EPIDIMIOLOGICAL STUDY OF GASTROINTESTINAL NEMATODES OF GOATS IN DISTRICT SWAT, KHYBER PAKHTUNKHWA, PAKISTAN

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ABSTRACT*: This study was conducted to delineate the epidemiology of gastrointestinal nematodes of goats in District Swat, Khyber Pakhtunkhwa. A total of 150 faecal samples were randomly collected from various age groups and of either sex of caprines. Overall prevalence of gastrointestinal nematodes in goats was 40.67%. Five species of nematodes were identified and included Nematodirusspathiger, Haemonchuscontortus, Trichostrongyluscolubriformis, Strongyloidespapillosus and Trichurisovis. Most prevalent species was Nematodirusspathiger (28.66%). Highest prevalence and mean eggs count per gram of faeces (EPG) were found in young animals (≤ 1 year old) as compared to adults (P < 0.05). Sex related prevalence indicates that infections were more common in males but association was non-significant (P > 0.05). No association between management practices and prevalence of GIT nematodes was detected but infection rate and mean EPG was higher in house hold animals as compared to commercially raised animals (P > 0.05). Body condition, faecal consistency, concurrent diseases and anaemia were not risk factor for the occurrence of nematodes in this study (P > 0.05). Parity status significantly influenced the egg shedding (P < 0.05). Litter size also affected the egg shedding intensity and higher EPG was recorded in goats with duplets and triplets.*

Key words: GITNematodes, PPR, Goats, Prevalence, Swat.

INTRODUCTION

Goat is important livestock species all over the globe and especially in tropical and subtropical regions. It has a pivotal role in small scale farming and rural economy of developing societies by generating employment and supplementing house hold income. Goats are primarily raised for milk, meat, hair and leather production [1]. Parasitic nematodes of gastrointestinal tract (GIT) are the main constraints to goat production all over the world and are a significant health issue in areas with poor sanitation and management [2].

Goats harbor a variety of GIT parasites that affect the production as well as growth of the animals. *Haemonchuscontortus*, a voracious blood sucking parasite found in abomasum causes anaemia, diarrhoea, loss of weight, oedema, recumbency, severe debility and ultimately death [3]. Furthermore, stress, poor nutrition and coincidental diseases may aggravate the condition of affected animal [4]. Heavy economic losses due to reduced productivity, mortality and parasite control measures are recorded in nematode parasites [5].

Prevalence of GIT nematodes vary in diverse geographical conditions and influenced by climate, management, vegetation and livestock density [6]. Number of studies reported on the prevalence of gastrointestinal nematodes in goats all over the world including Pakistan, and infection rates ranged from 43.10% to 93.29% [7, 8]. Prevalence studies on gastrointestinal nematodes have been conducted extensively in different parts of the country but no information is available from Swat, Khyber Pakhtunkhwa. A better understanding of the epidemiology of the GIT nematodes in goats is crucial in the development of viable and enduring parasite control strategies [9]. Present study has been designed to investigate the prevalence of gastrointestinal nematodes affecting the goat population of the area. In addition various risk factors influencing the prevalence and intensity of GIT nematodes in goats have also be determined.

MATERIALS AND METHODS

The study was conducted in district Swat situated in north of Khyber Pakhtunkhwa, Pakistan, 34° 46' 58" N and 72° 21' 43" E. The study was carried out from February to May 2012. A total of 150 goat animals including 75 males and 75 females were examined for the presence of gastrointestinal nematodes raised under two management systems (75 each from house hold and commercially raised animals). The animals were categorized into three age groups each having 50 animals. Young animals were ≤ 6 months old, immature were 6-12 months and adults were ≥ 1 year age. Age of the animal was estimated by dentition. In addition 20 more goats in last stages of pregnancy were monitored for two months (1 month before parturition and 1 month after parturition) to determine the effect of parity on nematode egg shedding. The goat kids were also monitored for parasitic infections for a period of one month.

Faecal samples were randomly collected from rectum and stored in refrigerator at 4°C for examination on same day or next day. Each sample was labeled and information regarding age, sex, body condition, management, concurrent disease, vaccination was recorded. Qualitative analysis was carried out by direct microscopic examination and flotation technique while quantitative analysis was carried out by McMaster egg counting techniques [10]. Third stage larvae were harvested by Bearmann technique and were identified from their morphological characteristics [11].

Statistical Package for Social Science (SPSS) version 16 was used for data entry and statistical analysis (SPSS, Chicago,

IL, USA). Chi square test was used to determine the association between qualitative variables. $P \leq 0.05$ was considered as significant.

RESULTS AND DISCUSSION

Out of 150 faecal samples 61 were found positive. The overall prevalence rate was 40.76% in the area which varies from different researches of different regions. Studies conducted in different regions have reported varied prevalence of gastrointestinal parasites in Pakistan i.e. 43.10 % prevalence in Hyderabad [7], 46.33 % in southern Punjab [12], 52% in Southern Punjab-Pakistan [13]. In the present study overall lower prevalence of GIT nematodes was recorded as compared with above mentioned studies and this may be attributed to the fact that prevalence and intensity of parasitic infection is very high in rainy season and low in winter [2, 14-16]. High prevalence of goat parasites in different regions is mainly due to the tropical environment and high humidity due to which infections persist throughout the year. Low infection rate in this study is mainly due to lower environmental temperature during the study period which is not conducive for larval development.Umur et al.,[17] also reported continuous decrease in infection rate from autumn until the onset of winter. The present results were not in accordance ofRadfar et al.,[18] who reported high prevalence in winter in Raeini Goat Research Center of Iran. Variations in results may be attributed due to climatic conditions, temperature, humidity, pasture contamination and previous infection in the area.

Table 1.Prevalence of different gastrointestinal nematode species in goats.

Nematode species	Infected animals	
	No.	Percentage
Nematodirusspathiger	43	28.66 %
Haemonchuscontortus	22	14.66 %
Trichostrongyluscolubriformis	06	4 %
Strongyloidespapillosus	09	6 %
Trichurisovis	17	11.33 %

Total number (N) =150

Five species of gastrointestinal nematodes *Nematodirusspathiger*, *Haemonchuscontortus*, *Trichostrongyluscolubriformis, Strongyloidespapillosus*and *Trichurisovis*were recorded in the present study. The most prevalent species in the area was *Nematodirusspathiger* (28.66 %) (Table 1). Similar prevalence rate of *Nematodirusspathiger*13% and 29% was recorded in Rawalpindi and Islamabad [19, 20]. Prevalence rate was reported in and around Hyderabad was *Trichostrongyluscolubriformis* (6.67 %), *Strongyloidespapillosus* (4.51 %) and *Trichurisovis*(8.17 %) while no *Nematodirusspathiger*was recorded in the study [7]. The variation in results can be attributed due to the pasture contamination in both areas.

High infection rate was recorded in young and immature i.e. 48 % while in adults was 26 % ($P < 0.05$). Higher prevalence in young animals can be contributed due to contaminated environment, overstocking and lack of immunity [21]. With increase in age the prevalence of GIT nematodes decreases due to the development of immunity and it is well documented that small ruminants develop partial immunity against GIT nematodes. Age has significant influence on the prevalence of GIT nematodes [22] that agree our findings that young ones are more susceptible to nematode infections. The present result are not inline to those ofHassan et al.,[1] who reported high prevalence rate in adults as compared to young animals in Chittagong, Bangladesh. Variation in results was because Bangladesh has highly humid and wet environment with moderate temperatures that favour completion of parasite life cycle and lead to pasture contamination round the year, whereas environmental temperature in the study area was around zero or single digit from November to March.

Prevalence and intensity of infection was high in males (46.66 %) as compared with females (34.66 %). The present results are supported by [23] that males were more susceptible to parasitic infections than females. Effect of sex on the resistance level against GI parasites was reviewed by [24] and reported that difference in resistance level were significant after puberty only. The difference in resistance level after puberty is due to estrogen stimulatory effect on immune response against GIT nematodes while androgen suppresses the immune response [25] and this is the reason that males are more susceptible to infectious diseases including nematode parasites than female.

Heavy infection rate and intensity was found in house hold animals (45.33 %) than grazing animals (36 %). These results are in agreement to that ofPal et al.,[26] that grazing animals have low prevalence rate as compared to house hold animals. Limited information is available to compare the prevalence and intensity of nematode infection in house hold and commercially raised goats. High infection in house hold goats may be attributed to confinement in a limited contaminated environment that results in continuous infection while lower infection commercially raised goats was due its unique feeding behavior (browsing).

Infection was found relatively high (42 %) in pregnant animals as compared with non pregnant animals (33.92 %). It is evident that pregnancy greatly influenced the prevalence rate due to temporary relaxation in immunity [27]. High infection rate and intensity has been observed in pregnant animals especially around parturition in small ruminants [28]. High intensity of nematode infection around parturition plays significant role in pasture contamination and disease transmission to susceptible animals especially kids.

Table 2.Prevalence of gastrointestinal nematode of goats in relation to the selected variables.

Variable	Category	Prevalence (%)	Chi-Square	P value
Age	1-6 month	48	6.68	0.03*
	6-12 months	48		
	≥ 1 year	26		
Sex	Male	46.66	2.23	0.13
	Female	34.66		
Parity	Pregnant	42	2.28	0.32
	Non pregnant	33.92		

Management	House hold	45.33	1.35	0.16
	Commerciall y raised	36		
Body condition	Good	39.85	0.47	0.35
	Poor	50		
Faecal consistency	Normal	40.81	0.06	0.64
	Abnormal	33.33		
Diseased	Yes	33.33	0.06	0.63
	No	40.81		
Anaemic	Yes	40	0.002	0.61
	No	40.71		

(Level of significant: p-value < 0.05*)

Different factors like sex, age, grazing behavior, economic status and education level of the farmers, management and anthelmintic used can greatly influence the prevalence of gastrointestinal nematodes [29]. Present study revealed that body condition, faecal consistency, current disease and anaemia did not show any significant association with the prevalence of nematode parasites (P>0.05). It could be explained by the fact that low grade infection was observed in the infected animals. Animals on severely contaminated pasture can carry large number of GIT nematodes and show moderate to severe clinical symptoms. Heavy infections may also cause death of animals whereas subclinicaly infected animals may not produce up to their potential [30] (Table. 2, 3).

Table 3.EPG per-goat in relation to the selected variables.

Variable	Category	EPG	P value
Age	1-6 month	282	
	6-12 months	211	0.13
	≥ 1 year	142	
Sex	Male	265	0.06
	Female	158	
Parity	Pregnant	147	0.46
	Non pregnant	126	
Management	House hold	254	0.13
	Commercially raised	169	
Body condition	Good	208	0.69
	Poor	250	
Faecal consistency	Normal	209	0.54
	Abnormal	333	
Diseased	Yes	333	0.54
	No	209	
Anaemic	Yes	210	0.98
	No	211	

(Level of significant: p-value < 0.05*)

One month after parturition the infection and intensity become high in pregnant goats whereas infection and intensity in dry goats was remain the same. The EPG was significantly higher in parturited goats as compared with dry goats one month after parturition (P = 0.04). Similarly higher EPG was recorded in does one month after parturition as compared with one month before parturition (P = 0.01). Previous studies show that higher faecal egg count was recorded in Creole goats around kidding and lactation [27]. Similarly high faecal egg count around parturition was reported and it is suggested that high faecal egg counts are influenced by increased prolactin levels [28]. Increased faecal egg counts around parturition are induced by the temporary relaxation in immunological response against parasite [31] and parturition associated endocrine changes [32]. Higher shedding of helminth egg around parturition can be a source of environment contamination that ultimately results in transfer of infection to young susceptible animals.

It was observed that litter size effect the egg per gram of faeces. In this study it was also reported that goats having litter size 1 had mean EPG 242, while animals having litter size 2, EPG was 942. The maximum EPG was 1500 of animal having litter size 3. Findings are in line with those of Romjali *et al*.,[33] in Indonesia that higher the litter size higher will be the faecal egg count due to greater relaxation in immunity.

CONCLUSION

From the present study it is concluded that appropriate strategic anthelmintic should be used by the local veterinarians and extension workers for effective control of GIT nematodes. For comprehensive and clear epidemiological picture, complete round the year study should be conducted, as small ruminants especially goats play a key role in income as livelihood source in the area.

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