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Research Article

Epidemiological Investigation of Gastro-intestinal Parasitic Infestation of Swamp Buffalo at Sylhet District

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Abstract

Background and Objective: The gastrointestinal tracts of buffalo harbor a variety of helminthes, which cause clinical and sub clinical parasitism of buffalo. Epidemiological pattern of the helminths diseases would provide a basis for evolving strategic and tactical control of different diseases. By taking into consideration these points, authors were very interested to study about the epidemiological investigation of gastro-intestinal helminths infestation of swamp buffalo in Sylhet district. **Materials and Methods:** The study was conducted from the period of November, 2015 to October, 2016. For the purposes, total 947 buffalo's faeces were collected and examined coprologically in the laboratory, Department of Medicine, Sylhet Agricultural University, Sylhet. All the collected data were entered to MS excel sheet and analyzed by using SPSS version 13. **Results:** A total of seven species of gastro-intestinal parasites were identified. The prevalence of *Fasciola* sp., *Paramphistomum* sp., *Neoscaris* sp., *Strongyloides* sp., *Bunostomum* sp., *Moniezia* sp. and *Eimeria* sp. were 32.02, 19.78, 8.38, 9.24, 10.53, 5.59 and 14.40%, respectively. The overall prevalence of GI parasite was 49.10%. From the epidemiological survey it was revealed that the prevalence of GI parasitic infestation was high in year round. The age, sex and season were highly enhancing the prevalent rate. Abundant rainfall, availability of intermediate host and other climatic condition enhanced the trematodal infestation in rainy season. The temperature and humidity become optimum for larval development of parasites and favorable for the migration and development of infective stages of snails. The female was affected much than that of male buffalo. The young were less susceptible than that of adult buffaloes. **Conclusion:** It's an important study for the identification and factors analysis for the occurrence of GI parasites in Sylhet. Only routine deworming practices and hygienic management can minimize the parasitic load of buffaloes in this area.

Key words: Anthelmintics, epidemiological, helminth, elimination, endemic, poverty, swamp, surveillance

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Data Availability: All relevant data are within the paper and its supporting information files.

INTRODUCTION

Bangladesh is an agro economical based country where livestock plays an important role in the economy of Bangladesh. Indigenous livestock breeds are known for their hardiness, disease resistance, survival on little inputs and adaptability to variable environments¹. Buffalo is one of the most important species of livestock as a source of dairy, meat, manure and drought power in Bangladesh and great importance for their products such as bones, skins. Buffalo have significant contribution in GDP through production of meat, milk and skin representing about 27.0, 23.0 and 28.0%, respectively to the total production from livestock sector in Bangladesh². Swamp and river type buffaloes both are found in Bangladesh. In contrast to the other region, buffaloes of Sylhet region are swamp type³. In Sylhet region, the village farmers were dependent upon the buffaloes mostly for draught and meat purposes, being an integral part of the farming system in this area. The physiography of Sylhet consists mainly of hill soils, encompassing a few large depressions known locally as "beels" and at the centre there is a vast low laying flood plain of recent origin with saucer shaped depressions, locally called "Haors". Maximum day time the buffaloes were grazing in the haor area, grazed in the pasture land, harvested paddy fields, along roadsides and fulfilled their physiological demands³. During that time they were affected by the most of the parasites by ingestion. Unlike bacterial and viral diseases, the diseases caused by parasites are of great importance. The gastrointestinal tracts (GIT) of animals harbor a variety of helminthes, which cause clinical and sub clinical parasitism. Helminthes adversely affect the health status of animals which may be a cause of economic losses to the livestock industry. Helminthes has been noted as a major constraint to ruminant's productivity on a clinical and subclinical level. Parasitic diseases are also emphasized for their pathogenicity and economic importance in animals by the experts both from the government and non-governmental organizations. Gastrointestinal worm lives in the digestive system in a larger organism/host. There are parasites and non parasites of gastrointestinal worm. The huge losses of the host can be caused by parasitic worms, due to the decrease in productivity and growth disorders, digestive disorders, anemia, even the death^{4,5}. Gastrointestinal worms that found in the digestive of ruminants were *Trichuris* and *Oesophagostomum* in colon, *Trichostrongylus*, *Cooperia*, *Nematodirus*, *Bunostomum*, *Strongyloides*, *Moniezia*, *Eimeria* and *Cryptosporidium* in small intestine, *Paramphistomum* in rumen, *Haemonchus*, *Ostertagia* and *Trichostrongylus* in abomasum⁶. Whereas gastrointestinal worms that found in buffalo are *Trichostrongylus*, *Oesophagostomum*,

Haemonchus, *Toxocara*, *Ostertagia*, *Bunostomum*, *Oesophagostomum*, *Strongyloides* and *Trichuris*⁷. The low lying muddy land and the stagnant water in haor consisted the intermediate hosts and infective stage of eggs trematodes mostly. In the body of the host, the egg of gastrointestinal worm released along with the faeces. If favorable environment found, then the eggs hatched into larvae. Number of worm eggs in each gram of faecal can be used to determine the level of worm infestation. In contrast, in developing countries, little published information and data on the epidemiological aspect of helminths infestations exists. The diverse agro climatic condition, animal husbandry practices and pasture management largely determines the incidence and severity of various parasitic diseases in a region. Epidemiological pattern of the parasitic diseases in the different agro climatic zones of the country would provide a basis for evolving strategic and tactical control of these diseases. Few research information is available regarding the epidemiology related to gastrointestinal parasites of swamp buffaloes in Bangladesh⁸⁻¹⁰. Most of the people of this area were living under poverty line. They directly involved with buffalo production and the buffalo production was severely hampered due to parasites. Elaborative epidemiological work on gastrointestinal parasites in swamp buffaloes has not been done yet in Sylhet region. For the purposes, the objective of the study was to identify the prevalence of major gastrointestinal parasites of naturally infested swamp buffalo at Sylhet district.

MATERIALS AND METHODS

Study period: The study was carried out during the period from November, 2015 to October, 2016.

Study area: All the faecal samples of buffaloes were collected from the several areas of Sylhet district such as Kanaighat, Jaintapur, Gowainghat, Jakiganj, Bishwanath, Balaganj where majority of buffaloes were reared as free range system. Faecal samples were collected following the scientific procedure and then examined in the laboratory, Department of Medicine, Sylhet Agricultural University, Sylhet and Upazilla Veterinary Hospital, Jaintapur, Sylhet.

Home territory: Sylhet district with an area of 3490.40 km², is bounded by the Khasia-Jainta hills of India on the North, Maulvi bazar district on the South, Kachhar and Karimganj districts of India on the East, Sunamganj and Habiganj districts on the west. The climate of Sylhet is humid subtropical with a predominantly hot and humid in summer and a relatively cool

inter¹¹. Annual maximum temperature is 33.2°C and minimum is 13.6°C, annual rainfall 3334 mm.

Selection pattern: Total 947 buffaloes faecal sample was collected from the mentioned area. At the time of collection of samples, buffalo age, sex, deworming history, body condition score, vaccination history, breed and season of the year were carefully enlisted. The age of the buffaloes was determined from the official record book, by interrogating the farmers and by examining the dentition. Buffaloes were divided into three groups on the basis of age i.e., Group A (<1 year), group B (1-3 years) and group C (>3 years). Among the all animals male and female buffaloes were 519 and 428, respectively. For proper observation of the seasonal variation, the all seasons were recorded carefully and divided into three sub groups i.e., summer (March-June), rainy (July-October) and winter (November-February).

Sample collection and examination: Faecal samples were collected per rectum, placed in labeled polythene collection bags and stored under refrigeration. Faecal samples were examined by faecal floatation using saturated salt solution and sedimentation techniques for the presence of eggs per oocysts of parasites¹². Information related to age, species, sex and managerial practices were recorded in a questionnaire at the time of sample collection. Faecal samples (fresh) were collected per-rectum using clean examination gloves, put into faecal pots, labeled and kept cool before transportation to the Laboratory, Department of Medicine, Sylhet Agricultural University where they were immediately examined or stored at refrigerated temperature (4°C) for a maximum of one day before processing. Identification of

helminth eggs was done according to key described elsewhere¹³. The presence of coccidian oocysts was also recorded.

Statistical analysis: All the collected data were entered to MS excel (Microsoft office 2007, USA) and analyzed by SPSS version 13 using F test ($p > 0.05$) and determined the prevalence of the parasitic infestation¹⁴.

RESULTS

The study was carried out 947 buffaloes throughout Sylhet district of Bangladesh during one year period from November, 2015 to October, 2016. During the study period, both healthy and sick animal's faeces were examined. Out of 947, a total of 465 samples were found to be infested with GI parasites with one or more species. Seven species of gastro-intestinal parasites were identified. Among them, two species were trematode, namely *Fasciola* sp. and *Paramphistomum* sp., three species were nematode, namely *Neoscaris* sp., *Strongyloides* sp. and *Bunostomum* sp., one species of cestode, namely *Moniezia* sp. and one species of protozoa, namely *Eimeria* sp. (Fig. 1). Overall prevalence of GI parasites in swamp buffalo was moderate in year round. The prevalence of different gastrointestinal parasites of buffaloes is shown in Fig. 1. A relatively higher prevalence of gastro-intestinal parasites was observed in summer followed by rainy season and winter seasons (Table 1).

The prevalence of *Fasciola* sp., was high in rainy season, moderate in summer season and lowest in winter season. The prevalence of *Paramphistomum* sp., was higher in rainy season and lower in winter season. Strongyloids infestation

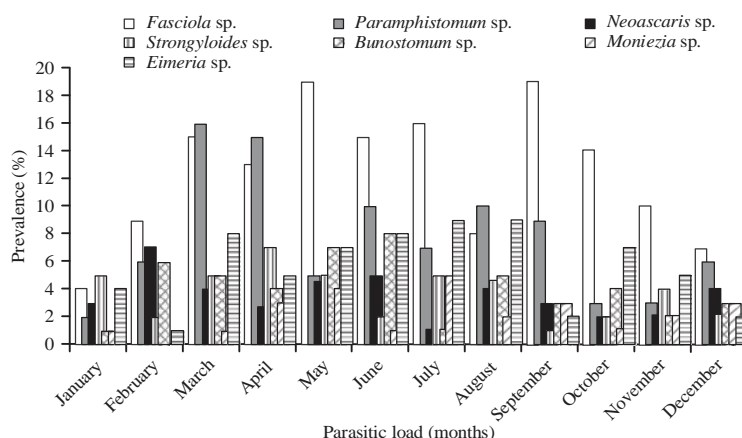


Fig. 1: Month wise prevalence of gastro-intestinal parasites of Buffalo (2015-2016)

Table 1: Season, sex and age wise prevalence of GI parasites of buffalo

Parasites	Season				Sex				Age							
	Summer		Rainy		Winter		Male		Female		Group A (<1 year)		Group B (1-3 year)		Group C (>3 year)	
	%	No	%	No	%	No	%	No	%	No	%	No	%	No	%	No
<i>Fasciola</i> sp.	30.54	62	36.53	57	28.30	30	28.16	60	35.31	89	20.96	26	28.64	55	45.63	68
<i>Paramphistomum</i> sp.	22.66	46	18.58	29	16.03	17	24.88	53	15.47	39	9.67	12	24.47	47	22.14	33
<i>Neoscaris</i> sp.	7.38	15	5.12	8	15.09	16	11.73	25	5.55	14	19.35	24	5.72	11	2.68	4
<i>Strongyloides</i> sp.	9.35	19	7.05	11	12.26	13	5.63	12	12.30	31	5.64	7	13.54	26	6.71	10
<i>Bunostomum</i> sp.	11.82	24	8.33	13	11.32	12	14.55	31	7.14	18	8.87	11	11.97	23	10.06	15
<i>Monilezia</i> sp.	4.43	9	7.05	11	5.66	6	3.28	7	7.53	19	9.67	12	5.20	10	2.68	4
<i>Eimeria</i> sp.	13.79	28	17.30	27	11.32	12	11.73	25	16.66	42	25.80	32	10.41	20	10.06	15
Total	43.65		33.54		22.79		45.80		54.19		26.66		41.25		32.04	

Value presented as N (%), number of positive sample and prevalence rate

was lower in all year round. The prevalence of *Eimeria* sp., was higher in rainy season and lower in winter season. Age group C were found more infested by gastro-intestinal parasites than below age group A (Table 1). *Fasciola* sp., was affected the adult age group C that was higher than age group A. *Paramphistomum* sp., was prevalent mostly in age group C than other. The most important nematode of buffalo calf was *Neosascaris* sp., that affected the below age group A than other. *Eimeria* sp., was higher in age group A and lower in age group C.

DISCUSSION

The prevalence of fasciolosis in buffaloes were higher than that of cows^{15,16}. The high prevalence might be due to difference in feeding habit and hygienic conditions of buffaloes¹⁶. The prevalence of gastro-intestinal helminths in buffaloes was very common and quite severe⁸. Thus it's true to say that the buffaloes were highly susceptible to various gastro intestinal parasites. The present study prevalence rate was lower than that of the findings recorded 64.41% of the buffaloes were positive for internal parasites in Pakistan¹⁷. The prevalence of helminthiasis in buffaloes in colony, Hyderabad was 15.2% which was higher than present study that might be due to difference in home territory and seasonal variation¹⁷. The overall prevalence of helminthiasis in buffaloes 47% with nematodes which was almost similar with the present findings¹⁸. In contrast to other findings, other reported 91.44% prevalence of helminthes in buffaloes¹⁹. The result is higher than previous mentioned findings of Mamun *et al.*⁸ and Azam *et al.*¹⁷, who reported that GI parasites in water buffalo of Kurigram district in Bangladesh and Pakistan was 61.02 and 64.41%, respectively. The prevalence of fasciolosis in buffaloes was 24.41% which was lower than the present finding²⁰. The variations among the findings might be due to the difference in the selection of animals, techniques of sample collection, sampling procedure, period and geographical location of the study, environmental factors and breed of the animals etc. Factors such as level of host immunity, stage of parasite infection, other inherent park specific ecological factors (moisture, humidity, vegetation, soil, animal interaction) and the number of adult parasites in the GIT may be related to the broad and high level of GIT parasites eggs per oocysts²¹. Seasonal fluctuation of the year had positively effects on the prevalence of gastro-intestinal parasitic infestation in buffaloes. The present findings was relatively much lower and contrast than the previous reports⁸ where overall seasonal prevalence (71.70%) in all water buffalo of Kurigram district during rainy season, followed by summer (58.90%) and winter

(57.27%). In present study, prevalence higher in rainy due to pasture grazing area situated near and around the water bodies, which is fertile land for various intermediate hosts and presence of infectious stage of parasites at high concentration. The seasonal influence was very much enhanced for larval development of nematode. The hot and humid climates in fact make this area a paradise for the parasite to affect the buffalo. So, there geo-climatic condition is responsible to enhance the incidence and prevalence rate of the parasitic disease which leads to the poor condition of health of buffalo. Age was another factor for occurring of gastro-intestinal parasitic infestation. The present study was agreed with the previous report where they found higher infestation rate was recorded in older buffaloes than the young buffaloes²². The infestation rate of *Fasciola* sp. increased with the increase of age²³. The findings reported that the higher prevalence of helminths infestation was found in young animals compared to adults in buffalo of Kurigram district in Bangladesh and in Pakistan respectively^{8,17}. The variation was due to exhausted immune system, nutritional deficiency, pasture management and ageing. The cause of this variation also might be due to the difference grazing area and management variation of animals. Sex had influenced the GI parasites occurrence. The higher percentage of infestation in the females may be due to the alteration in the physiological condition of the animals during pregnancy and lactation (production activity). Almost similar findings with the present study i.e., male (45.12%) and female (48.30%) was infested by helminths²². Male (24.88%) was affected much than female (15.47%) by *Paramphistomum* sp. Females (35.31%) were more susceptible to *Fasciola* sp. infestation than male (28.16%)²⁴. Higher prevalence was in males than female's buffaloes in Pakistan¹⁹ and the higher prevalence in males (61.34%) than females (59.52%)⁸.

CONCLUSION AND FUTURE RECOMMENDATION

Gastrointestinal parasitic infestation is one of the major obstacles for buffalo health in Sylhet. The GI parasites were very endemic in this region and the hot and humid climates in fact make this area a paradise for the helminths to affect the buffalo. The infestation of trematode and nematode was moderate in year round. The protozoal infestation was also recorded moderate in all season. It's an preliminary work, further more study may require for the specific species wise detection of parasites and their virulent effects on the body of the buffaloes by sero-surveillance. It will be helpful for evaluate the economic losses of the farmers due to GI

infestation of buffaloes and conduct the fruitful worm control plan in this area. We recommend using highly effective broad spectrum anthelmintics to the buffalo in every three months interval for proper deworming.

SIGNIFICANCE STATEMENT

This study will help the researchers who have fascination to uncover the critical areas of helminths parasitism in buffaloes and also discover new anthelmintics drugs against the identified species of parasite and contribute to the control of worm infestation as well as poverty elimination of this region.

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