high humid zone (500-1600 m amsl)	6874	4845 (70.48)
Temperate humid zone (1601-2896 m amsl)	4812	2906 (60.09)
Sub-alpine low humid zone (2897-4286 m amsl)	693	165 (23.81)
Alpine dry zone (4287-6667 m amsl)	225	17 (7.56)
Total	12,604	7933 (62.94)

Figures in parentheses indicates the percent prevalence.

Table 2. Overall prevalence of gastrointestinal parasites recorded in goats in Sikkim (N=12 604)

Parasite		No. (%) infected*
Nematodes		
	- Strongyles	5889 (46.72)
	- *Strongyloides* spp.	3979 (31.57)
	- *Nematodirus* spp.	2144 (17.01)
	- *Toxocara* spp.	322 (2.55)
	- *Trichuris* spp.	498 (3.95)
Cestodes		
	- *Moniezia* spp.	1247 (9.89)
Flukes		
	- Amphistome spp.	286 (2.27)
	- *Dicrocoelium* spp.	127 (1.07)
Protozoa		
	- *Eimeria* spp.	2445 (19.4)
Total		7933 (62.94)

* Total numbers and overall percentage of an animal exceed expected values because of multiple gastrointestinal parasitism.

Out of 7 933 positive faecal samples, epg count varied from 100 to 8400 with a mean of 1364.68. Higher mean epg were recorded during rainy and post rainy season (Fig 1). The incidence of helminthes especially strongyles was high throughout the period of study with a peak during August to October which was also reported by Sharma *et al*. (2007). High rainfall and humidity, lowered the resistance of animal vis a vis established heavy infection in the host (Hawkins 1945). Moreover, high humidity and moderate temperature during the monsoon also favored bacterial multiplication, which was used as nutrition by free living larvae for their survivability (Katoch *et al*. 1998). With the onset of winter from December onwards, the mean total epg count steadily decreased to a minimum of 106.11 in January and after that it would accelerate slowly with the increase in temperature and rainfall (Fig. 1). The result was in accordance with earlier

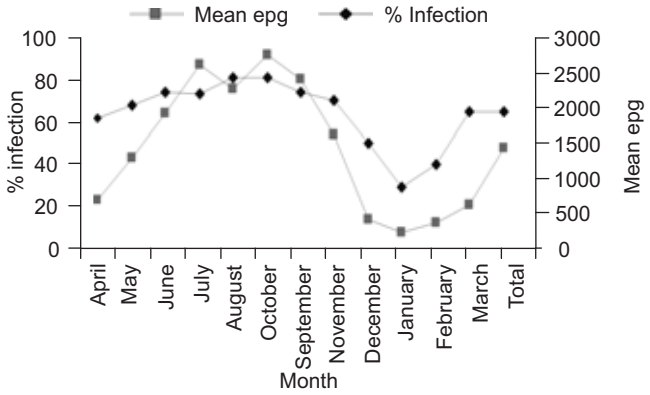

Fig. 1. Mean epg and per cent positive infection of gastrointestinal parasites in goats

Table 3. Prevalence of gastrointestinal helminths recovered at necropsy in goats (N = 567)

Location	Species	No. of animals infected	Percentage of infection	Number (%) of animals with worm burden		
				< 100	100-499	500-2000
Abomasum	*Haemonchus contortus*	368	64.91	57 (15.48)	264 (71.74)	47 (12.77)
	Trichostrongylus colubriformes	47	8.28	39 (82.97)	8 (17.02)	-
Small intestine	*Bunostomum trigonocephalum*	202	35.63	144 (71.28)	58 (28.71)	-
	Nematodirus spp	89	15.76	88 (98.87)	1(1.12)	-
	Moniezia expansa	83	14.64	83 (14.64)	-	-
	Stelesia spp	5	0.88	5 (0.88)	-	-
Large intestine	*Oesophagostomum columbianum*	248	43.74	235 (94.75)	12 (4.83)	1 (0.4)
	Trichuris globulosa	57	10.05	56 (98.24)	1 (1.75)	-
	T.ovis	20	7.49	19 (95.0)	1 (5.0)	-
Rumen	Amphistome spp.	127	22.4	28 (22.04)	77 (60.63)	22 (17.33)
Mixed infection	Trematode + Cestode +Nematode	56	9.88	9 (16.07)	34 (60.71)	13 (23.21)
Total		368	64.91	144 (39.13)	264 (71.73)	47 (12.77)

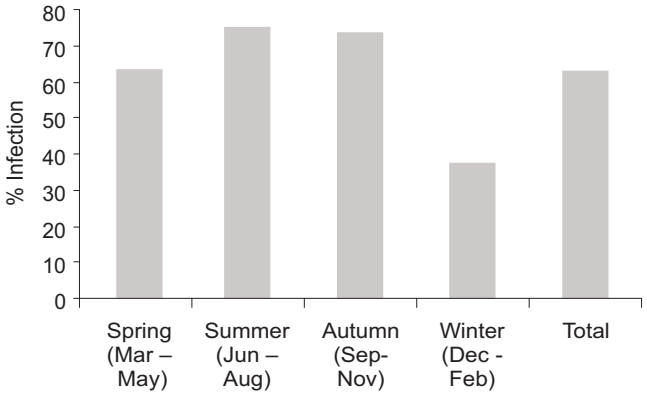

Fig. 2. Seasonal prevalence of gastrointestinal parasites in goats

workers (Sanyal 1989, Katoch *et al.* 1998, Pal and Bandyopadhyay 2004). Study regarding prevalence of infection in different seasons showed that it was minimum during winter (37.0%) and higher levels were recorded during summer (74.71%) and autumn (73.21%) (Fig 2).

Sanyal and Singh (1995) reported increased parasite burden both inside host as well as on pasture during rainy season in seven different agroclimatic zones of India. The present observation also indicated a similar trend with minor modification owing to various agroclimatic conditions and timing of onset of monsoon in the study area. The study indicated that, under normal condition, the animals harboured a worm burden without any clinical signs, but the worm burden would reach a threshold pathogenic level in the monsoon and post monsoon seasons (Jithendran and Bhatt 1999). The egg count data revealed that July to October were the months with the highest risk of GI parasites and pasture contaminations.

This study indicated that an agroclimatic condition of Sikkim was the most congenial for development of gastrointestinal parasites. However, persistent sub clinical level of infections in goat might be helpful for development of chemotherapeutic and prophylactic measures for eradication of GI parasitic infection in this region as well as in other regions having similar geoclimatic conditions. The present observations suggested that broad spectrum anthelmintic treatment of goats during March-May and August-September could reduce the gastrointestinal parasitic infection and increase the productivity of animals in this state.

ACKNOWLEDGEMENT

Authors thank the Indian Council of Agricultural Research, New Delhi, for providing financial support for the present study under the project of All India Network Programme on Gastrointestinal Parasitism (AINP on GIP). Thanks are also expressed to the Director and Joint Director of this institute for providing the necessary facilities.

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