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Epidemiological Studies for Gastrointestinal Parasitic Diseases in a Pure Breed Jamunapari Herd

Jitendra Tiwari, Daya Shankar, Dinesh Kumar Sharma, Souvik Paul

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Abstract The present study was carried out the objectives to know the pattern of gastro intestinal parasitism in pure breed herd of Jamunapari goat. In the study, a resource population of 344 Jamunapari goat kids with complete pedigree records has been analyzed. Coprological examination was done in Jamunapari goat kids of 3-6 months of age group born during three kidding seasons under the study period of 18 months from February 2013 to August 2014. Under natural infection a significantly (p<0.05) higher incidence of strongyle worms were observed during monsoon-autumn season (14.23%) as compared to spring-summer season (8.13%). Besides strongyle worms, infection of *Eimeria* spp., *Moniezia* spp. and *Trichuris* spp. parasites was also detected. Larva culture of the positive samples revealed a significantly (p< 0.01) higher incidence of *H. contortus* (90%) as compared to other strongylid worms. In the study, a non-significantly higher infection was observed in female kids (39.14%) as compared to male kids (31.95%).

Keywords Epidemiology, Jamunapari, GI parasitism, Goat.

J. Tiwari[1]*, D. Shanker[2], D. K. Sharma[3], S. Paul[4]
[1] Assistant Professor, [2]Professor and Head,
Department of Parasitology, College of Veterinary Science and Animal Husbandry, DUVASU, Mathura 281001, India
e-mail: Jitendra.vet@gmail.com
e-mail: sachan_ds@rediffmail.com

D. K. Sharma[3], S. Paul[4]
[3] Principal Scientist, [4]Scientist,
Goat Health Division, CIRG,
Makhdoom, Farah, Mathura 2281122, Uttar Pradesh, India
e-mail: lkofwb@gmail.com
e-mail: drsouvik.cirg@gmail.com
*Correspondence

Introduction

The domestic goat *(Capra hircus)* constitutes an important species of livestock in India. It plays a significant role in improving household nutrition and also provides food and nutritional security to millions of marginal farmers and agricultural laborers. India has the second highest goat population in the world, constituting about 15% of total goat population [1]. Jamunapari is one of the largest goats in India with an average weight of 45-60 kg. It is a dual purpose breed with good milk, meat and skin quality. The breed has been extensively utilized to upgrade indigenous breeds for meat and milk, and also been taken to many south and south-east Asian countries for the same purpose.

Diseases caused by gastro-intestinal (GI) parasites are one of the major causes of wastage and decreased productivity in small ruminants around the world. In India, small ruminant systems of production

commonly are based on grazing and therefore diseases caused by GI parasites are of primary importance. Jamunapari goat has been reported resistant to *H. contortus, Strongyloides* and *Oesephagostomum* spp. of parasites in comparison to Barbari breed [2]. Additionally, the Anglo-Nubian breed developed in United Kingdom from crossing Jamunapari and Zaraibi breeds with native goats considered as resistant to *H. contortus* [3]. Therefore, the present study was undertaken to obtain accurate epidemiological picture of GI parasites in a pure breed herd of Jamunapari goats over a period of eighteen months from February 2013 to August 2014.

Materials and Methods

The present study was carried out at Jamunapari goat farm of Central Institute for Research on Goats (CIRG), Makhdoom, Mathura. At CIRG, controlled breeding was practiced and does being bred during October-November and May-June, followed by kidding in March-April and October-November respectively. Under this study only kids of 3-6 months age group were included for detecting the actual status of parasitic load in the animals before the emergence of any acquired immunity in the animals. As the kids of required age group were available only twice during a year, the epidemiological data is presented here for monsoon-autumn and spring-summer seasons.

Under the study period kids born during three kidding seasons were included. Faecal samples were collected directly from the rectum of individual animal at the interval of every 21 days. A total of 1437 faecal samples were collected during the study period. The samples were collected in individual polythene bags and labelled with the corresponding animal identification number, date of collection, age, sex and weight of the respective animals. Samles were immediately transferred to the laboratory after collection and were stored at 4^0C in refrigerator till further processing. These samples were processed within 24-48 h of collection.

To determine the level of infection in individual sample, egg per gram (EPG) values of each sample was determined by the quantitative estimation of samples using modified McMaster egg counting technique. Besides the strongylid type of eggs, other parasitic eggs and oocysts were also examined and recorded for epidemiological studies. The samples in which FEC by McMaster technique was found zero were further subjected to a floatation technique to detect the EPG..

The positive fecal samples from each collection time were pooled and mixed thoroughly to identify the species of GIN involved in the infection. Coproculture was made as per the standard protocol [4]. The generic classification of the larvae was determined by examining under low power of microscope after adding a drop of lugol's iodine. All parasitological data was statistically analyzed by using SPSS (version 20.0 SPSS Inc., Chicago). Statistical analysis were performed by *t*-test and differences were considered significant for $p<0.05$.

Results and Discussion

In the present work, kids of 3-6 months of age group were studied for the pattern of GI parasitism in Jamunapari goat. Animals of this age group were selected because adult animals in comparison to younger kids can control the worm burdens in a better way by acquired immune response developed through repeated parasitic infections, which was lacking in kids that only has their innate immunity against the parasites.

A total of 344 kids were examined during the study period. Of the total,161 kids were male and 183 were female. During spring-summer season of two years 238 animals were examined of which 116 kids were male and 122 were female, while during a single monsoon-autumn season 106 kids were examined of which 45 were male and 61 were female. Perusal of the data revealed that animals were consistently infected throughout the period of study with an overall incidence of 35.76%. The infection rate was found to be 45.81% and 30.76% for the monsoon-autumn and spring-summer seasons respectively. However, no significant ($p<0.05$) difference was observed in overall parasitic infection in between the two seasons.

The percentage incidence of different parasitic species in the collected fecal samples was also deter-

Table 1. Species wise distribution of GI parasitism in Jamunapari kids. Parentheses showed the number of positive samples.The values having different superscripts are significantly (p<0.05) different.

Season	Monsoon-autumn	Spring-summer
Eimeria spp.	29.29% (140)	22.73% (218)
Strongylid worm	14.23%[a] (68)	8.13%[b] (78)
*Moniezia s*pp.	3.97% (19)	3.86% (37)
Trichuris spp.	1.67% (8)	1.67% (16)

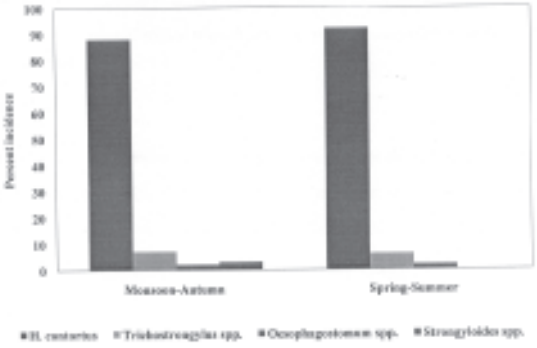

Fig. 1. Composition of strongylid worm infective larvae on coproculture.

mined. The different parasites encountered during the study were *Eimeria* spp.,strongylid worm, *Moniezia* spp. and *Trichuris* spp. The highest infection was recorded for *Eimeria* spp. (24.91%), followed by strongylid worm (10.16%), *Moniezia* spp. (3.89%) and Trichuris (1.67%). Present observations are in conformity with the findings of high incidence of coccidiosis in other parts of India (5, 6). High prevalence of coccidiosis observed in the study could been due to the fact that the animals were kept in permanent sheds most of the time except during grazing and they were in close contact with each other that might have favored the development and transmission of the protozoa. These factors along with the high humidity of the rainy season must have predisposed them to high coccidial infection.

Next to coccidia, strongyle incidence was observed high in this study. The high incidence rate of strongyle worms was in agreement with the findings of earlier investigators [7]. The area under the study with tropical climatic conditions would have been responsible for high incidence rate as climatic conditions of high precipitation and optimal temperature prevailing in tropics and subtropics favored the development and survival of parasitic nematode eggs in the environment and subsequent infection to animals [8].

Seasonal comparison for the two seasons revealed consistency of parasitic infection with increase for all types of infection except that for *Trichuris* spp. in monsoon-autumn season as compared to spring-summer season. The overall incidence of different GI parasites in depicted in Table 1.

A significantly (p<0.05) higher FEC of strongyle worm in the present study was found in monsoon-autumn season as compared to spring-summer season. Similar pattern of seasonal variation in FEC from Makhdoom was also reported previously by other scientists [9]. Seasonal variation in egg count of GI nematodes was likely to be dependent on the variation in availability of infective larvae on pastures that further depends on the environmental conditions. In rainy season high humidity and temperature range of 30-40^{0}C was highly suitable for the development, survival and translocation of pre-parasitic stages of GI nematodes. The results are in agreement with observations made by other workers [10].

Among the positive fecal samples, it was observed that few samples had mixed infection with more than one type of parasitic species, whereas in others only single species infection was present. Study of the data revealed that number of fecal samples with single species parasitic infection was significantly (p<0.05) higher (82.88%) than the number of samples having mixed species infection (17.12%). Mixed species infection in spring-summer season was seen in 18.31% of the total 295 positive fecal samples while in monsoon-autumn season 9.59% of the 219 positive fecal samples had mixed type of parasitic infection.

Study of relationship of host sex with parasitic infection reveals that incidence of parasitic infection in female kids (37.83%) was higher than male kids (33.43%). In both the seasons, same pattern of higher incidence was noticed in females. Species-wise analysis of data revealed that infection of Eimeria spp.

(26.12% and 24.05%) and strongylid worms (11.26% and 9.78%) was slightly higher in female than male kids respectively. Whereas incidence of *Moniezia* (3.93% and 3.81%) and *Trichuris* (1.69% and 1.64%) was almost same in male and female goats respectively.

Sex of kids has been reported to affect FEC of animals [11]. Females usually show higher FEC as compared to males after puberty although there appear to be no significant differences between sexes prior to puberty [12]. In the present study there was no significant difference in FEC among male and female kids and are thus consistent with earlier reports.

Faecal samples found positive for strongylid infection were cultured after pooling, so that larval population was true representative of each sampling time. Larvae appeared in the culture plates each time within 5-7 days. They were collected from the culture plates and identified up to genera level under low power of microscope. Overall strongylid larva composition showed the presence of infective larvae of *H. contortus, Trichostrongylus* spp.and *Oesophagostomum* spp. along with infective larvae of *Strongyloides* spp. However, the later one was found only during monsoon-autumn season. Differential composition of strongylid worm larvae during two seasons is given in Figure 1. The results showed significantly higher ($p<0.01$) proportion of *H. contortus* larvae as compared to other species of parasites during both the seasons. There was no significant difference found among larvae composition between the two seasons.

The fecal culture of representative samples reveals that *Haemonchus* was the most prevalent parasite in kids. The percentage occurrence of other nematodes viz. *Trichostrongylus, Strongyloides* and *Oesophagostomum,* were significantly ($p<0.01$) low throughout the study. *H. contortus* has been considered as most prevailing parasitic species of warm climatic regions by some other workers [13]. The present study revealed similar trends of *H. contortus* as most prevalent species of goats as reported by other workers [14].

The present study revealed the epidemiology of GI parasites in a well managed pure breed farm of Jamunapari goats. Not much work has been done on this aspect previously in any other part of country. The data presented here will be helpful in identifying the risk factors associated with the parasitic infection in this eminent goat breed of India that will furthert be helpful in policy making against these infections.

References

1. FAO (2008) FAOSTAT database Food and Agriculture Organization of the United Nations. FAO, Rome, Italy.
2. Rout PK, Chauhan KK, Matika O, Bishop SC (2011) Exploring the genetic resistance to natural gastrointestinal nematode infection in Indian goats. Vet Parasitol 180 : 315—322.
3. Bressani FA, Tizioto PC, Giglioti R, Meirelles SLC, Coutinho R, Benvenuti CL, Mudadu MA, Vieira LS, Zaros LG, Carrilho E, Regitano LA (2014) Single nucleotide polymorphisms in candidate genes associated with gastrointestinal nematode infection in goats. Genet Mol Res 13 : 8530—8636.
4. Taylor MA, Coop RL, Wall RL (2007) Veterinary parasitology. 3rd edn. Wiley Blackwell, Oxford.
5. Buragohain B,Phukan A, Baruah CC, Dutta TC, Dutta PR (2013) Prevalence of coccidiosis in goats of greater Kamrup district of Assam. Ind Vet J 90 : 42—43.
6. More BV, Kamble HA, Nikam SV (2014) Study of *Eimeria ninakohylakimovae* in goat and sheep from beed,Maharashtra state, India. Trends Parasitol Res 3 : 8—13.
7. Tiwari J, Shanker D, Jaiswal AK (2013) Epidemiology of gastrointestinal worm infection in ruminants in and around Mathura district of North Western UP. Ind Vet J 90 : 63—64.
8. Waller PJ (1997) Nematode parasite control of livestock in the tropics/subtropics : The need for novel approaches. Int J Parasitol 27 : 1193—1201.
9. Chauhan KK, Rout PK, Singh PK, Mandal A, Singh SK, Roy R (2003) Genetic resistance of Barbari and Jamunapari kids to natural infection with gastrointestinal nematodes. Trop Anim Health Pro 35 : 397—408.
10. Molla SH, Bandyopadhyay PK (2013) Prevalence of gastro-intestinal parasites in economically important Bonpala sheep in India. IOSR J Agric Vet Sci 9 : 87—93.
11. Kumar R, Ranjan S, Vishnu PG, Negi M, Senapati PK, Charita VG (2015) Variability of resistance in Black Bengal goats naturally infected with *Haemonchus contortus.* J Para Dis 39 : 76—79.
12. Woolaston RR, Piper LR (1996) Selection of Merino sheep for resistance to *Haemonchus contortus:* Genetic variation. Anim Sci 62 : 451—460.
13. Besier RB, Kahn LP, Sargison ND, Van-Wyk JA (2016) The pathophysiology, ecology and epidemiology of *Haemonchus contortus* infection in small ruminants. Adv Parasitol 93 : 95—143.
14. Emiru B, Ahmed Y, Tigre W, Feyera T, Deressa B (2013) Epidemiology of gastrointestinal parasites of small ruminants in Gechi district, Southwest Ethiopia. Adv Biol Res 7 : 169—174.