



Epidemiology of *Hemonchus contortus* in goat and sheep population of district Tank, Khyber Pakhtunkhwa

Arsalan Khan¹, Muhammad Jamil^{2*}, Jaweria Gul³, Habib Ullah⁴, Muhammad Kashif⁵, Atta Ur Rehman⁴, Imtiaz Khan⁶, Shahid Zeb⁷, Mubarik Ali⁸, Norina Jabeen⁹

¹Veterinary Research and Disease Investigation Centre, Dera Ismail Khan-29050-Pakistan

²PARC Arid Zone Research Centre, Dera Ismail Khan-29050-Pakistan

³Shaheed Benazir Bhutto University, Department of Biotechnology, Dir Upper, KPK, Pakistan

⁴Faculty of Veterinary and Animal Sciences, Gomal University, Dera Ismail Khan-29050-Pakistan

⁵Department of Clinical Sciences, Sub Campus Jhang, University of Veterinary and Animal Sciences, Lahore-54000-Pakistan

⁶Veterinary Research Centre, Tank- 29461-Pakistan

⁷Government Degree College No.2, Dera Ismail Khan-29050-Pakistan

⁸Animal science Institute, National Agricultural Research Centre, Islamabad, 54000-Pakistan

⁹Rural Sociology Department, Institute of Social Sciences, University of Agriculture Faisalabad, Pakistan

Abstract

Hemonchus contortus is a blood sucking parasite infesting sheep and goats throughout the world, thus significantly deteriorate the health and production of the animals, rendering huge economic losses to the livestock enterprise. Therefore, this cross-sectional study was designed for the estimation of epidemiological incidence of *Hemonchus contortus* in goat and sheep population in District Tank of Khyber Pakhtunkhwa province in Pakistan and to analyze the associated risk factors. For this purpose, a sum of 400 fecal samples were randomly collected from sheep and goat populations in District Tank, during the year 2021-22 for the determination of prevalence of the *Haemonchus contortus*. The results revealed that overall prevalence of *Haemonchus contortus* in sheep and goats in Tank was 15.50 and 13.00%, respectively. The significant difference ($P < 0.05$) was seen in the prevalence percentage of this parasite in both species of small ruminants. The males in sheep showed a prevalence of 12.85%, while the females showed a prevalence of 16.92%, revealing a non-significant ($P \geq 0.05$) difference. The prevalence percentage in bucks was 12.72%, while the female goats showed a prevalence of 13.10%, hence, that were statistically non-significant ($P \geq 0.05$). It was concluded from the study that there was significant incidence of *Haemonchus contortus* in small ruminants in District Tank, and it declines the production of the animals and badly affect their health, production and growth. Therefore, strategic control measures should be adapted and devised to control the infestation of *Haemonchus contortus* in the animals.

Key words: Economic impact; Endemic; Incidence of Parasitism; Infestation; Small Ruminants.

Article Info:

Received:

October 26, 2022

Received Revised:

December 23, 2022

Accepted:

December 24, 2022

Available online:

December 25, 2022

*Corresponding Author:

jamilmatrah@parc.gov.pk

1. INTRODUCTION

A wide variety of gastrointestinal (GIT) helminths have been concerned in significantly high morbidity and mortality rates in small ruminants like sheep and goats¹. The animals infested with the worms and helminths exhibit characteristic signs including mild to massive diarrhea, gastroenteritis, stunted growth and reduced weight, progressive milk decline, meat and dairy production, anorexia and in-appetence, alopecia, and loss of wool. Worm infestation prone the animals to declined production and devastating health effects².

In Pakistan, the livestock enterprise is principally subsistence business at small scale and commercial level, characterized by small flocks and herds to large scale production, respectively. Sheep, goats are particularly maintained for meat production *viz* mutton and chevon, respectively, while milk, hair and wool are obtained as by-products. Out of these species, the population growth of the goats has been extensively increased and progressively increasing at an exponential rate, in Pakistan³.

At present, Pakistan is serving the homeland with 53.70 (Millions) heads of goats and 26.40 (Millions) heads of sheep. The annual increase in the population of both species is 4.48 and 2.63%, for goats and sheep, respectively. And in Pakistan, again the province of Khyber Pakhtunkhwa is richly flourished with livestock, and it has been recorded in the animal population census that there are 9.50 (Millions) heads of goats and 3.30 (Millions) heads of sheep, in Khyber Pakhtunkhwa, and there are 0.190 (Millions) heads of goats and 0.07 (Millions) heads of sheep in the study area *viz* District Tank, Khyber Pakhtunkhwa⁴.

As the sheep, goats are primarily raised on open grazing and extensive farming system, therefore, these are prone to worm infestation and subsequently helminthiasis. Because these animals feed on the larvae and ova of these worms adhered to the grasses and pastures, on which these animals feed upon. Therefore, in sheep and goat farming, special attention is needed to their worm infestation⁵. Therefore, this study was carried out for the epidemiological investigation and determination of prevalence of the *Haemonchus contortus* in small ruminants' population of sheep, goats' along with the study of associated risk factor in spread of the parasite, in District Tank of Khyber Pakhtunkhwa province in Pakistan.

2. MATERIALS AND METHODS

2.1 Sample collection

For this purpose, the fecal samples were randomly collected from the sheep and goat population of the District Tank. The fresh fecal specimens were directly collected from the rectum of the animals following proper biosecurity measures and wearing disposable rubber gloves and other PPEs (personnel protective equipments). The samples were transported to the laboratory facility in sterile specimen bottles of 60ml volume.

2.2 Sample size

A sum of 400 fecal samples were randomly collected from sheep and goat populations in District Tank of Khyber Pakhtunkhwa Province, Pakistan, during the year 2021-22 for the purpose of epidemiological investigation and estimation of prevalence percentage of *Haemonchus contortus* parasite infesting the small ruminants.

2.3 Study Period

The study was carried out for the period (2021-22) including the four seasons

- A. B. Moon soon (July & August)
- B. Post moon soon (September to November)
- C. Winter (December to February)
- D. Pre Moon soon (March to June)

2.4 Selection indicators

The indicators are given below:

- (I) Animals of average age of 1- 5 years.
- (II) The animals should not be administered dewormers 02 months prior to the samples collection.

2.5 Description of the animals

The study comprised of flocks of small ruminants and a sum of 400 sheep, goats were sampled. The study was furnished with well structured and detailed questionnaire incorporating the details of owners (his address, location and contact information), animal particulars comprising flock type, flock size, type of feeding (open grazing or stall feeding), breed, age, sex, specie, health status of the animals as well as morbidity and mortality ratio in the flocks. The subject selection was based on randomization, without considering their health status. To stamp out biased sampling, completely random selection tools were practiced in this study, for even distribution of the variables and variations pertaining to the study. Moreover, 10% flock was sampled on random basis for equal presentation of the research data. The fresh fecal samples were directly collected from the animals' rectum, following biosecurity measures. The samples were preserved post collection and labeling the containers. Thereafter, the fecal samples were brought to the laboratory facility of Veterinary Research Center, Tank, for further processing and diagnosis.

2.6 Sample collection

The fresh fecal samples were directly collected from the animals' rectum, following biosecurity measures. The samples were preserved post collection and labeling the containers. Thereafter, the fecal samples were brought to the laboratory facility of Veterinary Research Center, Tank, for further microscopic study. The process of collection of samples and their microscopic examinations were continued throughout the study phase.

2.7 Laboratory protocols

Parasitological protocols concluded the determination of eggs of *Haemonchus contortus* in the fecal samples, collected from animals, using the floatation method. The eggs were identified using the standard key. The positive samples were subjected to McMaster technique for EPG estimation, with the 50 eggs per gram (EPG) sensitivity in feces⁶.

3. RESULTS AND DISCUSSIONS

It was revealed from our results that overall prevalence of *Haemonchus contortus* in sheep and goats out of the 400 collected fecal samples was 15.50 and 13.00%, respectively. There was a non-significant difference ($P \geq 0.05$) regarding incidence of *Haemonchus contortus* in both species of the small ruminants (Table 1). Our results were in agreement with the results of a study carried out on sheep population, for the determination of prevalence percentage of the parasite *Haemonchus contortus*, reporting the 23.92% incidence in sheep infestation and thus the remarkable incidence was seen in this parasite epidemiology⁷. In another study, overall prevalence of 21.7% was recorded in the sheep population in District Faisalabad Pakistan⁸. Our results are not coinciding with the results of the study in which the overall prevalence of 75.7% of *Haemonchus contortus* was described in Nyagatare District of Rwanda⁹. The difference in the results was due to the difference in specimen collection technique because in our study the samples were randomly collected from healthy flocks of small ruminants, randomly while in the reported study the fecal samples were collected from suspected animals.

Table 1: Prevalence of *Haemonchus contortus* in sheep and goats out of the 400 fecal samples collected randomly

Specie	No. of fecal samples collected	No. of samples positive for <i>H. contortus</i>	Prevalence (%)	X ²	P-value
Sheep	200	31	15.50	0.0209	0.884 (Non-significant)
Goat	200	26	13.00		
Total	400	57	14.25		

The area-wise prevalence was also determined in our study and the results of our study exhibited the non-significant difference ($P \geq 0.05$) in prevalence percentage of the parasite, the *Haemonchus contortus* in all the areas of District Tank, Khyber Pakhtunkhwa, Pakistan. However, the maximum incidence of *Haemonchus contortus* was seen in Gulimam area of Tank in both sheep and goats, with the prevalence rate of 20 and 17.50%, respectively (Table 2).

Table 2: Area-wise incidence of *Haemonchus contortus* in sheep and goats in different areas of District Tank, Khyber Pakhtunkhwa, Pakistan.

District	No. of fecal samples collected from Sheep	Positive sheep samples for <i>Haemonchus contortus</i>	Prevalence %	SD	No. of fecal samples collected from goats	Positive goat samples for <i>Haemonchus contortus</i>	Prevalence %	SD
Ama Khel	40	6	15.00	0.4472	40	5	12.50	0.120
Dabara	40	6	15.00	0.4472	40	4	10.00	0.4472
Gulimam	40	8	20.00	0.5477	40	7	17.50	0.5477
Gomal	40	6	15.00	0.4472	40	6	15.00	0.5477
Tank City	40	5	12.50	0.120	40	4	10.00	0.4472
Overall prevalence	200	31	15.50		200	26	13.00	

The sex-wise incidence of *Haemonchus contortus* was also determined in this study and a non-significant difference ($P \geq 0.05$) was found in the prevalence of *Haemonchus contortus* in both male and female sexes of the sheep and goat species. The prevalence of the *Haemonchus contortus* in sheep males was 12.85%, while, in females, the prevalence percentage was 16.92% (Table 3). The prevalence of the *Haemonchus contortus* in goat males was 12.72%, while, in females, the prevalence percentage was 13.10% (Table 4). The results of this particular study were strongly supported by studies conducted on the small ruminants^{8, 10, 11, 12, 13, 14, 15}. Similar reports were provided by Squire *et al.*¹⁶

Table 3: Sex-wise incidence of *Haemonchus contortus* in sheep

Sex	No. of fecal samples collected	Positive samples for <i>Haemonchus contortus</i>	Prevalence %	χ^2	P-value
Male	70	9	12.85	0.0132	0.9084 (Non-significant)
Female	130	22	16.92		
Total	200	31	15.50		

Table 4: Sex-wise incidence of *Haemonchus contortus* in goats

Sex	No. of fecal samples collected	Positive samples for <i>Haemonchus contortus</i>	Prevalence %	χ^2	P-value
Male	55	7	12.72	0.1706	0.6795
Female	145	19	13.10		
Total	200	26	13.00		

4. CONCLUSIONS

As the *Haemonchus contortus* bears major economic importance in both species of small ruminants and decline the production significantly and badly affects the health and growth of the animals, results of this particular study proved that the District Tank of Pakistan is endemic for the *Haemonchus contortus* infestation and requires special attention to its control.

ACKNOWLEDGMENT

The authors are thankful to the Government of Khyber Pakhtunkhwa for the grant of funds to execute this project.

CONFLICT OF INTEREST

The authors declare no conflict of interest.

REFERENCES

1. Khan A, Ali A, Jamil M, Zeb S, Arshad S, Noman M, Khan I, Safiullah Ullah, A, Zeeshan M, Ashraf U, Tariq A, Rasheed M, Hussain A, Ali M. A Review of Theileria incidence in cattle population, its impact on hematology of the infected animals and therapeutic approach towards the infection. Journal of Critical Reviews 2021;8(3):53-66.
2. Rahman MM, Islam MR, Hossain MK, Biswas D, Rashid MH. Prevalence of Helminth infestation of Goats relative to Season, Host, Sex, Age and Breed in Chittagong District. Bangladesh Livst. J. 2015;1:20-2.
3. Wasim MP. Trends and growth in livestock population in Sindh: a comparison of different censuses. Indus Journal of Management & Social Sciences. 2007;1(1):58-75.

4. Bahadur S, Khan MS, Shah M, Shuaib M, Ahmad M, Zafar M, Begum N, Gul S, Ashfaq S, Mujahid I, Hussain F. Traditional usage of medicinal plants among the local communities of Peshawar valley, Pakistan. *Acta Ecologica Sinica* 2020;40(1):1-29.
5. Ijaz M, Khan MS, Avais M, Ashraf K, Ali MM, Khan MZ. Infection rate and chemotherapy of various helminthes in diarrhoeic sheep in and around Lahore. *Journal of Animal and Plant Sciences* 2009;19(1):13-6.
6. Aimen U, Khan A, Ali A, Shah IA, Ullah W. Prevalence of *Hemonchus Contortus* in Naturally Affected Sheep and Goat Population of District D.I.Khan and Lakki Marwat. *South Asian Research Journal of Agriculture and Fisheries*. 2022;4(5): 73-76.
7. Brik K, Hassouni T, Elkharrim K, Belghyti D. A survey of *Haemonchus contortus* parasite of sheep from Gharb plain, Morocco. *Parasite epidemiology and control* 2019;4:e00094.
8. Iqbal Z, Akhtar M, Khan MN, Riaz M. Prevalence and economic significance of haemonchosis in sheep and goats slaughtered at Faisalabad abattoir. *Pakistan Journal of Agriculture Sciences* 1993;30(1).
9. Mushonga B, Habumugisha D, Kandiwa E, Madzingira O, Samkange A, Segwagwe BE, Jaja IF. Prevalence of *Haemonchus contortus* infections in sheep and goats in Nyagatare District, Rwanda. *Journal of veterinary medicine* 2018;1-9.
10. Hussain B, Hayat CS, Kazmi SE. The incidence of gastrointestinal parasites in buffalo calves. *Pakistan Journal of Agriculture Sciences* 1996;23:44-27.
11. Vanimisetti HB. *Genetics of resistance to Haemonchus contortus infections in sheep* (Doctoral dissertation, Virginia Tech). 2003.
12. Mandonnet N, Ducrocq V, Arquet R, Aumont G. Mortality of Creole kids during infection with gastrointestinal strongyles: A survival analysis. *Journal of Animal Science* 2003;81(10):2401-8.
13. Tasawar Z, Ahmad S, Lashari MH, Chaudhary SH. Prevalence of *Haemonchus contortus* in sheep at research centre for conservation of Sahiwal cattle (RCCSC) Jehangirabad District Khanewal, Punjab, Pakistan. *Pakistan Journal of Zoology* 2010;42(6):735-739.
14. Domke AV, Chartier C, Gjerde B, Leine N, Vatn S, Stuen S. Prevalence of gastrointestinal helminths, lungworms and liver fluke in sheep and goats in Norway. *Veterinary parasitology* 2013;194(1):40-8.
15. Barone CD, Zajac AM, Manzi-Smith LA, Howell AB, Reed JD, Krueger CG, Petersson KH. Anthelmintic efficacy of cranberry vine extracts on ovine *Haemonchus contortus*. *Veterinary parasitology* 2018;253:122-9.
16. Squire SA, Robertson ID, Yang R, Ayi I, Ryan U. Prevalence and risk factors associated with gastrointestinal parasites in ruminant livestock in the Coastal Savannah zone of Ghana. *Acta Tropica* 2019;199:105126.



This work is licensed under a Creative Commons Attribution-Non Commercial 4.0 International License. To read the copy of this license please visit: <https://creativecommons.org/licenses/by-nc/4.0/>