EPIDEMIOLOGY OF GASTROINTESTINAL HELMINTHS INFECTION IN BUFFALO OF NEW ALLUVIAL ZONE OF WEST BENGAL, INDIA

ABSTRACT

Aims: Epidemiology of naturally occurring gastrointestinal (GI) helminths was studied in buffalo of New Alluvial Zone of West Bengal and the role of different factors such as season, age, sex and rearing practices on prevalence was also recorded in the present study.

Methodology: Monthly 120 faecal samples of buffaloes of New Alluvial Zone (NAZ) were collected and examined by standard parasitological techniques from April, 2016 to March, 2017.

Results: The overall prevalence of GI helminths was recorded as 46.53% in buffalo of NAZ in West Bengal. Paramphistome (35.9%) was observed as the predominant parasite followed by Strongyle (9.93%), *Fasciola* (4.17%) and *Toxocara* (4.03%). Monsoon (54.58%) was found to be the most favourable season followed by winter (44.79%) and summer (40.21%) for GI helminths infection in buffalo. The overall prevalence (52.57%) as well as prevalence of Strongyle and *Toxocara* was higher in young buffaloes than the adult buffaloes (44.47%). The overall prevalence of GI helminths was higher in female buffalo (48.85%) than the male (40.74%) and the prevalence of individual parasites did not vary greatly between the two sexes of animals. Semi-intensive system (54.46%) of rearing showed higher prevalence of GI helminths than the intensive method (39.07%). Prevalence of Strongyle, Fasciola and Paramphistome was comparatively higher in animals maintaining under semi-intensive system than the intensive system of rearing.

Conclusion: The results of the present study might be utilized for planning control programme against GI helminths in buffaloes of NAZ of West Bengal.

Keywords: Buffalo, Epidemiological factors, Gastrointestinal helminths, New AlluvialZone, Prevalence

1. INTRODUCTION

Buffaloes play an important role in rural Indian economy by supplying milk and meat and they also help in the agricultural field by providing manure and drought. India has the highest buffalo population in the world (Animal census, 2019) but profitable production of buffalo is hampered by many factors. Among the many factors, rearing practices and disease problems are the most important limiting factor for sub-optimal productivity in buffalo in rural India[1].

Buffalo suffers from a variety of diseases of which, parasitic diseases particularly gastrointestinal helminth infection is the major one. Rearing practices of buffalo by the rural farmer is one of main reason for high prevalence of gastrointestinal helminthoses in livestock of India including West Bengal. Prevalence of GI helminths infection in buffalo has been reported from various parts of India [2, 3, 4, 5]including West Bengal[6, 7]. Gastrointestinal helminths infections cause huge economic losses to the livestock industry by reducing milk production, growth rate, fertility, work capacity and increasing susceptibility to other diseases[8, 9, 10].

The environmental condition as well as the climatic condition of West Bengal are favourable for survival of free-living infective stages as well as snail intermediate host of different types of helminth parasites [11, 12]. There are six agroclimatic zones in West Bengal and these are Hill zone, Tarai zone, Old Alluvial zone, Red Laterite zone, New Alluvial zone and Coastal zone. The state of West Bengal has a good population of buffalo but systematic studies on GI helminth infection is scattered in buffalo. Knowledge on epidemiology as well as factors responsible for occurrence of disease are most important before planning strategic control programme against that particular disease. Therefore, the prevalence of GI helminths was recorded in buffaloes of New Alluvial Zone and also the effects of different epidemiological factors such as seasons, age, sex and rearing practices were also recorded in the present study.

2. MATERIALS AND METHODS

2.1. Study area

New Alluvial Zone of West Bengal consists of Murshidabad, Bardhhaman (East and West), Hooghly, Howrah, Medinipur (West) and North 24 Parganas districts. Two villages from each district of Murshidabad, Bardhhaman (East) and Hooghly were selected in every month for the present study. Soil of this region is new alluvium type which is sandy loam to clayey in texture.

The study had been conducted for one year from March, 2016 to February, 2017. This study was a part of project work entitled “All India Network Programme on Gastrointestinal Parasitism” funded by the Indian Council of Agricultural Research.

2.2. Selection of animals

Buffaloes of either sex in the age group of six months to 5 years were selected for the present study. Buffaloes in the age group 6 months to 2.5 years were identified as young animals and buffaloes in the age group of > 2.5 years to 5 years were identified as adult animals. A total 1440 buffaloes were coprologically screened for one year of study period and out of which 592 were male buffalo and 848 were female buffalo. A total of 1039 animals were adult and 401 animals were young buffaloes in the present study. Out of 1440 buffaloes, 807 animals were maintained by intensive systemwith total confinement in animal shed and sometimes tied with rope in the open area near the animal shed and 633 buffaloes were maintained by semi-intensive system where buffaloes were allowed to graze on common pasture for few hours during the day time and then confined in animal shed during the night time. Routine deworming for buffaloes was not practiced in those villages.

2.3. Collection and examination of faecal samples

Faecal samples of twenty buffaloes were collected from each of the six villages (20 samples / village) under the above mentioned three districts and thus a total of 120 faecal samples were collected at each month.Approximately 5 gms of faecal samples, either per-rectal or freshly voided sampleswithout dust contamination were collected in vials containing 10% formalin. Details of animals including age, sex and rearing practice were recorded against each sample. Faecal samples were carried to the laboratory maintaining cold chain for further processing of samples.

Faecal samples were examined by standard parasitological techniques; sedimentation and floatation technique [13]. After discarding the formalin, faecal sample was triturateddby adding little amount of tap-water in pestle and mortar and then some amount of water was added to the faecal mixture to make faecal suspension. Faecal suspension was then passed through an ordinary tea-strainer in a clean vial and it was kept undisturbed for 15 minutes. Then, the supernatant was discarded without disturbing the sediment. The vial was then filled with tap-water and kept undisturbed for 15 minutes after which the supernatant was discarded as previous and a drop from the sediment was takenon a glass-slide and one drop of water was mixed with it. Faecal mixture was covered with cover-slip and was examined under low power magnification.

After discarding the supernatant for the second time, saturated salt solution (NaCl) was poured up to the brim of the vial and then it was covered with a glass-slide. It was kept undisturbed for

15 minutes. Then the slide was taken out and a cover slip was put on the drop present underside the slide and it was then examined by the upside down under low power magnification.

3. RESULTS AND DISCUSSION

3.1. Prevalence of gastrointestinal helminths

In the present study all the three types of helminths; trematode (*Fasciola* and Paramphistomes), nematode (Strongyle, *Strongyloides*, *Trichuris* and *Toxocara*) and cestode (*Moniezia*) were recorded. The overall prevalence of GI helminths was 46.53% in buffaloes of New Alluvial Zone of West Bengal (Fig. 1). Epidemiological knowledge on GI helminthoses is an important component of control programme. In the present study a moderate level of infection has been reported in buffalo. In contrast to the present study many authors reported slightly higher prevalence (54% - 64%) of GI helminths in buffalo [4, 6, 7, 14]. On the other hand, only 13% prevalence of GI helminths has been reported in buffalo of Bikaner region of Rajasthan [2] and Jabalpur district of Madhya Pradesh [5].The difference in prevalence of GI helminths might be due to variation in ecological factors and agroclimatic conditionsbetween the New Alluvial Zone West Bengal and other places of study and also the difference in rearing practices and the number of animals involved in the study might be the other factors responsible for variation in prevalence of GI helminths in buffaloes of different parts of the country.

The infection of Paramphistomes (35.90 %) was found to be predominantspecies of GI helminth in buffaloes of NAZ in West Bengal. Strongyle group of nematodes were the second highest (9.93%) recorded helminth followed by *Moniezia* (4.31%), *Fasciola* (4.17%), *Toxocara* (4.03%), *Strongyloides* (2.92%), and *Trichuris* (2.15%). Highest prevalence of Paramphistomes had also been recorded by many authors in India[3, 4, 15] in large ruminants of India including West Bengal [6, 7 12]. The climatic condition of New AlluvialZone such as average temperature, relative humidity and total rainfall and also the availability of water-bodies favours the development of free-living stages of helminths in the environment and also the grazing behaviour of buffalo over the water-logged areas help in the transmission of infective stages of Paramphistomes and Strongyle nematodes and thus resulting into comparatively higher prevalence.

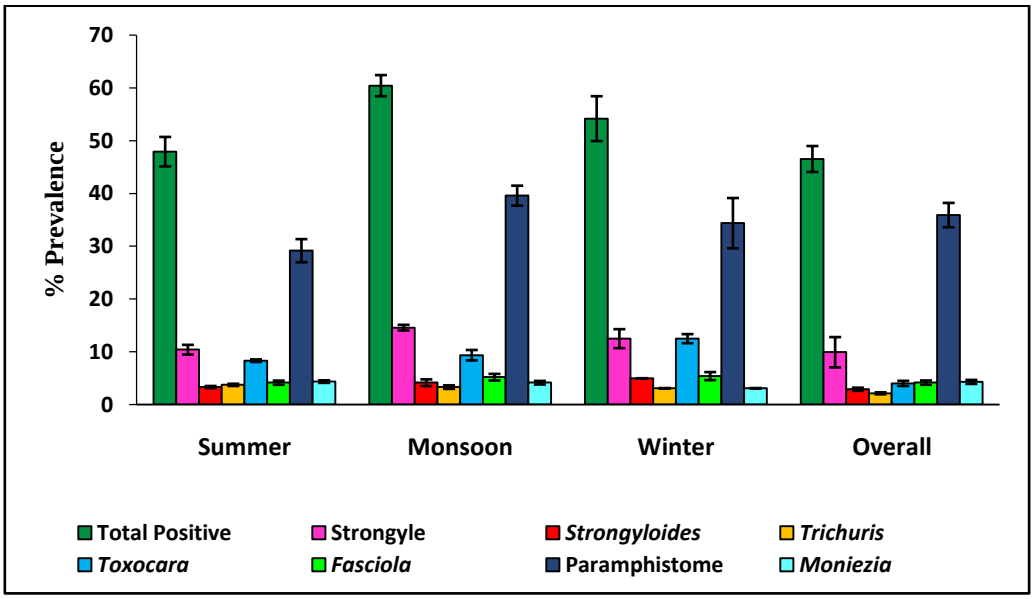
3.2. Seasonal prevalence of gastrointestinal helminths

The prevalence of GI helminths was recorded in all the three seasons during the study period. Highest prevalence of GI helminths was observed in monsoon (54.58%) followed by winter 44.79%) and lowest in summer (40.21%). The prevalence of Paramphistomes and Strongyle group of nematodes followed the same seasonal pattern as that overall prevalence of GI helminths (Fig. 1).

Variation in prevalence of GI helminths in different Seasonshas been recorded in livestock all over world [8, 16, 17] including India [7, 11]. The prevalence of GI helminths including

Paramphistomes and Strongyle infection was highest during monsoon in buffaloes of NAZ of West Bengal and this was in agreement with earlier finding in buffalo [3, 5, 7, 15, 17]. The environmental conditions and availability of ample green grassesduring monsoon are favourable for survival of infective stages of Strongyle nematodes and also for breeding of snail intermediate host of Paramphistomes.Comparatively higher temperature in summer season and also the lower temperature and low relative humidity during the winter are not favourable for survival and development of free-living stages of GI helminths and snail intermediate host of trematodes and hence comparatively lower prevalence of GI helminths during summer and winter compared to monsoon season[7, 11, 17]

Fig. 1. Overall and Seasonal Prevalence of Gastrointestinal helminthoses in buffalo of New Alluvial Zone of West Bengal



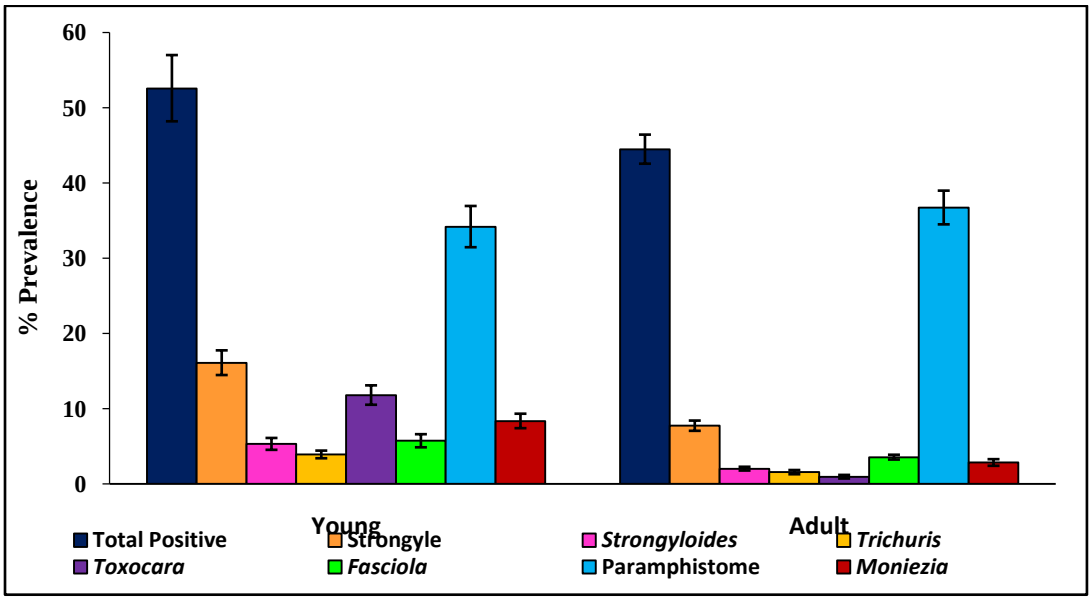
3.3. Age-wiseprevalence of gastrointestinal helminths

The overall prevalence of GI helminths irrespective of their species was higher in young animals (52.57%) compared to adult buffaloes (44.47%) as depicted in Fig. 2.The prevalence of strongyle, *Toxocara* and *Moniezia* was significantly higher in young buffalo (16.1%, 11.8%, 8.36%) compared to the adult buffalo (7.73%, 0.95%, 2.84%). On the other hand, the prevalence of

Paramphistomes was slightly higher in adult buffaloes (36.72%) compared to the young animals (34.18%).

The higher prevalence of Strongyle, *Moniezia* and *Toxocara* as well as overall prevalence of GI helminthsas recorded in young animals in the present was also reported earlier s [2, 3, 7, 18, 19]. Comparatively higher susceptibility of young animals might be accredited to lower exposer to infection resulting into low resistance [7, 19] and also the smaller number of young animals (401) compared to adult buffalo (1039). Das *et al*. [5] and Biswas *et al*. [16]observed higher prevalence of GI helminths in adult buffalo which was not in agreement with our findings and this variation might be ascribed to the difference in the agroclimatic conditions and number of adult and young animals included in the study.

Fig. 2. Prevalence of Gastrointestinal helminthoses in young and adult buffaloes of New Alluvial Zone of West Bengal



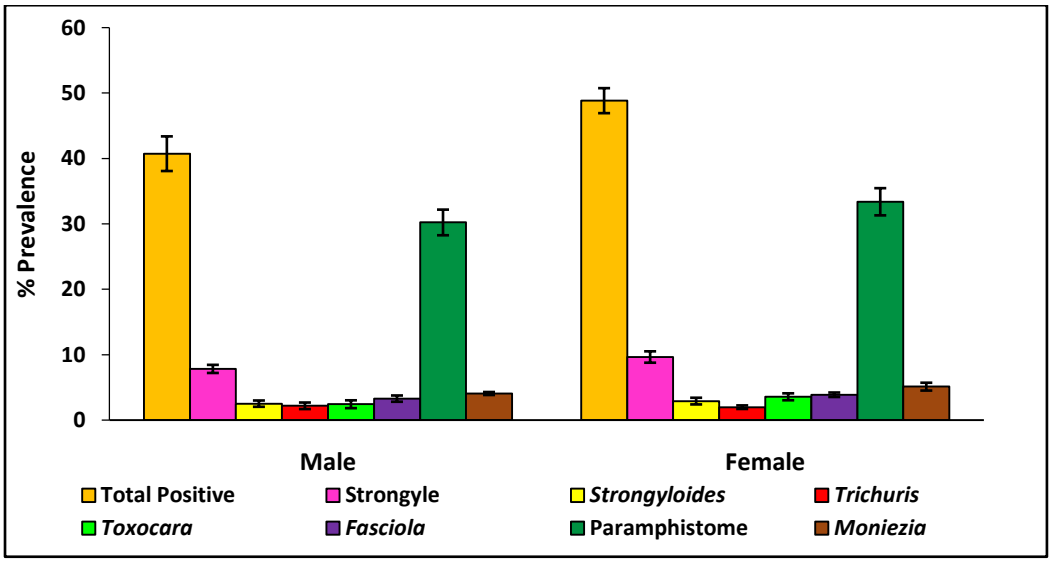
3.4. Sex-wiseprevalence of gastrointestinal helminths

In the present study 592 male and 848 female buffaloes were screened. The overall prevalence of GI helminths was found to be slightly higher in female (48.85%) than the male buffaloes(40.74%) of NAZ of West Bengal (Fig. 3). Prevalence of Paramphistomes, *Fasciola*, Strongyle, *Toxocara*, *Strongyloides* and *Trichuris* was slightly higher in female than the male.

Irrespective of age of animal and season of the year female buffaloes were found to be more susceptible to naturally occurring gastrointestinal helminths than the male animals.

Higher prevalence of GI helminths as recorded in female animals in the present study was also recorded earlier by many authors [7, 10]. Higher prevalence of GI helminths might be due to productive and reproductive stress in female buffalo. In comparison to the present finding, higher prevalence of GI helminths was recorded in male buffaloes than the female [16,19] and this variation might be due to variation in rearing practice.

Fig. 3. Prevalence of Gastrointestinalhelminthoses in male and female buffaloes of New Alluvial Zone of West Bengal



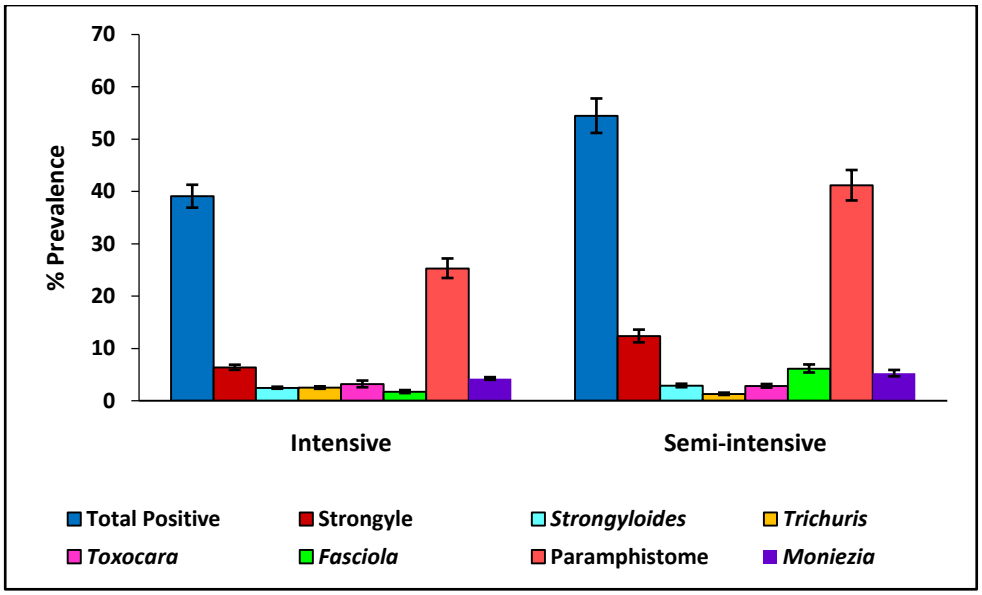
3.5. Managemental practice-wiseprevalence of gastrointestinal helminths

Out of 1440 buffaloes screened, 807 animals were maintained by intensive system and 633 animals were maintained by semi-intensive system. Buffalo maintained by semi-intensive system showed higher prevalence of GI helminths (54.46%) compared to intensive system(39.07%) in the NAZ of West Bengal (Fig. 4). The prevalence of pathogenic helminths such as Paramphistome, *Fasciola*, and Strongyle group of nematodes was also significantly higher in buffaloes rearing by semi-

intensive (41.17%, 6.14%, 12.35%) than the animals reared by intensive system(25.3%, 1.74%, 6.37%).

Rearing practice of animals are known to influence the prevalence of naturally occurring GI helminth parasite in livestock [11]. Buffaloes reared by semi-intensive system had greater access to the infective stages of helminth parasites in the pasture for longer time which could be responsible for higher prevalence of GI helminths. While the buffaloes maintained by the intensive system had very little access to infective stages of GI helminths and thereby comparatively lower prevalence of GI helminths than the animals maintained by semi-intensive system.

Fig. 4. Comparative prevalence of Gastrointestinalhelminthoses in buffaloes maintained by intensive and semi-intensive system in New Alluvial Zone of West Bengal



4. CONCLUSION

Buffaloes of NAZ of West Bengal were infected with GI helminths throughout the year and the prevalence of GI helminths differed in relation to season, age and sex of animals, and also in relation to the rearing practices. As observed in the present study, monsoon season, young and female animals and semi-intensive system of rearing were favourable for GI helminths infection in buffalo.Data obtained in the present study might be useful for controlling GI helminths in buffalo of New Alluvial Zone of West Bengal, India.

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COMPETING INTERESTS

There is no conflict of interest.

AUTHORS’ CONTRIBUTIONS

All authors contributed to the study conception and design. RJ: Conceptualization, Project administration, Writing – original draft. DK: Methodology, Investigation, Data curation. SP: Data analysis. SB: Writing – review & editing. AN: Investigation and data curation.

All authors approved the final version of this manuscript.

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