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Ectoparasites of buffaloes (*Bubalus bubalis*) in Kurigram district of Bangladesh

M. A. A. Mamun, N. Begum, H. M. Shahadat and M. M. H. Mondal
Department of Parasitology, Bangladesh Agricultural University, Mymensingh-2202, Bangladesh

Abstract

Epidemiology of ectoparasites of buffaloes was studied in Kurigram district of Bangladesh from November, 2007 to October, 2008. A total of 236 buffaloes were examined, among them 61.86% were found infested with one or more species of ectoparasites. Three species of ectoparasites were identified of which, two species were arachnids, namely, *Boophilus microplus* (13.98%), *Haemaphysalis bispinosa* (11.44%) and one species was insect, namely, *Haematopinus tuberculatus* (51.27%). No mites were detected. Among the ectoparasites, mixed infection was common. In this investigation, prevalence of ectoparasites in relation to age, sex and seasonal dynamics were also studied. Ectoparasitic prevalence was higher ($p<0.01$) in winter season (80.00%) followed by summer (50.68%) and rainy (39.62%) seasons. Significantly ($p<0.01$) higher prevalence of ectoparasites were recorded in female animals (85.71%) than in males (56.70%). In the age groups, buffalo calves aged 0.5-2 years (73.68%) were mostly susceptible ($p<0.01$) to ectoparasites than young aged > 2-5 years (70.73%) and adult animals aged >5 years (58.52%). Overall mean ectoparasitic burden was 2.31±1.31 per square inch of heavily infested area. The highest parasitic burden was recorded in case of *H. tuberculatus* (3.49±2.29) followed by *B. microplus* (1.85±0.94) and *H. bispinosa* (1.59±0.69). It is concluded that, ectoparasites are the common threat to Buffalo rearing in Kurigram district of Bangladesh irrespective of age and sex of the buffaloes and seasons of the year.

Keywords: Ectoparasites, Epidemiology, Buffalo, Kurigram district

Introduction

In Bangladesh, buffaloes play an important role in domestic economy and trade. Both the swamp and river type buffaloes are found in Banglasesh (Latif, 1994). The population of buffaloes (*Bubalus bubalis*) has been estimated to 0.83 million head in Bangladesh (FAO, 2004). Buffalo is considered to be a multipurpose animal and they are extensively used for agricultural land preparation (ploughing and laddering), inter-cultural operation (racking), carting and transportation of goods (mainly agricultural products) in rural areas, threshing and crushing of sugarcane and oil seeds in the country (Rahman and Islam, 1992). The buffalo milk and meat production of the world are 60.33 and 3.08 million metric tones, respectively per year (Bachal *et al*., 2002). In general, the water buffalo is regarded as more productive, healthier and more useful than the cow, especially for the poorest “backyard” farmers in Asia (Bhat, 1999). In comparison to research on cattle, research on water buffaloes has been much neglected (Johan, 2002).

Among many constrains, parasitism is thought to be a major cause that hindering the development of livestock population including buffaloes in Bangladesh (Jabber and Green, 1983). Unlike bacterial and viral diseases, the diseases caused by ectoparasites are of great importance. The losses due to ectoparasites in the form of mortality, lowered general health condition, retarded growth, lower output of work, decrease in the production of milk and meat (Faiz, 1972). Of the ectoparasites, ticks comprise a burning veterinary problem because they transmit diseases, induce paralysis or toxicosis and cause physical damage to bufffaloes (Razput *et al.*, 2005).

The diverse agroclimatic conditions, animal husbandry practices and pasture management largely determine the incidence and severity of various ectoparasitic diseases in a region. Epidemiological pattern of the ectoparasitic diseases in the different agro-climatic zones of the country would provide a basis for evolving strategic and tactical control of these diseases. Therefore, the present study was undertaken to examine the status of ectoparasites in buffaloes in kurigram district of Bangladesh.

Materials and Methods

Area of study

Bangladesh is a country of sub-tropical monsoon climate, located between latitudes 20°34' and 26°38'N and between longitudes 88°01' and 92°41'E. Kurigram District is located in the north-eastern region of Bangladesh along the border of India. Weather of the Kurigram district is different from the middle or southern part of Bangladesh. During summer, temperature is higher and lower in winter than middle or southern part of Bangladesh. The average maximum temperature is about 32-33°C when average minimum temperature is about 10-11°C. Heavy rainfall is usually observed during the rainy season like other parts of Bangladesh and the average annual rainfall is about 3000 mm. Kurigram is one of the least developed district of Bangladesh, where buffaloes are popularly used for the drought purpose because lack of proper roads for transportation.

Ectoparasitological examination

The investigation was carried out during the period from November, 2007 to October, 2008 from different areas (mostly chars and river basins) of Kurigram district. Morphological examination was conducted in the Department of Parasitology, Bangladesh Agricultural University, Mymensingh. Two hundred and thirty six buffaloes were selected randomly. The age of the buffaloes were 6 months and above. During collection of samples the age, sex, breed, place of farming and season of the year were carefully recorded. The selected buffaloes were thoroughly investigated by close inspection for the detection of ectoparasites and clinical manifestations relevant to ectoparasitic infestation.

Ticks and lice were collected from the different parts of the body of the individual buffalo by hand picking. When required, small camel hair brush dipped in ethanol was used for the collection of ticks. The point of attachment was smeared with ethanol. Adequate precautions were taken to preserve the mouth parts and appendages of the ectoparasites during collection. Ticks and lice were preserved in 70% alcohol in clean, well-stopped glass vials and labeled properly.

Presumptive identifications were made while preserved in ethyl alcohol under stereoscopic microscope and final identifications were made under compound microscope. For this, collected arthropods were processed for permanent mounting using methods suggested by Cable (1967). Lice were identified following the methods suggested by Herms and James (1961). Ticks were identified as described by Soulsby (1982).

Statistical analyses

Statistical analyses were carried out by Statistical Package for Social Science (SPSS) using F test. To compare the prevalence of ectoparasites in both sexes, data were analysed by 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 ectoparasits

The research work revealed that the buffaloes were very much susceptible to ectoparasitic infestation. About 61.86% buffaloes were found to be infested with one or more species of ectoparasites, of them prevalence of *H. tuberculatas* was the highest (51.27%) followed by *B. microplus* (13.98%) and *H. bispinosa* (11.44%). Chowdhury (1992) also reported 52.85% prevalence of *H. tuberculatus* in Buffaloes in Bangladesh. On the other hand, Islam (1989), Chowdhury (1992) and Islam *et al.* (1992) reported 8.1%, 7.42% and 11.3% prevalence of *H. bispinosa,* respectively in Buffaloes in the country which also supported the present findings. But the present findings is in contrast with the previous findings of Chowdhury (1992) and Islam *et al.* (2006), who reported 21.71% and 56.3% prevalence of *B. microplus,* respectively in Bangladesh which is much higher than the present findings. During this experiment, no mite was detected but Chowdhury (1992) detected 17.42% and 7.71% prevalence of *Sarcoptes scabei* and *Psoroptes natalensis,* respectively. This difference in the present and previous findings might be due to the variation in the methods of sample collection as no tissue scraping was collected.

Age related prevalence of ectoparasites

It was revealed that age of the host had a significant ($p<0.01$) effect on ectoparasitic infestation. Buffalo calves were comparatively more susceptible (73.68%) than young (70.73%) and adult animals (58.52%). It was observed that, susceptibility decreased with the increase of age. Islam (1989) reported that prevalence of *H. tuberculatus* was highest (65.8%) in the age groups less than 2 years which supported the present findings. During this experiment, it was observed that prevalence of *H. bispinosa* was the highest (17.07%) in the young (> 2 to 5 years). This finding is in agreement with the earlier reports of Islam (1989) who recorded highest (15.4%) prevalence of *H. bispinosa* in the buffaloes aged between 2-4 years. The present finding is in contrast with the earlier reports of Chowdhury (1992) who recorded the higher (60%) prevalence of *H. tuberculatus* in the young (2-4 years) whether highest (8%) prevalence of *H. bispinosa* was found in the calves (< 1 year). Chowdhury (1992) also reported the higher (24%) prevalence of *B. microplus* in the buffaloes aged between 1-2 years which is much higher than the present findings. These variations among the present and previous studies might be due to the variation in the geographical locations of the study area, selection and collection of samples. It is very difficult to explain exactly the frequent occurrence of ectoparasitic infestation in calves, but it may be assumed that the less developed immune system of the calves may be responsible for the higher prevalence of ectoparasitic infestation. On the other hand, buffaloes developed immunity with the increase of age, so susceptibility decreased with the increase of age.

Sex related prevalence of ectoparasites

From this study, it was found that the prevalence of ectoparasites were significantly ($p<0.01$) higher in female buffaloes (85.71%) than male (56.70%). Female buffaloes were 4.58 times more susceptible to ectoparasitic infestations than the male buffaloes. In both the male and female groups, *H. tuberculatus* was the main pest. Although the exact cause of higher prevalence of ectoparasitic infestations in female buffaloes can not be explained but it can be hypothesized that some hormonal influences may be associated with this phenomenon. Lloyd (1983) reported that higher level of prolactin and progesterone hormones make the individual more susceptible to any infection. Moreover, stresses of production, such as, pregnancy and lactation make the female animals more susceptible to infection.

Seasonal dynamics of ectoparasitic infestation in buffaloes

Seasonal fluctuation of the year had a significant ($p<0.01$) effect on the prevalence of ectoparasitic infestations in buffaloes. A relatively higher infestation with ectoparasites was observed in winter (80.00%) followed by summer (50.68%) and rainy season (39.62%). The present finding is supported by the findings of Islam (1989) who reported the higher incidence of *H. tuberculatus* and *H. bispinosa* in winter season. Chowdhury (1992) also recorded the higher incidence of *H. tuberculatus* in winter season. During this study, it was observed that the higher prevalence of *B. microplus* and *H. bispinosa* was observed during winter and summer, respectively, which is in contrast to the findings of Chowdhury (1992) who recorded the higher prevalence of *B. microplus* and *H. bispinosa* in summer and winter, respectively. The contrast in between the present and earlier finding can be explained by the fact of variation in the geographical location of the experimental area, topography and composition of soil type, temperature and humidly. However, the highest prevalence in winter season might be attributed to favourable climatic condition in winter supplemented by little hygienic care like washing, grooming etc.

The observations from the present study may contribute to the increased understanding of the epidemiology of ectoparasites affecting buffaloes in Bangladesh, so that, control strategies can be suggested. However, during this study, only two species of ticks and one species of lice were detected but no mites and flies were recorded. Further studies should be conducted to identify those ectoparasites.

Table 1. Overall prevalence of ectoparasites of buffaloes in Kurigram, Bangladesh

Name of parasites	No. of animals affected (N= 236)	Percentage (%)	Parasitic burden	
			Range	Mean±SD
Haematopinus tuberculatus	121	51.27	1-13	3.49±2.29
Boophilus microplus	33	13.98	1-4	1.85±0.94
Haemaphysalis bispinosa	27	11.44	1-3	1.59±0.69
Total=	**146***	**61.86**	1-13	**2.31±1.31**

N = Total animals examined
* = Total no. of animals affected is less than the summation of individual infestation because same animal was infested by more than one type of ectoparasites

Table 2. Age related prevalence of ectoparasites of buffaloes in Kurigram, Bangladesh

Age of animals	Name of parasites recovered	No. of animals affected	Percentage (%)	Parasitic burden		Odds ratio
				Range	Mean±SD	
Buffalo calves (0.5-2years) n=19	*H. tuberculatus*	13	68.42	1-13	3.48±2.30	Calves vs Young = 1.16
	B. microplus	1	5.26	1-4	1.85±0.94	
	H. bispinosa	3	15.79	1-3	1.59±0.69	
	Subtotal=	**14***	**73.68**	**1-13**	**2.31±1.31**	
Young (> 2-5 years) n=41	*H. tuberculatus*	26	63.41	1-13	3.49±2.30	Young vs Adult = 1.71
	B. microplus	6	14.63	1-4	1.83±0.95	
	H. bispinosa	7	17.07	1-3	1.61±0.67	
	Subtotal=	**29***	**70.73**	**1-13**	**2.33±1.31**	
Adult (>5 years) n=176	*H .tuberculatus*	82	46.59	1-13	3.65±2.36	Calves vs Adult = 1.98
	B. microplus	26	14.77	1-4	1.85±0.97	
	H. bispinosa	17	9.66	1-3	1.41±0.62	
	Subtotal=	**103***	**58.52**	**1-13**	**2.31±1.32**	
P value		P=0.0014**				

n = Total animals examined
* = Total no. of animals affected is less than the summation of individual infestation because same animal was infested by more than one type of ectoparasites
** = Means p<0.01

Table 3. Sex related prevalence of ectoparasites of buffaloes in Kurigram, Bangladesh

Parameters	Name of parasites	No. of animals affected	Percentage (%)	Parasitic burden		Odds ratio
				Range	Mean±SD	
Male n=194	*H. tuberculatus*	90	46.39	1-13	3.37±2.40	Female vs Male = 4.58
	B. microplus	25	12.89	1-4	1.80±0.91	
	H. bispinosa	21	10.82	1-2	1.29±0.47	
	Subtotal=	**110***	**56.70**	**1-13**	**2.15±1.26**	
Female n=42	*H. tuberculatus*	31	73.81	1-8	3.81±1.94	
	B. microplus	8	19.05	1-4	2.00±1.07	
	H. bispinosa	11	26.19	1-3	2.10±0.74	
	Subtotal=	**36***	**85.71**	**1-8**	**2.64±1.25**	
P value		0.0071**				

N = Total animals examined
* = Total no. of animals affected is less than the summation of individual infestation because same animal was infested by more than one type of ectoparasites
** = Means p<0.01

Table 4. Seasonal prevalence of ectoparasites of buffaloes in Kurigram, Bangladesh

Season	Name of parasites	No. of animals affected	Percentage (%)	Parasitic burden		Odds ratio
				Range	Mean±SD	
Rainy N=53	*H. tuberculatus*	15	28.30	1-5	2.87±1.25	Summer vs Rainy = 1.57
	B. microplus	5	9.43	1-2	1.40±0.55	
	H. bispinosa	7	13.21	1-3	1.57±0.79	
	Subtotal=	**21***	**39.62**	**1-5**	**1.95±0.87**	
Summer N=73	*H .tuberculatus*	28	38.36	1-8	3.18±1.83	Winter vs Summer = 3.89
	B. microplus	13	17.81	1-4	2.00±1.00	
	H .bispinosa	6	8.22	1-2	1.25±0.50	
	Subtotal=	**37***	**50.68**	**1-8**	**2.14±1.11**	
Winter n=110	*H .tuberculatus*	78	70.91	1-13	3.71±2.56	Winter vs Rainy =6.09
	B. microplus	15	13.64	1-4	1.87±0.99	
	H. bispinosa	19	17.27	1-3	1.69±0.70	
	Subtotal=	**88***	**80.00**	**1-13**	**2.42±1.42**	
P value		0.0001**				

n = Total animals examined
* = Total no. of animals affected is less than the summation of individual infestation because same animal was infested by more than one type of ectoparasites
** = Means $p<0.01$

Fig. 1. *Haematopinus tuberculatus* showing sternal plate

Fig. 2. *Haematopinus tuberculatus*

Fig. 3. *Boophilus microplus*

Fig. 5. *Haemaphysalis bispinosa*

References

Bachal, B., Sharif, P., Rahamatullah, R. and Aijaz, H.S. 2002. Prevalence of Gastro-intestinal helminths in Buffalo calves. *Journal of Biological Sciences,* 2(1): 43-45.

Bhat, N.P. 1999. *Buffaloes. In*: Payne, W.J.A., Wilson, T.R. eds., An Introduction to Animal Husbandry in the Tropics. Blackwell Science Oxford (Oxfordshire), UK, pp. 815.

Cable, R.M. 1967. *An Illustrated Laboratory Manual of Parasitology*. 4th edition, Burgess Publishing Co. Minneapolis 15, Minnesota, pp. 127-132.

Chowdhury, M.W.H. 1992. External parasites of buffaloes in Mymensingh districts. MS thesis, Submitted to the Department of Parasitology, Faculty of Veterinary Science, Bangladesh Agricultural University, Mymensingh.

Faiz, M.A. 1972. Report on investigation into the epidemiology of parasites Diseases in East Pakistan. *In*: Activities of Research Section of Directorate of Livestock Services, Bangladesh, 1968-1972.

FAO, 2004. Statistics. http://apps.fao.org/faostat/collections.

Herms, W.B. and James, M.T. 1961. *Medical Entomotogy*. 1st edition, The Mac Millan Co., New York.

Islam, F.M.S. 1989. Incidence of parasites of buffaloes in some areas of Bangladesh. MS thesis, Submitted to the Department of Parasitology, Bangladesh Agricultural University, Mymensingh.

Islam, F.M.S.; Rahman, M.H. and Chowdhury, S.M. 1992. Prevalence of Parasites of Water Buffaloes in Bangladesh. *Asian Australasian Journal of Animal Sciences.* 5(4): 601-604.

Islam, M.K.; Alim, M.A ; Tsuji, N. and Mondal, M.M.H. 2006. An investigation into the distribution, host-preference and population density of Ixodid ticks affecting domestic animals in Bangladesh. *Tropical Animal Health and Production.* 38: 485-490.

Jabber, M. and Green, D.A.G. 1983. The status and potential of livestock within the context of Agricultural Development Policy in Bangladesh. The University of Wales. Aberystwyth, United Kingdom. p. 113.

Johan, B. 2002. Tropical Ecology and Environmental Management BI0380, 2001/2002. Project Report: Water Buffaloes-Ecology and Usefulness in Africa. http://www.evp.slu.se/trop_ecology/JohanB_proj.htm.

Latif, M.A. 1994. Buffalo production in Bangladesh: problems and prospects. Proceedings of the 1st Asian Buffalo Association Congress, January 17-21, Khon Kaen, Thailand.

Lloyd, S. 1983. Effect of pregnancy and lactation up on infection. *Veterinary Immunology Immunopathology,* 4: 153-176.

Mostafa, M.G. 1989. *Methods of statistics*, Fourth edition, Karim Press and Publications, Dhaka, pp. 296-298.

Rahman, S.M. and Islam, M.R. 1992. Draught Animal Power in Bangladesh. *Asian Livestock*, 17(2): 15-16.

Razput, Z.I.; Hu, S.H.; Arijo, A.G.; Habib, M. and Khalid, M. 2005. Comparative study of *Anaplasma* parasites in tick carrying buffaloes and cattle. *Journal of Zhejiang University Science.* 6(11): 57-62.

Schlesselman, J.J. 1982. *Case-Control Studies.* 1st edition, Oxford University Press, New York, pp. 174-177.

Soulsby, E.J.L. 1982. *Helminths, Arthropod and Protozoa of Domesticated Animals.* 7th edition, Bailliere Tindal and Cassell Ltd., London, pp. 461-467.