EPIDEMIOLOGICAL STUDIES ON GASTROINTESTINAL PARASITES OF BUFFALOES IN SEVEN AGRO-CLIMATIC ZONES OF MADHYA PRADESH, INDIA

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ABSTRACT

In the present study 3779 feacal samples of buffaloes were collected from the seven agro-climatic zones of Madhya Pradesh state, India. The study was conducted for a period of one year from April 2011 to March 2012. The prevalence of gastrointestinal (GI) parasitic infection was 55.65% (2143). Amphistomes (28.10%) being the most prevalent GI parasite followed by Strongyle (25.59%), *Schistosoma* sp. (5.19%), *Strongyloides* sp. (3.15%), *Trichuris* sp. (2.59%), *Fasciola* sp. (2.30%), *Toxocara* (0.66%) and *Monezia* sp. (0.42%). Among non helmithic infection coccidian showed prevalence of 19.00%. Out of the seven zones, zone V (Central Narmada valley) had the highest prevalence (61.46%) and the Hills of Jhabua zone XII had the lowest prevalence (50.42%).

Prevalence in calves was more (59.78%) as compared to adult (54.36%). Season wise highest prevalence was observed in monsoon (73.41%) followed by winter (60.47%) and then summer (36.22%). Prevalence of coccidiosis (25.00%) was highest in winter. Monthly prevalence data showed highest prevalence in the month of August (79.68%) and lowest in the month of April (28.25%). Mean EPG of strongylewas 321.8 and highest intensity of strongyle infection was recorded in the month of July (513.1). Coproculture examination revealed that *Haemonchus* being the predominant (72.08%) nematode genus, followed by *Trichostrongylus* (11.42%), *Oesophagostomum* (10.08%), *Bunostomum* (3.75%) and *Strongyloides* (2.67%). The current investigation provide basis to formulate strategic control measures against GI parasitism.

Keywords: buffalo, gastrointestinal parasite, prevalence, strongyle

INTRODUCTION

World population of buffaloes (*Bubalus bubalis*) is approximately 177.247 million of which 97% (171 million) are found in Asia. India constitutes about 55.7% (98.7 million) of the total world buffalo population (FAO, 2008). Buffaloes are important livestock because of their multifunctional purposes, providing milk,

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meat and good quality hides. They are considered as "tractors" in Southeast Asia in agriculture farms, means of transportation and their dung act as a good fertilizer and fuel (Liu *et al*., 2009). Gastrointestinal parasitism is one of the major constraints of livestock industry, severely affecting the animal productivity, retarded growth and increased susceptibility to other diseases. The economic losses may run into millions of rupees (Shah and Chaudhry, 1995).

But, the problem is neglected due to its chronic and insidious nature (Sanyal, 1998). The prevalence of gastrointestinal parasites and its severity depends on many factors such as local environmental conditions and management practices (Regassa *et al*., 2006). Studies of epidemiological pattern of the parasitic diseases in different agro-climatic zones of the country empower us to develop measures for strategic and tactical control of these diseases. Epidemiology and factors associated with prevalence of gastrointestinal parasites in domesticated animals of the Indian subcontinent is described by Chowdhury and Tada (1994). The incidence of GI parasites in buffaloes has been reported from different states of India (Haque *et al*., 2011; Wadhwa *et al*., 2011; Reddy *et al*., 2012; Singh *et al*., 2012 and Mir *et al*., 2013). A few reports are available on the prevalence of GI parasites in buffalo of Madhya Pradesh and adjoining area (Agarwal *et al*., 2002 and Pal *et al*., 2001). The present communication records such information pertaining to buffaloes of Madhya Pradesh to formulate control strategies against GI parasites.

MATERIALS AND METHODS

The study was carried out in the state of Madhya Pradesh which extend between latitude 21.20^{o}N-26.87^{o}N and longitude 74.02^{o}E-82.49^{o}E and considered as "Heart of India or Central India" and stretches over an area of 3,08,252 sq km. The average rainfall is about 1,370mm and having subtropical climate. The M.P state has been divided in 11 major agro-climatic zones and 50 districts (Figure 1). Present work has been carried out in 7 zones out of the eleven agro-climatic zones.

The study period was April 2011 to March 2012. A total of 3779 faecal samples were collected per rectally or immediately after defication from the selected villages throughout the year at monthly interval. These samples were collected in sterile labeled polythene bags and brought to the Department of Veterinary Parasitology, College of Veterinary Science& Animal Husbandry, Jabalpur. These samples were subjected to flotation and sedimentation technique (Soulsby, 1982). The positive samples were further checked for their intensity by Mc Master technique as described by Thienpont *et al*. (1979). The samples positive for nematodes were examined for the generic composition by glass tumbler method. The infective larvae were collected by Bearmann technique (Anon, 1977), cleaned and segregated by repeated centrifugation and decantation. These were identified as per the keys by Van Wyk *et al.* (2004). Data analysis was done according to Snedecor and Cochron (1980).

RESULTS AND DISCUSSION

Overall prevalence

Out of 3779 buffaloes coprologically examined during the period April 2011 to March 2012, 2103 (55.65%) were positive for different gastrointestinal parasitic infections (Table 1).

The prevalent parasites constituted strongyles, *Strongyloides* sp. and *Trichuris* sp. amongst nematodes and amphistomes, *Schistosoma* sp., *Fasciola* sp., *Moniezia* sp. and coccidian as non nematode GI parasites. Strongyles were the predominant (25.59%) nematodes, followed by *Strongyloides* sp. (3.15%) and *Trichuris* sp. (2.59%). Likewise, Kashyap *et al*. (1997) reported 40.3% prevalence of gastrointestinal helminthiosis in cattle and buffaloes from Madhya Pradesh where strongyle showed highest prevalence. Prevalence of amphistomosis was highest (28.10%) amongst the non-nematode parasites. The prevalence of coccidia, *Schistosoma* sp. and *Fasciola* sp. was 19.00%, 5.19% and 2.30% repectively (Table 1). Our study is in accordance with many workers reporting higher prevalence of strongyle in dairy animals (Haque *et al*., 2011; Singh *et al*., 2012 and Singh *et al*., 2008). The higher range of prevalence of amphistomes in the present study is in agreement with Yadav *et al*., (2004) and Kuchay *et al*., (2011). It may be due to factors such as wallowing habit, easy dispersion of faeces in water and bulk ingestion of grasses near the water source, increases the risk of amphistomosis due to availability of intermediate host (Radostitis *et al*., 1994).

Agro-climatic zone-wise prevalence

Out of the seven zones, Central Narmada Valley, zone IV had the highest prevalence (61.46%) and the Hills of Jhabua zone XI had the lowest prevalence (50.42%) (Table 2, Figure 2) however the difference is non-significant. Prevalence of strongyle was highest in zone I (31.11%) minimum in Zone III (19.67%). Zone II (Northen hills zones of Chhattisgarh) showed the highest prevalence of amphistome (36.46) and coccidian infection (23.54%). Zone VIII (Satpura Plateau) and zone I (chhattisgarh Plains) showed the lowest prevalence of amphistome (18.96%) and coccidia (13.36%) respectively (Table 2).

Age wise prevalence

Faecal samples of 2879 adult buffalo and 900 buffalo calf were examined coprologically. Prevalence of GI parasitism in buffalo calves (59.78%) was non-significantly higher compared to the adult (54.36%) (Table 3). The result of present investigation were in accordance with Haque *et al.* (2011) and Bilal *et al.* (2009) who reported higher prevalence of GI parasites in calves. In our country, calves are more prone to the parasitic infection due to inadequate attention towards management, treatment and disease control measures (Pfukenyi *et al*., 2007). Conversly Biswas *et al*. (2014) reported higher infection in adult. The cause of contradiction may be due to exhausted immune system, different grazing pattern and managemental practices. Adult buffaloes show very low level of prevalence of *Toxocara vitulorum* (0.07%) there is an inverse relationship between prevalence and age of animal (Halmandge *et al.,* 2005). Coccidiosis was significantly higher in calves ($P<0.01$) than adult animals as the later exhibited cellular immunity against coccidiosis as a result of the previous exposure to the oocysts (Soulsby, 1982). Moreover the practice of using coccidiostat or coccidiocidal drug was very less in this region. Our finding was in accordance with Haque *et al*. (2011) and Singh *et al*. (2012). Moneziosis was not seen in adult buffaloes. Prevalence of amphistomosis was insignificantly higher in adult buffaloes.

Season wise prevalence

The prevalence of G.I. parasitic infections in summer, monsoon and winter season was 36.22%, 73.41% and 60.48%, respectively (Table

4). The prevalence of gastrointestinal parasites was significantly higher in Monsoon season (P<0.01). The onset and advancement of monsoon rains have profound effect on incidence and seasonality of gastrointestinal infection (Wadhwa *et al*., 2011). Significant higher infection rate of strongyle and amphistome infection, was seen in rainy season (P<0.01). Same results were seen in the study of Baseshankar and Maske (2000) but results of many scientists vary with the present findings and they have found different seasons for highest prevalence at their working area. Biswas *et al*. (2013) in Bangladesh, Samanta and Santra (2009) in West Bengal and Mir *et al*. (2013) in Jammu reported summer to be the prevalent season for GI parasitic incidence. The environmental condition of these regions was hot and humid with normal rainfall during summer providing favourable conditions for development and survival of pre parasitic stage of the parasites where as during rains there was excessive rainfall declining the pastural growth of pre parasitic larvae. In Madhya Pradesh rainfall occur mainly in monsoon providing suitable environment for the survival and propagation of preparasitic stages of parasite. Coccidiosis was significantly higher in winter season (P<0.01) because of the suitable temperature and humidity required for the oocystic sporulation at this time.

Intensity of strongyle infection

The overall mean EPG (Egg Per Gram) counts in the seven agro-climatic zones studied were and found to be moderate (321.8) (Figure 2). Wadhawa *et al.* (2011) reported high overall mean EPG (684.61). It may be due to the climatic and geographical variation. Highest intensity of strongyle infection was recorded in the month of July (513.1). The month wise intensity of strongyle infection is presented in Figure 4. Highest mean EPG was observed in the rainy season followed by winter and summer. The present finding was supported by the results of Mathur *et al.* (1996) and Waruiru *et al*. (2000) reporting the monsoon season to be the highest intensity showing season. The mean intensity of strongyle infection was highest (362.1) in zone II and lowest in zone III (262.7).

Generic composition of nematode larvae

Coprocultural examination of faeces revealed that *Haemonchus* was the predominant (72.08%) nematode genus, followed by *Trichostrongylus* (11.42%), *Oesophagostomum* (10.08%), *Bunostomum* (3.75%) and *Strongyloides* (2.67%). (Figure 3) This finding is consistent with the findings of earlier workers (Yadav *et al.* 2008) who reported *Haemonchus* to be the most common and pathogenic genus among various gastrointestinal nematodes causing high mortality and morbidity in India. Jamra *et al.* (2014) reported *Haemonchus* to be the most prevalent genera followed by *Trichostrongylus* and *Oesophagostomum*. Climatic and geographic condition of this region supports the propagation and growth of *Haemonchus* larvae.

In order to formulate effective control strategies against parasitic infection in any particular region we have to know the status of infection which can be only possible by the surveys as conducted in the present study. The results give a brief scenario about the prevalent parasites in Madhya Pradesh emphasizing amphistomes and strongyle to be most prevalent GI parasites. Among non-helminth parasites coccidian had the highest prevalence. It is imperative that integrated strategies and measures be taken to control helminth infections in buffaloes in Madhya Pradesh and elsewhere.

Table 1. Overall prevalence (%) of different GI parasitic infections in buffalo of M.P.

No. Examined	Positive (%)	Positive for GI Nematodes				Positive for other GI parasites				
		Strongyle	*Strongyloides*	*Trichuris*	*Toxocara*	*Fasciola*	Amphistome	*Schistosoma*	*Moniezia*	Coccidia
3779	55.65	25.59	3.15	2.59	0.66	2.30	28.10	5.19	0.42	19.00

Table 2. Prevalence (%) of GI parasitism in buffalo in different Agro climatic zones of M.P.

Zone	No. Examined	Positive (%)	Positive for GI Nematodes				Positive for other GI parasites				
			Strongyle	*Strongyloides*	*Trichuris*	*Toxocara*	*Fasciola*	Amphistome	*Schistosoma*	*Moniezia*	Coccidia
I	479	60.13	31.11	3.34	4.18	0.84	1.46	21.50	6.05	1.04	13.36
II	480	58.54	27.50	3.96	3.13	1.04	2.71	36.46	6.04	0.83	23.54
III	900	54.00	19.67	1.56	0.89	0.00	2.22	33.56	4.78	0.00	19.67
IV	480	61.46	26.46	3.33	2.71	1.46	3.96	33.75	6.25	0.63	21.88
V	480	54.38	27.29	3.33	2.71	0.63	2.08	22.08	5.21	0.83	13.75
VIII	480	52.08	26.88	2.71	2.50	1.25	1.04	18.96	4.38	0.00	16.88
XI	480	50.42	25.42	5.21	3.54	0.00	2.71	25.63	3.96	0.00	23.33

Table 3. Age wise prevalence (%) of different GI parasites in buffalo of M.P.

Zone	No Examined	Positive (%)	Positive for GI nematodes				Positive for other GI parasites				
			Strongyle	*Strongyloides*	*Trichuris*	*Toxocara*	*Fasciola*	Amphistome	*Schistosoma*	*Moniezia*	Coccidia
Young	900	59.78	26.44	3.78	3.33	2.56	2.11	26.78	3.89	1.78	24.33
Adult	2879	54.36	25.32	2.95	2.36	0.07	2.36	28.52	5.59	0	17.33
X^2 Value		8.16*	0.45					1.16			36*

(*) P<0.01

Table 4. Seasonal prevalence (%) of GI parasitism in buffalo in M.P.

Season	No. Examined	Positive (%)	Positive for GI Nematodes				Positive for other GI parasites				
			Strongyle	*Strongyloides*	*Trichuris*	*Toxocara*	*Fasciola*	Amphistome	*Schistosoma*	*Moniezia*	Coccidia
Summer	1259	36.22	11.44	1.03	1.91	0.00	1.43	18.98	2.86	0.24	13.82
Monsoon	1260	73.41	40.16	4.84	4.21	1.19	3.02	37.46	7.62	0.79	22.06
Winter	1260	60.48	25.00	3.33	2.14	1.27	1.75	30.48	3.89	0.48	25.00
X^2 Value		35*	23*					17*			5.3*

(*)P<0.01

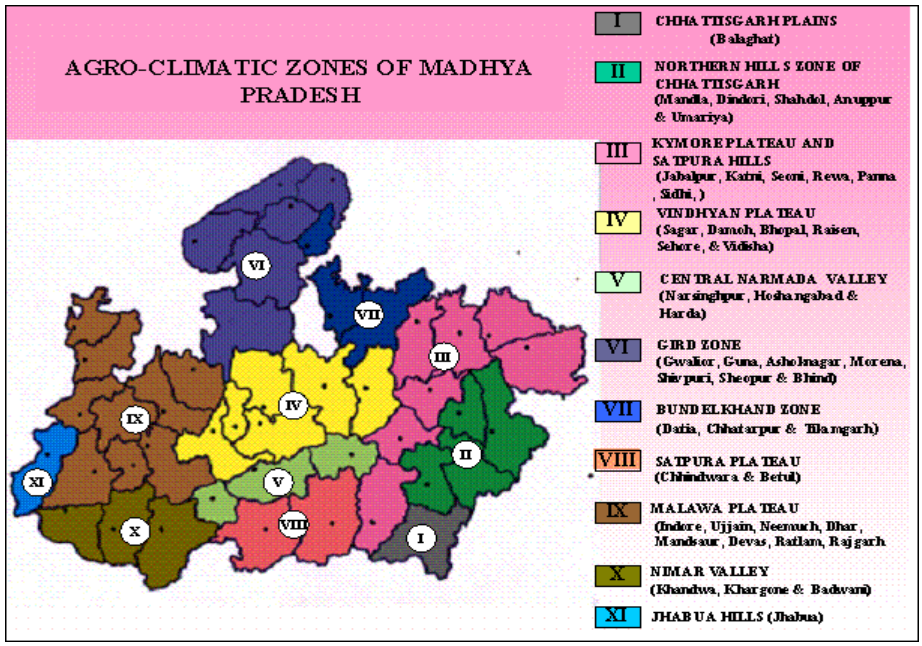

Figure 1. Different Agro climatic zones of M.P.

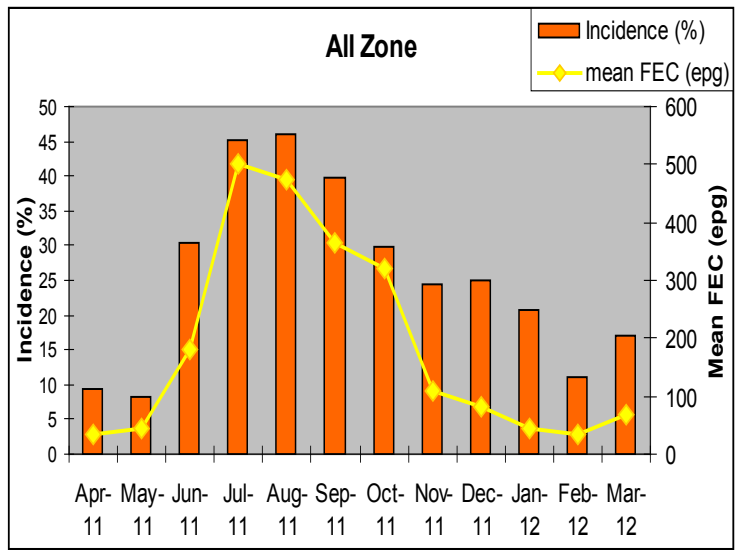

Figure 2. Intensity of strongyle infection in buffalo of M.P.

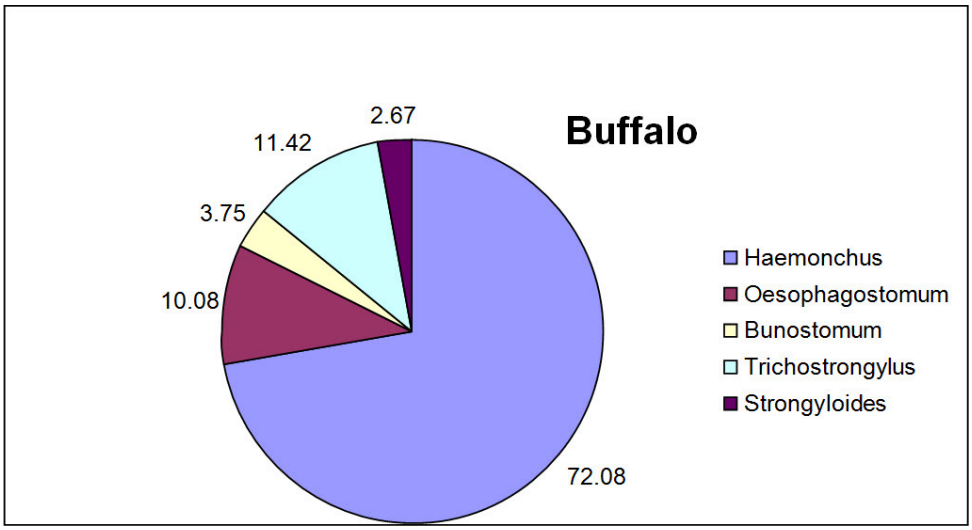

Figure 3. Mean generic composition of nematode larvae in buffalo.

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