

Prevalence of Gastrointestinal Parasites in Large Ruminants (Bovines) in District Abbottabad, Khyber Pakhtunkhwa, Pakistan

Muhammad Sohail^{1*}, Hamidullah², Muhammad Sajid³, Muhammad Shoaib⁴ and Mehwish Malik⁴

¹Research Officer at Veterinary Research and Disease Investigation Center, Abbottabad, Khyber Pakhtunkhwa, Pakistan

²Principal Research Officer at Veterinary Research and Disease Investigation Center, Abbottabad, Pakistan

³Senior Research Officer Veterinary Research and Disease Investigation Center, Abbottabad, Khyber Pakhtunkhwa, Pakistan

⁴Research Officer at Veterinary Research and Disease Investigation Center, Abbottabad, Pakistan

***Corresponding Author:** Muhammad Sohail, Research Officer Veterinary Research and Disease Investigation Center, Abbottabad, Khyber Pakhtunkhwa, Pakistan.

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Abstract

The current study was carried out in district Abbottabad of Hazara region, Khyber Pakhtunkhwa Pakistan. Prevalence endoparasites in bovines (cattle and buffalo) was observed through analyzing fecal samples ($n = 620$) through standard protocols (eggs per gram/EPG) collected from various locations of the study area. It was observed that endoparasites were highly prevalent in both cattle and buffaloes and resulted in huge economic losses to dairy farmers. The overall prevalence of gastrointestinal parasites was 90.80% and it was higher in buffaloes (93.1%) than cattle (89.74%) population while only 10.26% samples were found negative in cattle and 6.9% in buffaloes. In buffaloes, the *Eimeria Spp* (22.6%) was highly prevalent followed by *Strongyle spp* 17.2%, *Toxocara spp* 17.4%, mixed infection 17%, *Ascaris spp* 10.3%, *Fasciola spp* 3.5%, *Monezia spp* 5.3%, *Cooperia spp* 2%, *Trichuris spp* 3.7% and *Schistosoma bovis* 1% respectively. Likewise, in cattle the *Strongyle spp* was highest (21.9%) among the endoparasites followed by *Eimeria Spp* 15.8%, *Toxocara spp* 17.8%, *Fasciola spp* 12.1%, *Trichuris spp* 5.7%, *Ascaris spp* 9.3%, *Dicrocoelium dendriticum* 2.3% and *Moniezia spp* 2.1% and mixed infections 13% respectively. The effect of age on occurrence of worms was highly significant and it was observed that the incidence increased with the advancement of age in both cattle and buffaloes. The seasonal variation also significantly affected worm load in both species and showed a higher prevalence in wet weather condition in contrast to dry conditions. Gender effect was also prominent and it was noted that the prevalence of gastrointestinal parasites was higher in females than male animals which might be due to higher stress factors in females. It was concluded this higher prevalence might be due to improper deworming and management techniques. This can be improved through conduction of awareness campaigns among the farmer community and regular feedback.

Keywords: Prevalence; Endo Parasites; Bovines; Age; Season Gender

Introduction

Parasitic infection in the Gastro-intestinal tract is a serious threat to ruminants worldwide. Gastrointestinal (GI) parasites cause considerable global economic losses as a consequence of reduced weight gain, digestive disturbance, lowered production, impaired reproductive performance, condemnation of affected organs, and mortality in infected animals. In addition, the diverse agro-climatic conditions, animal husbandry practices, and pasture management largely determine the incidence and severity of various parasitic diseases in certain area [1].

In heavy infections there is drastic decrease in the economic returns from the animals like reduced milk yield in cattle and buffaloes due to parasites which also interfere with the digestion by mal absorption of essential minerals like calcium and vitamins for the milk production in the mammary glands [2].

A high prevalence of GI nematodes and coccidial oocysts were reported in countries with tropical and temperate regions such as India, Bangladesh, South Africa, Sri Lanka, Italy and Mongolia with the prevalence rate ranging from 20 - 96% [3-8].

To combat these parasitic problems it is important to become aware about the commonly prevalent gastrointestinal parasites in their respective geographical locations to expedite the diagnosis and treatment process and prevent economic losses to the poor farmers who depend on the livestock for their livelihood.

With the above initiative a prevalence study was planned on gastrointestinal parasites of bovine species (cattle and buffalo) in district Abbottabad. This region has ample of livestock resources and farmers to rear cattle and buffaloes for their livelihood. The objectives of this study were; to diagnose the prevalence of gastro-intestinal parasites and to find out the effect of age climatic conditions on the nomenclature of gastro-intestinal infections in bovines species in the study area.

Materials and Methods

The current study was carried out at Veterinary Research and Disease Investigation Center Abbottabad.

Sample collection

Fresh fecal samples ($n = 620$) from different regions of district Abbottabad were collected from dispersed population of cattle and buffaloes. The samples were placed in sealed and labeled plastic containers in an ice-containing box. The samples were then shifted to lab for further analyses.

Qualitative and quantitative parasitological examinations

Qualitative and quantitative coprological analyses were performed by fecal floatation technique following standard procedures that used a saturated solution of sodium chloride and sugar for the presence of parasite eggs/oocysts [9]. The parasite eggs/oocysts were observed and identified by microscopy based on the morphology and size of the eggs/oocysts up to the parasite genus level. Positive Samples were rendered to quantitative analysis, the McMaster technique was used to estimate eggs/oocysts per gram of feces (EPG/OPG).

Data analyses

The data gathered from the study for the prevalence of parasitological infection was arranged in Microsoft Excel and effect of various parameters was calculated.

Results and Discussion

The results obtained from this study are elaborated and discussed in this chapter. The fecal samples ($n = 620$) were processed in this study at Parasitology Laboratory of Veterinary Research and Disease Investigation Center, Abbottabad for diagnosis of endoparasites through McMaster Technique. It was observed that the overall prevalence of gastrointestinal parasites was 90.80% and was higher in buffaloes (93.1%) than cattle (89.74%) population while only 10.26% samples were found negative in cattle and 6.9% in buffaloes. The results of the current study are supported by Keyyu., *et al.* [10] and Maichomo., *et al.* [11] who stated that the endoparasites are highly prevalent in large ruminants resulting in huge economic losses directly and indirectly and are a limiting factor in livestock farming. Acute illness and death, premature slaughter and rejection of some parts at meat inspection directly results in economic loss while indirect losses are a decreased growth rate, weight loss in young growing calves and late maturity of slaughter stock. The results of the current study are in line with the findings of Priyanka., *et al.* [2] for cattle. However, results for buffaloes are contrary to it which might be due

to difference in geoclimatic conditions. The results of the current study are also supported by Gupta, *et al.* [12] who reported a higher prevalence in buffaloes (73%) and lower in cattle (65%) in India. This higher prevalence might be due to specie effect and lack of information regarding deworming and proper rearing of animals and improper dosing of the dewormer and usage of a single dewormer over long period which results in development of resistance in worm species.

Species	Total samples	Positive samples (%)	Negative samples (%)	Overall prevalence (%)
Cattle	350	89.74	10.26	90.80
Buffalo	270	93.1	6.9	

Table 1: Overall prevalence of gastrointestinal parasites in Bovines.

Genera wise prevalence of various gastrointestinal parasites of Buffalo is elaborated in table 2. It was observed that the *Eimeria Spp* (22.6%) were highly prevalent followed by *Strongyle spp* (17.2%), *Toxocara spp* (17.4%), mixed infection (17%), *Ascaris spp* (10.3%), *Fasciola spp* (3.5%), *Monezia spp* (5.3%), *Cooperia spp* (2%), *Trichuris spp* (3.7%) and *Schistosoma bovis* (1%) respectively. The results of this study are in line with the findings of Gunathilaka, *et al.* [13] who also reported similar results.

Overall prevalence of various gastrointestinal parasites of cattle is presented in table 2 the prevalence of *Strongyle spp* was higher (21.9%) followed by *Eimeria spp* (15.8%), *Toxocara spp* (17.8%), *Fasciola spp* (12.1%), *Trichuris spp* (5.7%), *Ascaris spp* (9.3%), *Dicrocoelium dendriticum* (2.3%) and *Moniezia spp* 2.1% and Mixed infections (13%) respectively. The results of this study are supported by the findings of Carlos, *et al.* [14] who also reported a higher prevalence of *Eimeria spp*, *Strongylus spp* and *Faciola spp* in cattle.

Spp	Prevalence %											Total
	Strongyle spp	Eimeria Spp	Toxocara spp	Fasciola spp	Trichuris spp	Asc spp	Dicrocoelium dendriticum	Monezia spp	Cooperia Spp	Schistosoma bovis	Mixed	
Buffalo	17.2	22.6	17.4	3.5	3.7	10.3	-	5.3	2	1	17	270
Cattle	21.9	15.8	17.8	12.1	5.7	9.3	2.3	2.1	-	-	13	350

Table 2: Prevalence of various genera of GI parasites in bovines of District Abbottabad.

Incidence of gastrointestinal parasites in cattle

The incidence of gastrointestinal parasites in cattle is linked with various environmental and physiological factors. Important parameters are discussed under following subheadings.

Effect of age

The effect of age on occurrence of GI parasites was highly significant. It was observed that the incidence of occurrence of GI parasites increased with advancement of age. The *Strongylus spp.* was lower (5.3%) in calves of less than one year of age. However, its incidence increased with the advancement of age; *i.e.* 6.4% in 1 to 3 year age group while 10.2% in more than three years of age. Likewise, *Eimeria Spp.* was 3.4%, 5.1% and 7.3%, *Toxocara spp.* 2.1%, 6.0% and 9.7%, *Fasciola spp.* 0.3%, 4.7% and 7.1%, *Trichuris spp.* 0.9%, 1.5% and 3.3%, *Ascaris spp.* 2.1%, 3.5% and 3.7%, *Dicrocoelium spp.* 0%, 0.7% and 1.6%, *Moniezia spp.* 0.1%, 0.5% and 1.5% and mixed infections were 3.7% 4.1% and 5.2% in cattle of < 1 Year age, 1 - 3 Year of age and > 3 Year of age respectively. While *Cooperia spp.* and *Schistosoma spp.* were negative in all age groups. The results of the current study were supported by Priyanka, *et al.* [2] who also reported a higher incidence of endoparasite infestation with advancement of age in cattle and buffaloes. The increase in the prevalence of gastrointestinal parasites with the advancement of age was also recorded by Quershi and Tanveer [15] and Telila, *et al.* [16].

Effect of season

The results of this study depicted that seasonal variation significantly affected the incidence of gastrointestinal parasites in cattles. The worm load was very high in wet season as compared dry season.

The *Strongylus spp* was 7.3% and 14.6%, *Eimeria Spp*. 5.1%, 5.1%, *Toxocara spp*. 6.4%, 11.4%, *Faciola spp*. 1.7%, 10.7%, *Trichuris spp*. 1%, 4.7%, *Ascaris spp*. 2.1% and 7.2%, *Dicrocoelium spp*. 0.3%, 2%, *Moniezia spp*. 0.1%, 2% in dry and wet season respectively. While *Cooperia spp*. and *Schistosoma spp*., were negative in both seasons. The mixed infestations were also higher in wet season (9.6%) as compared to dry season (3.4%). The Hailu., *et al.* [17] reported that prevalence of endoparasite infection in cattle and buffaloes was higher in wet season while a lower incidence was observed during the dry months on the year. The results of his study are supporting to the current findings.

Sex of animals

It was observed from the results of the current study that the effect of sex on occurrence of gastrointestinal parasites is highly significant. The female animals has more worm load as compared to male animals i.e. The *Strongylus spp* was 7.3% and 14.6%, *Eimeria Spp*. 7.2%, 10.6%, *Toxocara spp*. 7.1%, 10.7%, *Faciola spp*. 5.1%, 7%, *Trichuris spp*. 2.3%, 3.4%, *Ascaris spp*. 4.1% and 5.2%, *Dicrocoelium spp*. 1.2%, 1.1%, in male and female animals respectively. While *Moniezia spp*., *Cooperia spp*. and *Schistosoma spp*. were negative in both male and female cattle. The mixed infestations were also higher in female animals (8.9%) as compared to male animals (7.2%). Contrary results on effect of sex has been reported by Fikru., *et al.* [1], Bilal., *et al.* [18] and Awraris., *et al.* [19] reporting a higher incidence in male animals and a lower incidence in females. However, a higher incidence in current study is supported by the presence of stress factors like milk production and pregnancy in females of both cattle and buffaloes. The incidence of cestodes in the current study is supported by the findings of Swarnakar., *et al.* [20] and Keyyu., *et al.* [21] who also reported the same results.

Variables	Category	Prevalence (%)											Total
		Str. Spp	Eimeria Spp	Toxocara Spp	Fasciola Spp	Trichuris Spp	Asc Spp	Dicrocoelium dendriticum	Moniezia spp	Cooperia spp	Schistosoma Spp	Mixed	
Age	< 1 Year	5.3	3.4	2.1	0.3	0.9	2.1	0	0.1	-	--	3.7	120
	1 - 3 Year	6.4	5.1	6	4.7	1.5	3.5	0.7	0.5	--	--	4.1	110
	> 3 Year	10.2	7.3	9.7	7.1	3.3	3.7	1.6	1.5	--	--	5.2	120
Season	Dry Season	7.3	5.1	6.4	1.7	1	2.1	0.3	0.1	--	--	3.4	170
	Wet Season	14.6	10.7	11.4	10.4	4.7	7.2	2	2	--	--	9.6	180
Sex	Male	7.3	5.2	7.1	5.1	2.3	4.1	1.2	--	--	--	7.2	150
	Female	14.6	10.6	10.7	7	3.4	5.2	1.1	--	--	--	8.9	200

Table 3: Incidence of GI parasites in Cattle spp with respect to various factors.

Incidence of gastrointestinal parasites in buffaloes

The incidence of gastrointestinal parasites in buffaloes is presented in table 4. It is observed that the occurrence is affected by various internal and external factors. It was observed that prevalence of gastrointestinal parasites is higher in buffaloes as compared to cattle. The important parameters are elaborated as under.

Effect of age

The effect of age on occurrence of gastrointestinal parasites in buffaloes was found highly significant. It was observed that the incidence of occurrence of gastrointestinal parasites increased with advancement of age.

The *Strongylus spp*. was 3.1%, 5.7% and 8.4%, *Eimeria Spp*. 4.1%, 7.3% and 11.2%, *Toxocara spp*. 2.4%, 3.9% and 11.1%, *Faciola spp*. 0.5%, 1.1% and 1.9%, *Trichuris spp*. 0.3%, 1% and 2.4%, *Ascaris spp*. 0.3%, 2.9% and 4.4%, *Moniezia spp*. 0.2%, 1.3% and 3.8%, *Cooperia spp*. 0%, 0% and 2%, *Schistosoma spp*. 0%, 0.2% and 0.8% and mixed infections were 4.1%, 4.3% and 8.6% in buffaloes of < 1 Year age, 1-3 Year of age and > 3 Year of age respectively. While *Dicrocoelium spp*. were negative in all age groups. Present study depicted that there is a higher prevalence of Coccidia than other endoparasites. Moreover, it is higher in buffaloes than cattle. Its higher incidence might be due to its resistance to deworming practices performed in the region. These results are contrary to the results of Raza., *et al.* [22] who revealed that protozoans infection lower than others gastrointestinal infection in domestic animals. Such difference might be due to seasonal differences in both study areas.

Effect of season

The results of this study depicted that seasonal variation significantly affected the incidence of gastrointestinal parasites in buffaloes. The worm load was very high in wet season as compared dry season. The incidence of *Strongylus spp* was 7.1% and 10.1%, *Eimeria Spp*. 5.2% and 17.4%, *Toxocara spp*. 7.2% and 10.2%, *Faciola spp*. 0.5% and 3%, *Trichuris spp*. 0.5% and 3.2%, *Ascaris spp*. 3.4% and 6.9%, *Moniezia spp*. 0.9% and 4.4%, *Cooperia spp*. 0.1% and 1.9% and *Schistosoma spp* 0% and 1% in dry and wet season respectively. While *Dicrocoelium spp*. was negative in both seasons. The mixed infestations were also higher in wet season (11.9%) as compared to dry season (5.1%). The results of the current study are in agreement with the findings of Mukaratirwa., *et al.* [23] who reported that the occurrence of endoparasites infestation increased significantly with wet conditions.

Effect of sex

The results of the current study show that the effect of sex on occurrence of gastrointestinal parasites in buffaloes is highly significant. The female animals has more worm load as compared to male animals i.e. The *Strongylus spp* was 7.1% and 10.1%, *Eimeria Spp.* 10.1%, 12.5%, *Toxocara spp.* 5.2%, 12.2%, *Fasciola spp.* 1.2%, 2%, *Trichuris spp.* 1.5%, 2.2%, *Ascaris spp.* 3.1% and 7.2%, *Moniezia spp.* 1.8% and 3.5%, *Cooperia spp.* 0.2% and 1.8% *Schistosoma spp.* 0% and 1% in male and female animals respectively. While, *Dicrocoelium spp.* was negative in both sexes of buffaloes. The mixed infestations were also higher in female animals (12.1%) as compared to male animals (4.9%). Biu., *et al.* [24] reported a higher incidence of *Strongylus spp.* in large ruminants round the year in both sexes and in varying age groups which is in line with the findings of the current study.

Variables	Category	Prevalence (%)											Total
		Strongyle spp	Eimeria Spp	Toxocara spp	Fasciola spp	Trichuris spp	Asc spp	Dicrocoelium dendriticum	Monezia spp	Cooperia Spp	Schistosoma bovis	Mixed	
Age	< 1 Year	3.1	4.1	2.4	0.5	0.3	3	--	0.2	0	0	4.1	90
	1 - 3 Year	5.7	7.3	3.9	1.1	1	2.9	--	1.3	0	0.2	4.3	100
	> 3 Year	8.4	11.2	11.1	1.9	2.4	4.4	--	3.8	2	0.8	8.6	80
Season	Dry Season	7.1	5.2	7.2	0.5	0.5	3.4	--	0.9	0.1	0	5.1	130
	Wet Season	10.1	17.4	10.2	03	3.2	6.9	--	4.4	1.9	1	11.9	140
Sex	Male	7.1	10.1	5.2	1.2	1.5	3.1	--	1.8	0.2	0	4.9	100
	Female	10.1	12.5	12.2	02	2.2	7.2	--	3.5	1.8	1	12.1	170

Table 4: Incidence of GI parasites in buffaloes with respect to various factors.

Conclusions and Recommendations:

It was concluded that a higher prevalence in the study area might be due to unawareness among the farmers regarding deworming protocols, healthy management practices and grazing patterns on pastures. Moreover, due to development of resistance, subclinical infections are prevailing which resultantly affect production traits of dairy and meat animals. Therefore, it is recommended that regular awareness campaigns are required to be conducted by livestock extension department to educate the farmers of the locality to improve their socioeconomic conditions.

Conflict of Interests

There are no conflicts of interest among all the authors regarding this article or its data.

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