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Epidemiological aspects of gastro-intestinal parasites in buffalo in Bhola, Bangladesh

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ABSTRACT

A survey was conducted to investigate the prevalence of parasitic infections of buffalo in Bhola district from September 2011 to August 2012. Out of 497 examined buffaloes 419 (84.90%) were found infected with gastro-intestinal parasites. Thirteen (13) species of gastro-intestinal parasites were identified, of them 4 species were trematodes (*Fasciola gigantica* (25.40%), *Paramphistomum cervi* (41.40%), *Schistosoma indicum* (5.80%), *Schistosoma spindale* (2.40%)); 6 species of nematodes (*Haemonchus contortus* (9.70%), *Toxocara vitulorum* (3.0%), *Trichuris ovis* (3.0%), Strongyles (0.80%), *Strongyloides papillosus* (2.0%), *Capillaria* sp. (0.40%)), 1 species of cestode (*Moniezia expansa* (0.60%)), and 2 species protozoa (*Eimeria zuernii* (7.0%) and *Buxtonella sulcata* (37.40%)). In this study, prevalence of gastro-intestinal parasites in relation to age, sex, seasonal dynamics and nutritional status of the animal were studied. Significantly higher prevalence was observed in summer (84.30%) followed by rainy (83.62%) and winter (81.16%). Females (87.53%) were 1.20 times more susceptible to gastro-intestinal parasitic infection than males (84.37%). In age group, significantly higher prevalence was in adult (88.81%) followed by young (83.45%) and calves (68.05%). In nutritional status group, significantly higher rate of infection was in poor conditioned buffalo (96.61%) than that in medium body conditioned buffalo (75.51%). Egg per gram/cyst per gram/oocyst per gram of feces was also determined and ranged from 100–1,600. The present study has not emphasized on the losses due to parasitic infection. So it is necessary to assess the economic losses due to parasitic infections and to find out effective control strategies against it.

Key words: Bangladesh, Buffalo, Epidemiology, Gastro-intestinal parasites

The world population of buffalo (*Bubalus bubalis*) was estimated at over 172 million (FAO 2004). Parasitism is a major cause hindering the development of livestock population (Jabber and Green 1983). Helminths parasitism, especially, gastrointestinal parasitism is one of the major health problems severely limiting the animal productivity in dairy animals and the significant production losses, which may run into millions of rupees (Shah and Chaudhry 1995). The problem is neglected due to its chronic and insidious nature (Sanyal 1998). The prevalence of gastrointestinal parasites and the severity of infection also vary considerably depending on local environmental conditions, such as humidity, temperature, rainfall, vegetation and management practices (Regassa *et al.* 2006). The diverse agro-climatic conditions, animal husbandry practices and pasture management largely determine 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. Parasitic infection in buffaloes from different regions of Bangladesh has not been studied thoroughly especially offshore region in Bhola district which in future is contemplated as resourceful for buffalo rearing for Bangladesh. Therefore, the aims of the present study were to study the present status of parasitic infection by determining the overall prevalence and also to correlate the effect of age, sex, nutritional status of the buffaloes and seasonal dynamics of the year on the prevalence of gastrointestinal parasites in Bangladesh.

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MATERIALS AND METHODS

The study was conducted from September 2011 to August 2012 in different areas of Bhola district such as Char kukri-mukri, Charpatila, Dhal char, Mujibnagar (Char Motahar), Char kachua, Char Jahiruddin, Majherchar etc. where majority of buffaloes are reared in free range. Buffaloes (497) were selected randomly. The age of the buffaloes was determined by examining the teeth (Samad 2008). After taking all the relevant information according to questionnaire form, the fecal samples were collected directly from the rectum of the animals. Fresh fecal samples were also collected from the ground where the animals defecated. About 20–25 g of feces were collected from each

Table 1. Overall prevalence of gastro-intestinal parasites in buffalo in Bhola district

Name of parasites	No. of animals infected N=497	Percentage (%)	EPG/CPG/OPG	
			Range	Mean ± SE
Strongyloides papillosus	10	2.00	100–400	220.00±38.87
Schistosoma indicum	29	5.80	100–300	141.38±11.66
Trichuris ovis	15	3.00	100–400	140.00±21.38
Strongyles	4	0.80	100–300	150.00±50.00
Buxtonella sulcata	186	37.40	100–1600	351.61±16.14
Eimeria zuernii	35	7.00	100–600	308.57±21.84
Schistosoma spindale	12	2.40	100–300	166.67±18.80
Capillaria sp.	2	0.40	200–200	200.00±0.00
Fasciola gigantic	126	25.40	100–500	178.57±8.92
Moniezia expansa	3	3.00	100–200	113.33±9.09
Toxocara vitulorum	15	3.00	100–200	113.33±9.09
Haemonchus contortus	48	9.70	100–300	152.08±9.41
Paramphistomum cervi	206	41.40	100–1400	238.35±11.77
Subtotal	419*	84.30%	100–1600	141.38±11.66

*, Total no. of animals affected is less than the summation of individual infection because same animal was infected with more than one type of gastro-intestinal parasites; N, total number of samples collected.

Table 2. Age related prevalence of gastro- intestinal parasites in buffalo in Bhola district

Age	Name of parasites	No. of animal infected	Prevalence (%)	EPG/CPG/OPG		
				Range	Mean EPG±SE	Odds ratio
Buffalo calvs (0.5–2) years N=72	*Strongyloides papillosus*	3	4.16	100–400	233.33±88.19	Young vs calf 2.36
	Trichuris ovis	4	5.55	100–200	125.00±25.00	
	Buxtonella sulcata	17	23.61	200–500	305.88±23.44	
	Eimeria zuernii	4	5.55	300–600	425.00±75.00	
	Capillaria sp.	1	1.38	200–200	200.00±0.00	
	Fasciola gigantica	3	4.16	100–100	100.00±0.00	
	Toxocara vitulorum	8	11.11	100–200	112.50±12.50	
	Haemonchus contortus	22	30.55	100–300	163.64±15.49	
	Paramhistomum cervi	14	19.44	100–800	228.57±48.53	
	Subtotal	49	68.05		210.44±36.02	
Young (2–5) years N=139	*Strongyloides papillosus*	4	2.86	100–400	275.00±62.92	Adult vs young 1.57
	Schistosoma indicum	8	5.75	100–200	137.50±18.30	
	Trichuris ovis	10	7.19	100–400	150.00±30.73	
	Strongyles	3	2.15	100–300	166.67±66.67	
	Buxtonella sulcata	32	23.02	100–1200	315.63±42.39	
	Eimeria zuernii	12	8.63	100–500	325.00±41.06	
	Schistosoma spindale	5	3.59	100–300	180.00±37.42	
	Fasciola gigantica	27	19.42	100–500	188.89±20.21	
	Moniezia expansa	1	0.71	100–100	100.00±0.00	
	Toxocara vitulorum	6	4.31	100–200	116.67±16.67	
	Haemonchus contortus	20	1.43	100–300	145.00±13.52	
	Paramphistomum cervi	58	41.72	100–1400	246.55±26.40	
	Subtotal	116	83.45	100–1200	198.27±33.04	
Adult >5 years N=286	*Strongyloides papillosus*	3	1.04	100–200	133.33±33.33	Adult vs calf 3.72
	Schistosoma indicum	21	7.34	100–300	142.86±14.75	
	Trichuris ovis	1	0.34	100–100	100.00±0.00	
	Strongyles	1	0.34	100–100	100.00±0.00	
	Buxtonella sulcata	137	47.90	100–1600	365.69±19.28	
	Eimeria zuernii	19	6.64	100–500	273.68±23.99	
	Schistosoma spindale	7	2.44	100–200	157.14±20.20	
	Capillaria sp.	1	0.34	200–200	200.00±0.00	
	Fasciola gigantica	96	33.56	100–500	178.13±10.17	
	Toxocara vitulorum	1	0.34	100–100	100.00±0.00	
	Haemonchus contortus	6	2.09	100–200	133.33±21.08	
	Paramphistomum cervi	134	46.85	100–1100	235.82±13.21	
	Subtotal	254	88.81	100–1600	193.76±15.42	

Level of significance, 0.0052**; **P<0.05; *N,* total number of samples collected.

buffalo. The parasites eggs were identified according to the morphology and quantitative estimation (Soulsby 1982).

Statistical analysis

Statistical analyses were carried out by using F test. To compare the prevalence of parasites in both sexes, data were analyzed using paired sample t-test (Mostafa 1989). Odd ratio was calculated according to the formula given by Schlesselman (1982).

RESULTS AND DISCUSSION

Overall prevalence of gastro intestinal parasites: In the present study, 84.30% buffaloes were found infected with one or more species of gastro-intestinal parasites. The result is higher than Mamun *et al.* (2011) and Azam *et al*. (2002) who reported that 61.02% and 64.41% buffaloes were positive for gastro-intestional parasites in water buffalo of Kurigram district in Bangladesh and in Pakistan respectively. The variations among the findings might be due to the difference in the selection of animal, techniques of sample collection, period and place of study, environmental factors and breed of the animals etc.

Age related prevalence of gastro-intestinal parasites: Age of the buffaloes had a significant (P<0.05) effect on gastro-intestinal parasitic infection. Adult animals (88.81%) were 1.57 and 3.72 times more susceptible with gastro-intestinal parasitic infection than young animals (83.45%) and calves (68.05%). But it did not support the findings of Mamun *et al.* (2011) and Asif *et al*. (2007) who reported that higher prevalence of helminths infection was found in young animals compared to adults in buffalo. The cause of variation on the basis of age is difficult to explain, but it might be due to exhausted immune system, difference grazing area and management variation of animals.

Sex related prevalence of gastro-intestinal parasites: A significant (P<0.05) relationship of gastro-intestinal parasites was observed in the prevalence of male and female buffaloes. Female (87.53%) were 1.2 times more vulnerable to gastrointestinal parasitic infection than males (84.37%). This finding supported the previous report of Bachal *et al.* (2002) who reported a slightly higher prevalence (48.30%) of helminths in female than in male (45.12%) in buffalo calves. Azhar *et al.* (2002) reported no variation in gastro-intestinal parasitic infection due to sex of host. This disparity among the findings cannot be explained exactly. The higher percentage of infection in the females may be due to the alteration in the physiological condition of the animals during pregnancy and lactation (production activity). Lioyd (1983) reported higher level of prolactin and progesterone hormones make the individual (female) more susceptible

Table 3. Sex related prevalence of gastro-intestinal parasites in buffalo in Bhola district

Parameters	Name of parasites	No. of animal infected	Prevalence (%)	EPG/CPG/OPG		
				Range	Mean EPG±SE	Odds ratio
Male (N=160)	*Strongyloides papillosus*	1	0.62	400–400	400.00±0.00	Female vs male 1.2
	Schistosoma indicum	9	5.62	100–200	133.33±16.67	
	Trichuris ovis	4	2.50	100–400	225.00±62.92	
	Strongyles	2	1.25	100–100	100.00±0.00	
	Buxtonella sulcata	54	33.75	100–1000	327.78±27.65	
	Eimeria zuernii	13	8.12	100–600	323.08±41.07	
	Schistosoma spindale	3	1.87	100–200	133.33±33.33	
	Fasciola gigantica	33	20.62	100–500	193.94±17.91	
	Toxocara vitulorum	1	0.62	100–100	100.00±0.00	
	Haemonchus contortus	11	6.87	100–300	181.82±22.64	
	Paramphistomum cervi	49	30.62	100–1400	244.68±35.18	
	Subtotal	135	84.37	100–1400	214.81±28.60	
Female (N=337)	*Strogyloides* papillosus	1	0.30	100–400	200.00±37.27	
	Schistosoma indicum	9	2.67	100–300	145.00±15.35	
	Trichuris ovis	4	1.18	100–200	109.09±9.09	
	Strongyles	2	0.59	100–300	200.00±100.00	
	Buxtonella sulcata	132	39.16	100–1600	361.36±19.73	
	Eimeria zuernii	13	3.85	100–500	300.00±25.48	
	Schistosoma spindale	3	0.89	100–300	177.78±22.22	
	Capillaria sp.	3	0.89	200–200	200.00±0.00	
	Fasciola gigantica	93	27.59	100–500	173.12±10.27	
	Moniezia expansa	3	3.00	100–200	113.33±9.09	
	Toxocara vitulorum	3	0.89	100–200	114.29±9.71	
	Haemonchus contortus	1	0.30	100–300	143.24±9.91	
	Paramphistomum cervi	157	46.58	100–900	236.48±11.23	
	Subtotal	295	87.53	100–1600	192.31±19.79	

Level of significance, 0.0005;**P<0.05.

Table 4. Seasonal status related prevalence of gastro-intestinal parasites in buffalo in Bhola district

Seasons	Name of parasites	No. of animals affected	Prevalence (%)	EPG/CPG/OPG		
				Range	Mean EPG±SE	Odds ratio
Rainy (N=171)	*Strongyloides papillosus*	6	3.50	100–400	200.00±51.64	Summer vs rainy
	Schistosoma indicum	19	11.11	100–200	136.84±11.37	1.04
	Trichuris ovis	9	5.26	100–400	166.67±33.33	
	Strongyles	1	0.58	100–100	100.00±0.00	
	Buxtonella sulcata	72	42.10	100–1200	390.00±43.77	
	Eimeria zuernii	5	2.92	200–500	340.00±50.99	
	Schistosoma spindale	10	5.84	100–300	160.00±22.11	
	Fasciola gigantica	50	29.23	100–500	180.00±16.90	
	Toxocara vitulorum	8	4.67	100–200	112.50±12.50	
	Haemonchus contortus	16	9.35	100–200	125.00±11.18	
	Paramhistomum cervi	94	54.97	100–1100	238.30±16.85	
	Subtotal	143	83.62	100–1200	195.39±27.07	
Summer (N=172)	*Strongyloides papillosus*	1	0.58	400–400	400.00±0.00	Summer vs
	Schistosoma indicum	5	2.90	100–200	120.00±20.00	Winter 1.24
	Trichuris ovis	5	2.90	100–100	100.00±0.00	
	Strongyles	3	1.74	100–300	166.67±66.67	
	Buxtonella sulcata	68	39.53	100–1600	327.27±31.11	
	Eimeria zuernii	21	12.20	100–600	304.76±30.45	
	Schistosoma spindale	1	0.58	200–200	200.00±0.00	
	Capillaria sp.	2	1.16	200–200	200.00±0.00	
	Fasciola gigantica	43	25.00	100–400	190.70±12.81	
	Moniezia expansa	3	3.00	100–200	113.33±9.09	
	Toxocara vitulorum	5	2.90	100–200	120.00±20.00	
	Haemonchus contortus	15	8.72	100–300	153.33±16.52	
	Paramhistomum cervi	66	38.37	100–1400	260.61±26.17	
	Subtotal	145	84.30	100–1600	203.33±20.34	
Winter (N=154)	*Strongyloides papillosus*	3	1.94	100–300	200.00±57.74	Rainy vs
	Schistosoma indicum	5	3.24	100–300	180.00±48.99	winter 1.18
	Trichuris ovis	1	0.64	100–100	100.00±0.00	
	Buxtonella sulcata	56	36.36	100–1200	356.67±19.55	
	Eimeria zuernii	9	5.84	100–500	300.00±40.82	
	Schistosoma spindale	1	0.64	200–200	200.00±0.00	
	Fasciola gigantic	33	21.42	100–400	160.61±15.04	
	Toxocara vitulorum	2	1.29	100–100	100.00±0.00	
	Haemonchus contortus	17	11.03	100–300	176.47±18.25	
	Paramhistomum cervi	46	29.87	100–400	206.52±12.97	
	Subtotal	125	81.16	100–1200	198.03±26.67	

Level of significance, 0.0075;** P <0.01.

to any infection.

Seasonal prevalence of gastro- intestinal parasites in buffalo: In the present study, seasons of the year had a significant (P <0.01) effect on the prevalence of gastro-intestinal parasites in buffaloes. Prevalence of gastro-intestinal parasites was little higher in summer (84.62%) followed by rainy season (83.62%) and in winter (81.16%). Buffaloes were found 1.04 and 1.24 times more susceptible to gastro-intestinal parasitic infection in summer than in rainy and winter seasons, respectively. In summer and rainy season buffaloes were almost equally (odds ratio 1.04) prone to gastro-intestinal parasitic infection. In Bangladesh, the present findings are slightly higher and contradicted the reports of Mamun *et al.* (2011) who reported the overall highest (71.70%) seasonal prevalence in all water buffalo of Kurigram district during rainy season, followed by summer (58.90%) and winter (57.27%). The contrast in between the present and earlier findings can be explained by the fact of variation in the geographical location of the study area and also the methods used in the study. Moreover, in this study, year was divided into 3 seasons but in other parts of the world there were 4 seasons. So, this difference in the division of seasons had made some over lapping of months and seasons. Therefore, that might have created some contradictions.

Nutritional status related to prevalence of gastro-intestinal parasites in buffalo: Significantly (P<0.05) higher rate of infection was observed in poor condition buffaloes (96.61%) and medium condition buffaloes (75.51%). Poor body conditioned buffaloes were 9.26 times susceptible than

Table 5. Nutritional status related to prevalance of gastro-intestinal parasites in buffalo

Parameters	Name of parasites	No. of animal affected	Prevalence (%)	EPG/CPG/OPG		
				Range	Mean EPG±SE	Odds ratio
Poor (N=207)	*Strongyloides papillosus*	8	3.86	100–400	237.50±46.05	Poor vs medium 9.26
	Schistosoma indicum	26	12.56	100–300	142.31±12.62	
	Trichuris ovis	14	6.76	100–400	135.71±22.50	
	Strongyles	3	1.44	100–300	166.67±66.67	
	Buxtonella sulcata	72	34.78	100–1600	375.00±30.88	
	Eimeria zuernii	8	3.86	100–500	300.00±46.29	
	Schistosoma spindale	11	5.31	100–300	163.64±20.33	
	Capillaria sp.	1	0.48	200–200	200.00±0.00	
	Fasciola gigantica	72	34.78	100–500	169.44±11.81	
	Moniezia expansa	3	3.00	100–200	113.33±9.09	
	Toxocara vitulorum	5	2.41	100–200	120.00±20.00	
	Haemonchus contortus	28	13.52	100–300	150.00±13.11	
	Paramphistomum cervi	110	53.14	100–1400	264.55±18.74	
	Subtotal	200	96.61	100–1600	194.22±25.75	
Medium (N=290)	*Strongyloides papillosus*	2	0.68	100–200	150.00±50.00	
	Schistosoma indicum	3	1.03	100–200	133.33±33.33	
	Trichuris ovis	1	0.34	200–200	200.00±0.00	
	Strongyles	1	0.34	100–100	100.00±0.00	
	Buxtonella sulcata	114	39.31	100–1000	336.84±17.68	
	Eimeria zuernii	27	9.31	100–600	311.11±25.22	
	Schistosoma spindale	1	0.34	200–200	200.00±0.00	
	Capillaria sp.	1	0.34	200–200	200.00±0.00	
	Fasciola gigantica	54	18.62	100–500	190.74±13.55	
	Toxocara vitulorum	10	3.44	100–200	110.00±10.00	
	Haemonchus contortus	20	6.89	100–300	155.00±13.52	
	Paramphistomum cervi	96	33.10	100–900	208.33±12.71	
	Subtotal	219	75.51	100–900	191.28±22.00	

Level of significance, 0.0063; **P<0.05.

medium body conditioned buffaloes. This finding coincides with the findings of Pachauri (1995) and Alim (1997). The present study agreed with the earlier study of Lapage (1962) who found malnourished animals are more susceptible to any infection as they are immunity compromised. It appears that malnutrition in animals increases the susceptibility to parasitic infection.

This is a unique study in Bangladesh, which has determined both prevalence and load of gastro-intestinal parasites of buffaloes in different chars and mainlands in Bhola district. It is concluded that further studies should be conducted to identify the species of parasites and to assess the economic losses due to parasitic diseases of buffaloes and to find out effective control strategies against it.

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