

Research Article

Sero-epidemiological study of ecto- and endo- parasites and their hematological effects in small ruminants reared under pastoral system in district Bannu, Pakistan

Naimat Ullah Khan^{1*}, Muhammad Shafee², Jawaria Ali Khan¹, Kamran Ashraf¹, Rafiullah Khan³, Azmatullah Khan¹ and Mumtaz Ali Khan¹

1. University of Veterinary & Animal Sciences, Lahore Pakistan.

2. Center for Advanced studies in Vaccinology & Biotechnology (CASVAB) University of Balochistan, Quetta Pakistan.

3. Veterinary Research Institute Peshawar Pakistan.

*Corresponding author's email: Naimatullahkhan19@yahoo.com, Shafeedr73@gmail.com

Citation

Naimat Ullah Khan, Muhammad Shafee, Jawaria Ali Khan, Kamran Ashraf, Rafiullah Khan, Azmatullah Khan and Mumtaz Ali Khan. Sero-epidemiological study of ecto- and endo- parasites and their hematological effects in small ruminants reared under pastoral system in district Bannu, Pakistan. Vol. 4, Issue 1, 2015, pp 50-56

Received: 05/11/2014

Revised: 30/01/2015

Accepted: 02/02/2015

Abstract

The parasitic infestations pose major global threat to animal population which leads to serious economical and health problems. Small ruminants are major source of cash income for many rural populations, especially in low income settings of developing countries. A total of 1000 (500 sheep and 500 goats) fecal samples were collected and analyzed for the detection of any parasitic ova using direct smear microscopy and flotation method. Hemonchus, trichostrongyloid and fasciola viz, 41.7, 11.9 and 11.3% respectively, were the major helminthes in both sheep and goat populations. Coccidia, trichuris and strongyloids were also detected in considerable percentage viz, 7.7, 6.2 and 3.2 % respectively. Similarly ecto-parasites (lice, ticks and mites) were found 22.8, 9 and 7.5 % with relatively more infection in goat than sheep but the internal helminthes were more in sheep than goat population. The hematological profile of infected animals revealed marked decrease in hemoglobin posing anemia while slight increase in total leukocyte count and eosinophils were also recorded. In conclusion heavy ecto and endo-parasitic infestation were recorded in the target area ovine population which draws the immediate attention of policy makers of the area to construct an obdurate strategy to minimize the infection and heavy economic losses.

Key Words. Parasite; small ruminants; trichuris; ticks; hematology.

Introduction

Parasitic infections especially gastrointestinal nematode and trematode is a serious health threat that limit the productivity of livestock due to the associated morbidity, mortality, cost of treatment and control measures [1]. The prevalence of helminths of small ruminants results in low productivity due to stunted

growth, poor weight gain and poor feed utilization [2]. Helminthiasis adversely affects ruminants, causing hematological and biochemical disturbances [3]. Anorexia, weight loss, poor reproductive performance and even death of lambs and reduce productive and reproductive potential are the major consequences [4]. In Pakistan, parasitism is one of the major threat to

livestock, especially causing obstacles to the development of profitable sheep industry [5]. Livestock is the major sector where maximum peoples are engaged to raise livestock for production of milk, meat and wool etc. Pakistan is highly populated with small ruminant including 27.4 and 58.3 million sheep and goats respectively [6]. Heavy worm's infestation badly affects the small ruminants as well as large ruminants which result in biochemical and hematological disturbances [3].

Gastro-intestinal nematodes cause major drain on the production of goats due to their adverse effects like reduction in appetite, loss of body weight, hypoproteinemia, impaired digestive efficiency and other pathogenic complications leading to lowered productivity, retarded growth rate and even death [1,7]. Trematodes and nematodes are the major endo-parasites which creates major health problems as well as decrease the production of small ruminants. These worms are responsible for heavy mortality, morbidity and treatment expenses [1]. Endo-parasites decrease the profit up to 15% and the body weight up to 50 % [8]. The Fascioliasis in small ruminants is the major parasitic problem. Various blood parameters are affected by Fascioliasis. In Pakistan, the major problem for livestock production is worm infestation and it is considered the major threat for the development of the small ruminants industry [6].

In sheep and goats, ecto-parasites create huge economic loss and affect the production. Skin diseases are highly contagious and seriously affect the meat quality. Furthermore, ecto-parasites damage the skin in the form of hyperkeratosis. These lesions on skin started from anterior part of the body such as head and neck. Ecto-parasites causes the loss of

weight, pruritus and death has been reported in some cases [9]. Ecto-parasites also affect the blood parameters and the biochemical properties. Packed cell volume, total erythrocyte count (TEC) and hemoglobin (Hb) was lower in goats suffering from ecto-parasites than normal goats. Erythrocyte sedimentation rate (ESR) and total serum protein (TSP) was higher in infected goats than normal goats [10].

The present study was aimed to access the prevalence of endo and ecto-parasites in small ruminants in District Bannu, KPK, Pakistan.

Materials and Methods

The present study was conducted to assess the prevalence of ecto and endo-parasites and their effect on blood profile in 1000 small ruminants in District Bannu, KPK. The samples were processed in the District Diagnostic Laboratory, Bannu. All the possible hygienic measures were adapted during collection and transportation of samples.

Study area

Bannu is located at 32° 59' 22" North, 70° 36' 21" East and is approximately 192 km to the South of Peshawar. About 45% area of district is irrigated mostly through canals and the rest depends upon rains. Cattle, buffaloes, sheep and goats are common livestock. More than 43% population depends upon agriculture and livestock (Fig. 1). Goat and sheep flocks are maintained through traditional production system. Feeding requirement of the animals is met mainly through grazing. Mostly 59% animals are fed from fields, 20% are stall fed and 21% on both grazing and stall feeding. It has been estimated that 51% animal feeding is dependent on tree leaves, cut fodder and



Fig. 1: Map showing the sampling area of District Bannu Khyber Pashtunkhwa, Pakistan.

Table 1: Prevalence of ecto-parasites in sheep and goat population in District Bannu, KPK, Pakistan.

Species	Sheep n= 500	Goat n= 500	Prevalence (%)
Ticks	39	51	90 (9)
Lice	76	152	228(22.8)
Mites	34	41	75 (7.5)
Total	149	244	393 (39.3)

Table 2: Prevalence of internal parasites in small ruminants population in District Bannu, KPK, Pakistan.

Species	Sheep (n=500)	Goat (n=500)	Total Positive with (Percentage)
<i>Haemonchus</i>	166	251	417 (41.7)
<i>Trichurus</i>	34	28	62 (6.2)
<i>Strongyloid</i>	12	20	32 (3.2)
<i>Coccidia</i>	34	43	77 (7.7)
<i>Fasciola hepatica</i>	53	60	113 (11.3)
<i>Trichostrongyloid</i>	68	51	119 (11.9)
Total	367 (73%)	453 (91%)	820 (82)

kitchen waste, 29% on tree leaves and 20% on cut fodder [11].

Study population

A total of 1000 small ruminants (500 sheep and 500 goats) were examined for parasitic infestation. The fecal samples were collected from peri urban villages of Bannu, KPK. The inclusion criteria for animals were debilitating animals showing clinical signs of either ecto or endo-parasites. Furthermore, blood samples were also collected from animals showing either ecto or endo-parasitic infections.

Endo-parasites' study

Coprological evaluation

The fecal samples were collected directly from the rectum and were placed in clean pre-labelled polythene bags. All the samples were examined for the presence or absence of eggs using direct microscopic examination method [12]. Briefly a small quantity of the fecal material and a drop of water was placed onto clean glass slide. After homogenous mixture formation the large fecal particles were removed with the help of forceps and a cover slip was applied. The smear was examined under low power objective of microscope to detect the ova. Each sample was tested by direct smear method and the fecal samples found negative in direct smear method were confirmed by simple salt floatation method.

Ecto-parasites

Samples collection and evaluation

All the samples were collected in pre-labelled clean universal bottle containing 70% ethanol and were transported to Diagnostic Laboratory. The sample for mange mites were collected from animals which were positive for mange infestation and showing clinical signs of itching, irritation and alopecia. Briefly, equal amount of skin scrap and a drop of Potassium hydroxide (KOH) was placed in middle of slide. KOH and scrapings were mixed properly with the help of needle to prepare a homogenous mixture

and allow undisturbed for 5 min. After cover slip application, the smear was examined under microscope for presence of parasite.

Hematological studies

All the positive animals (ecto and endo-parasites) were studied hematologically for Hemoglobin (Hb), differential leukocyte count (DLC) and total leukocyte count (TLC) in the Diagnostic Laboratory of Medicine Department, University of Veterinary & animal Sciences, Lahore. The results were recorded and interpreted.

Results

The overall prevalence of ecto and endo-parasites was found 39% and 82 % in ovine population respectively. In goat the ecto-parasites were as 10.2 %, 30.4 % 8.2 % ticks, lice and mites respectively. While in sheep the infestations were 7.8 %, 15.2 % . 6.8 % for ticks, lice and mites. In both small ruminants (sheep and goats) lice infestation was the most prevalent ecto-parasities observed in goat 30.04 % and in sheep 15.02 % lice prevalence was observed.

Prevalence of endo-parasites

Total prevalence of endo-parasites was 89 % which includes 90.6 % endo-parasites in goat and 87.4 % in sheep, indicating that both sheep and goat are heavily infested with endo-parasites. The most commonly found endoparasites were *Haemonchus* spp. *Trichurus*, *Strongyloid*, *Coccidia*, *Fasciola* and *Trichostrongyloide*. The prevalence of Endo-parasites was significantly high ($P < 0.05$) in goat from district Bannu. Overall goats were more likely to be positive for *Haemonchus* spp. and almost 50.2 % (251/500) animals found positive. The prevalence of other endo-parasites like *Trichurus* 5.6 % (28/500), *Strongyloid* 4% (20/500), *Coccidia* 8.6 % (43/500), *Fasciola* 12 % (60/500) and *Trichostrongyloide* were 10.2 % (51/500).

Hematological study

In the present study blood samples were collected from all infected sheep and goats

suffering from ecto or endo-parasites or mix infection. These samples were subjected for hematological values such as hemoglobin (Hb) estimation, total leukocyte count (TLC) and differential leukocyte count (DLC). During hemoglobin estimation marked decrease was observed. The number of monocytes remained at normal level and no significant change was observed. It was clear that marked increase in eosinophils counts was seen in sheep and goats and no change was observed in basophil counts.

Discussion

The agro-ecological and geo-climatic conditions of Pakistan are highly favorable for growth and multiplication of helminths. There are multiple factors responsible for the prevalence of ecto-parasites such as breed, sex, level of education, grazing habits, management standard, and economic status of farmers and use of anthelmintics [13].

The overall prevalence of endo-parasites in the present studied goats was 90.4% which is dissimilar to the previous studies of Jugessur *et al.* (1998) in which the prevalence of endo-parasites in goats was 55.40 % [14]. This dissimilarity might be due to unhygienic condition of goat house, illiteracy of goat keepers and avoidance tendency of preventive measure in the present study. Most of the goats were found to be infected with more than one species of parasites in the present study. Mixed parasitic infections of *Strongyloides* spp., *Oesophagostomum* spp., *Bunostomum* spp., *Hemonchus* spp., *Paramphistomum* spp., *Trichostrongylus* spp., *Moniezia* spp., *Fasciola* spp. and *Trichuris* spp. were reported earlier in the semi-scavenging goats on Chittagong Hill Tract [15].

Fasciola hepatica is one of the most important parasitic infestation in the goats and sheep of present study area as 12.9 % infections has been reported in goats in Bangladesh [16]. Generally, old goat was more infected than young one most probably

due to grazing habits in low land and grass of low land contain eggs of endo-parasites more eggs parasites. Large flock size was more infected to parasitic infestation (both by ecto- and endo-parasites) than the smaller ones and this is due to direct contact, overcrowding and unhygienic condition of goat farm.

The prevalence of *Hemonchus* was higher ($P = 0.05$) in sheep compared to goats. Similarly, *Trichuris* were more frequently ($P < 0.01$) found in the fecal samples of sheep as compared to goats. However, the prevalence of *Coccidia* was alike ($P > 0.05$) in both types of animals. The prevalence rate of fascioliasis in goat was 12 % and sheep was 10.06 % was observed in this study. These results are in close agreement with the previous observation of Mirza and Razzak [17]. Where prevalence in goat was 12.03% and 01.04% in sheep was recorded. The study was in close agreement to the results achieved by Durrani *et al.* [18] who recorded 12 % in goat.

Various species of endo-parasites recovered in the present study has also been reported earlier by Pal and Qayyum, [19]. The higher prevalence of hemonchosis in sheep than goats may be attributed to a variety of factors like ground grazing habit of sheep, relatively less cleanliness and extensive pasture grazing compared with goats [20]. *Hemonchus* is an important and common nematode parasite and requires special attention for its control. It has been observed that *Hemonchus* can develop acquire resistance rapidly than other nematodes, like *trichostrongylus*, because of its high biotic potential [21].

The overall lice prevalence was higher in the study then observation recorded in Ethiopia, 10 % in goat and 02% in sheep [22]. There were certain factors such as difference in management of agro-climate and health status of sheep and goat in the study area. Due to these factors there was difference in prevalence of lice. In goat the prevalence of tick infestation was high as compare to sheep.

Hot and rainy season is responsible for high prevalence of ticks.

Conclusions

In conclusion the prevalence of endo and ecto-parasites has been considered one of the major hitches in ovine populations in district Bannu. The parasitic infestation was higher in goats as compared to sheep. To overcome the above threats it is necessary to create awareness among farmers about regular deworming program for endo-parasites and regular use of insecticide for ecto-parasites to make the livestock farms more profitable for farmers to improve their socio-economic status in the society individually and to increase the national growth economy collectively.

References

- 1 Raza MA, Murtaza S, Bachaya HA, Qayyum A & Zaman MA (2010). Point prevalence of *Toxocara vitulorum* in large ruminants slaughtered at Multan abattoir. *Pak Vet J*, 30: 242-244.
- 2 Pedreira J, Silva AP, Andrade RS, Suarez JL, Arias M, Lomba C, Diaz P, Lopez C, Banos PD & Morrondo P (2006). Prevalence of gastrointestinal parasites in sheep and parasite control practices in North-West Spain. *Prev Vet Med*, 75: 56-62.
- 3 Ijaz M, Khan MS, Avais M, Ashraf K, Ali MM & Khan MZU (2009) Infection rate and chemotherapy of various Helminthes in diarrheic sheep in and around Lahore. *J Anim Plant Sci*, 19: 13-16.
- 4 Aya MM, Raza MA, Murtaza S & Akhtar S (2013). Epidemiological survey of helminths of goats in southern Punjab, Pakistan. *Trop. Biomed*. 30: 62-70.
- 5 Asif M, Azeem S, Asif M & Nazir S (2008). Prevalence of gastrointestinal parasites of sheep and goats in and around Rawalpindi and Islamabad, *Pak. J. Vet. Anim. Sci*. 1: 14-17.
- 6 Economic Survey of Pakistan (2012). Finance Division. Islamabad, Government of Pakistan, pp.29-31.
- 7 Siddiki AZ, Uddin MB, Hasan MB, Hossain MF, Rahman MM, Das BC, Sarker MS & Hossain MA (2010). Coproscopic and haematological approaches to determine the prevalence of helminthiasis and protozoan diseases of Red Chittagong Cattle (RCC) breed in Bangladesh. *Pak Vet J*. 30: 1-6.
- 8 Hussain Q (1985). Studies on the incidence of gastrointestinal parasites and efficacy of Banmth-II against nematodes in buffalo calves. M.Sc. Thesis, Dept Parasitol, Univ Agric, Faisalabad, Pakistan.
- 9 Rao DV & Naidu MM (1999). Clinical and hematological observations in goats with sarcoptic mange. *Indian Vet. J*. 76:77
- 10 Sharma RL, Peer FU & Bhat TK (1990). Antiparasitic activity of Ivermectin against Natural Psoroptes communes var. ovis infestation in Kashmir Merino Sheep. *Indian Vet. J*. 67:264-66
- 11 http://en.wikipedia.org/wiki/Bannu_District. Accessed on 20-09-2014.
- 12 Soulsby EJ (1982). Helminthes, Arthropods and Protozoa of Domestic Animals, 7th ed., Lea and Fibiger, Philadelphia, USA pp. 366-388
- 13 Valcarcel F & Garcia RC (1999). Prevalence and seasonal pattern of caprine trichostrongyles in a dry area of central Spain. *J. Vet. Med*. 46: 673-681.
- 14 Jugessur VS, Ramjee R & Ramnauth RK (1998). The effectiveness of some widely used anthelmintic drugs on endoparasitic nematodes of village goats. Food and Agricultural Research Council, Reduit Mauritius, pp. 32-38.
- 15 Uddin KH, Main MF & Taimur MJFA (1998). Gastrointestinal Helminth infections of goats in Chittagong Hill Tract Area of Bangladesh. *Bang. J. Liv.*

- Res., 5: 18-24. various helminths in diarrhoeic sheep in and around Lahore. *J Anim Plant Sci*, 19: 13-16.
- 16 Bhuyan MA (1970). A survey of helminths parasiting the livers of domesticated ruminants in Bangladesh. M. Sc. Vet. Sci. Thesis, Submitted to the Department of Parasitology, BAU, Mymensingh.
- 17 Mirza MA & Razzak A (1998). Internal parasitism in sheep and goats under extensive grazing system. *Pak Vet. J.* 18: 53-54.
- 18 Durrani MS, Chaudhry NI & Anwar AH (1981). The incidence of gastrointestinal parasitism in sheep and goats of Jhelum Valley (Azad Kashmir). *Pak. Vet. J.*, 1: 164-165.
- 19 Pal RA & Qayyum M (1992). Breed, age and sex-wise distribution of gastrointestinal helminthes of sheep and goats in and around Rawalpindi region, Pakistan. *Pak. Vet. J.* 12: 60-63.
- 20 Javed MS, Iqbal Z & Hayat B (1992). Prevalence and economics of haemonchosis in sheep and goats. *Pak. Vet. J.* 12: 36-38.
- 21 Torres-Acosta JFJ, Dzúl-Canche U, Caballero AJA & Vivas RIR (2003). Prevalence of benzimidazole resistant nematodes in sheep flocks in Yucatan, Mexico. *Vet Parasitol*, 114: 33–42.
- 22 Mohammed H (2001). Study on Skin Disease of small ruminants in Central Ethopia. DVM Thesis, FVM, Addis Ababa University, Debre Zeit.