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A coprological survey of common gastrointestinal parasitic infections in buffaloes in Jabalpur district of Madhya Pradesh, India

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Abstract
Gastrointestinal (GI) parasitic infections are serious problem in livestock animals. They are responsible for production losses, ill health and even death of the animals which leads to economic losses to the farmers. A study was carried out to detect the occurrence of parasitic infections in buffaloes in Jabalpur district of Madhya Pradesh, India. A total of 1237 faecal samples were examined in the departmental laboratory out of which 163 (13.18 %) were positive for different parasitic eggs/oocysts during a one year study period. The prevalence of Amphistomes (9.54%)) was highest followed by Strongyle (3.15%), Coccidia (0.65%), *Fasciola* (0.32%) and *Moniezia* (0.24%) infection. Seasonal prevalence revealed significantly higher ($p < 0.01$) in monsoon season (20.39%) than summer (11.86%) and winter (7.25%). Whereas age wise prevalence was non-significantly higher ($p > 0.005$) in adult (13.48%) as compared to calves (12.3%). Prevalence of nematode larvae showed preponderance of *Haemonchus* (43.6%), followed by *Trichostrongylus* (24%), *Oesophagostomum* (16.2%), *Bunostomum* (11.6%) and *Strongyloides* (1.7%). The most common Eimerian infection seen was *Eimeria bareillyi, Eimeria bovis* and *Eimeria zuernii*. The present investigation revealed that the prevalence of gastrointestinal (GI) parasites in buffaloes is common and relatively high.

Keywords: Prevalence, gastrointestinal parasites, buffalo, Jabalpur, Madhya Pradesh

Introduction
India has a population of 108.7 million of buffalo [1], which play an important role in the Indian economy and are multipurpose providing dairy, meat, manure and drought power. The gastro- intestinal tract of buffaloes harbor a wide variety of parasites mainly helminthes and coccidia which causes clinical and sub clinical parasitism. These parasites adversely affect the health status of buffaloes and cause enormous economic losses like lowering fertility, weight gain and milk production, reducing working capacity, involuntary culling, reduction in food intake, treatment cost, increased susceptibility to other diseases and mortality in heavily parasitized animals [2]. The milk production in buffaloes suffering from gastrointestinal nematodosis can be increased to the tune of 0.43 liter/buffalo per day when the animals were treated with anthelmintic as compare to the nontreated animals [3]. Epidemiological survey of gastrointestinal parasitic infection is an important assist to combat infections more efficiently and in controlling economic losses by adopting effective control measures. The incidence of gastrointestinal parasites in buffaloes from different parts of India has been published from time to time for this purpose [4, 5, 6, 7]. The aim of this study was to determine the prevalence of infection with gastrointestinal parasites in Jabalpur district of Madhya Pradesh, India. It is very important that integrated strategies and measures be taken to control gastrointestinal (GI) parasitic infections in buffaloes in Jabalpur district and in different places of Madhya Pradesh.

Materials and Methods
Location of Work
The study was conducted in Jabalpur district of Madhya Pradesh. It is situated in between latitude 23° 10' N and longitude 79° 56' E with an average height of 411 m above mean sea level. Jabalpur has a humid subtropical climate typical of North-Central India (Madhya Pradesh and Southern Uttar Pradesh). Summer begins in late March, lasting until June. May is the hottest month, with the average temperature exceeding 45 °C (113 °F). Summer is followed by the southwest monsoon, which lasts until early October and produces 35 inches (889 mm) of rain from July to September.

Average annual precipitation is nearly 55 in (1386 mm). Winter begins in late November, and lasts until early March. January is the coldest month, with an average daily temperature near 15 °C (59 °F).

Samples collection and processing

The study was undertaken for a period of one year from April 2016 to March 2017. Faecal samples were collected directly from rectum (using examination gloves) of the host into individually labelled polythene bags and the faeces collected were taken to laboratory for further processing or stored at 4 °C until further examination. During collection of faecal samples the age of the buffaloes, month and season of the year were carefully recorded. Seasons were considered as summer (March-June), rainy (July-October) and winter (November-February). Faecal samples were examined by faecal flotation method using saturated salt solution and sedimentation techniques for the presence of eggs/oocysts of parasites.

Identification of strongyle larvae and *Eimeria* species

Identification of the oocysts or eggs in the samples was made on the basis of morphological and sporulation characteristics of oocysts in case of *Eimeria* species and morphology of eggs and hatched out larvae in case of strongyle worms. To be brief a representative number of fecal samples were pooled in equal quantities and used for coproculture. Culture larvae were harvested using petridish method and were identified based on the total length, tail length, tail shape, sheath, intestine cell and esophagus types [8]. Coccidia oocysts rich positive faecal samples were diluted with distilled water and sieved to remove the large faecal debris. The washed faecal samples were then mixed with saturated salt solution (NaCl flotation) and centrifuged at 3000 rpm for 10 minutes, oocysts were collected from top of centrifuge tubes. The oocysts were washed again with phosphate buffered saline through centrifugation. The oocysts were subjected to sporulation using 2.5% solution of potassium dichromate, incubated at room temperature for 7-10 days till sporulation. To examine and identify the *Eimeria* species based on their sizes and morphological characteristics(shape, colour, form index, presence or absence of micropyle and its cap, presence or absence of residual, polar and stieda bodies) of the oocysts and sporocysts [9, 10].

Statistical Analysis

Suitable statistical technique was performed on prevalence data by applying χ^2-test as described by Snedecor and Cochran [11].

Results and Discussion

During this one year study (April 2016 to March 2017) a total of 1237 fecal samples were examined by faecal sample examination technique, of which 163 (13.18%) were found positive for different gastrointestinal (GI) parasites (Table 1). The findings of the present study are in close agreement with the findings of Yadav *et al* [5] and Wadhwa *et al* [12] who reported 13.88 per cent in Uttarakhand and 13 per cent in Rajasthan respectively. Considerably higher prevalence was observed by Muraleedharan [4] and Singh *et al* [13] who recorded 20.45 per cent in Karnataka and 23.33 per cent in Punjab respectively. Dissimilar to these findings, high prevalence were reported by Nath *et al* [7] and Patel *et al* [6] who recorded 55.65 per cent in Madhya Pradesh and 64.67 per cent in Gujarat respectively. Low and high prevalence rate of gastrointestinal parasite from different parts of India might be difference in deworming schedule, managemental practices adopted in different agro-climatic conditions, seasons and number of animals included in the study. A total of nine species of gastro-intestinal parasites (eggs/ oocysts) were identified, representing five species of nematode, two trematodes, one species each of cestode and protozoa. Mixed infection was common. It was observed that, prevalence of Amphistomes (9.54%), was the highest followed by strongyle (3.15%), coccidia (0.65), *Fasciola* (0.32) and *Moniezia* (0.24%). Similar findings, on the prevalence of higher percentages of amphistomes infections have been recorded from Punjab, Tripura and Bangladesh [13, 14, 15]. Low prevalence of cestodes, nematodes and coccidia were more or less similar to the reported by Muraleedharan [4] and Sreedevi and Hafeez [14]. It is interesting to note that prevalence of trematode infection was higher with compared to others gastrointestinal (GI) parasites. This might be due to the fact that the buffalo is exposed to a higher risk of infection with molluscan intermediate host and their tendency to seek rivers, pools or swamps for wallowing behavior [16]. Absence of *Toxocara* spp. might be due to the arrested larval development resulting in non-patent infection or treatment of the dam before calving and treating the calves with anthelmintic at below one month of age. In the present study, prevalence of gastrointestinal (GI) parasitic infections was non-significantly higher in adult (13.48%) as compared to the calves (12.3%) (Table 1). The present finding is similar to the earlier reports of Azhar *et al* [17] and Biswas *et al* [18] who noticed higher infection rate in older buffaloes than the young calves. However, the present finding is in contrast to the previous reports by Singh *et al* [13] and Patel *at al* [6] who observed that young animals were more susceptible to infection than adult. Prevalence of Amphistome (10.11%) was highest in adult buffaloes as compared to calves (7.89%). Present finding is in agreement with the previous reports of Alim [19] and Roy *et al* [15] who observed that infection rate of trematodes increased with the increase of age. Calf management practices adoption by the farmers in the study area may be the cause of lower prevalence of gastrointestinal (GI) parasitic infections in young buffaloes. The seasonal fluctuation on gastrointestinal parasites infection in buffaloes was significantly higher ($P<0.01$) during the rainy season (20.39%) followed by the summer (11.86%) and winter (7.25%) seasons (Table 1). Similar observations also reported by Mamun *et al* [20] and Sreedevi and Hafeez [14]. The highest prevalence in rainy season may be due to high humidity and rainfall which favors the growth and multiplication of parasites as well as their vectors. Prevalence of nematode larvae showed preponderance of *Haemonchus* (43.6%), followed by *Trichostrongylus* (24%), *Oesophagostomum* (16.2%), *Bunostomum* (11.6%) and *Strongyloides* (1.7%) and other 2.89 per cent (Fig. 1). The findings are in close agreement with the findings of Chavanet *et al* [21]; Yadev *et at* [6] and Jamra *et at* [22] who reported *Haemonchus* spp. to be the most prevalent strongyle from various parts of India. Females of *Haemonchus* spp. are prolific egg layers [23]. Infective stages of *Haemonchus* spp. survive for prolonged periods on pastures [9] and are constantly picked up by animals while grazing in large numbers resulting in clinical gastrointestinal nematodosis. The only cestode observed in the buffalo was *Moniezia benedeni*. The occurrence of cestodes species is very few compared to others gastrointestinal parasites [24, 25]. Based on morphology (shape and size of oocysts, presence or absence of micropyle and

oocyst wall) and sporulation time, *Eimeria bareillyi*, *Eimeria bovis* and *Eimeria zuernii* species of *Eimeria* were identified in the present study. Although 13 known species of *Eimeria*, but not all are pathogenic. The most common pathogenic species are *Eimeria bareillyi*, *Eimeria zuernii* and *Eimeria bovis* causing morbidity or even mortality associated with mucus and blood stained diarrhea in calves [26, 27]. All domestic animals are susceptible to coccidial infections. Although, coccidiosis is host specific, every host may be infected with several species of coccidia at the same time [28].

Conclusion

The present investigation revealed that the prevalence of gastrointestinal (GI) parasites in buffaloes is common and relatively high. Keeping in view these factors, strategic treatment and control programme may be formulated to control gastrointestinal parasitic infections in buffaloes in Jabalpur district and elsewhere in Madhya Pradesh.

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Table 1: Prevalence of gastrointestinal parasitic infections in Buffaloes in Jabalpur District of Madhya Pradesh

Factors	No. Examined	Positive (%)	Strongyle (%)	*Fasciola* (%)	*Amphistome* (%)	*Moniezia* (%)	Coccidia (%)
	Season wise						
Summer	430	51 (11.86)	10 (2.33)	0 (0)	37 (8.60)	0 (0)	5 (1.16)
Monsoon	407	83 (20.39)	14 (3.44)	4 (0.98)	68 (16.71)	1 (0.25)	2 (0.49)
Winter	400	29 (7.25)	15 (3.75)	0 (0)	13 (3.25)	2 (0.50)	1 (0.25)
ρ value	DF=2	<0.01	NS	NS	<0.01	NS	NS
	Age wise						
Adult	920	124 (13.48)	28 (3.04)	4 (0.43)	93 (10.11)	1 (0.11)	6 (0.65)
Calf	317	39 (12.3)	11 (3.47)	0 (0)	25 (7.89)	2 (0.63)	2 (0.63)
ρ value	DF=1	NS	NS	NS	NS	NS	NS
	Overall						
Over all	1237	163 (13.18)	39 (3.15)	4 (0.32)	118 (9.54)	3 (0.24)	8 (0.65)

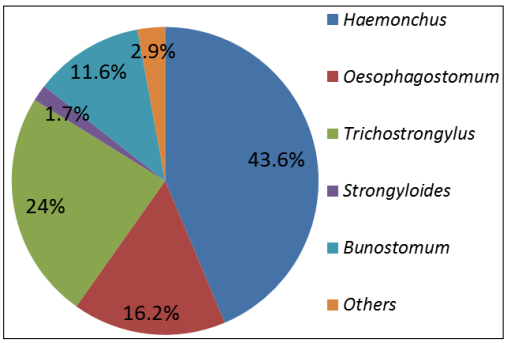

Fig 1: Mean generic composition of nematode larvae in Buffaloes

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