Prevalence of Haemoprotozoan diseases of buffalo of Chattogram division

A clinical report submitted by

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A clinical report prepared in accordance with the authorized style and content.

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Abbreviation	Elaboration
A. Marginale	*Anaplasma marginale*
A. Centrale	*Anaplasma centrale*
B. Bigemina	*Babesia bigemina*
B. bovis	*Babesia bovis,*
B. divergens	*Babesia divergens*
B. major	*Babesia major*
T. annulata	*Theileria annulata*
T. parva	*Theileria parva*

T. mutans	*Theileria mutans*
T. orientalis	*Theileria orientalis*
%	Percentage
>	Greater than
<	Less than
Spp.	Species
GDP	Gross domestic product

Abstract

Haemoprotozoan diseases are a major cause of devastating losses to the livestock industry throughout the world. This study set out to conduct a cross-sectional assessment of the prevalence of hemoprotozoan diseases in the Buffalo of Chattogram district, Bangladesh, during a seven-month period, from May to November 2023. During this investigation, the effects of age, sex, deworming status, BCS, and geographical location on the occurrence of Haemoprotozoa were also noted. Total 100 blood samples were collected purposively from buffaloes of three upazilas (Boalkhali, Kabirhat, and Companigonj) of Chattogram. After collecting the blood samples Giemsa's stained thin blood smear technique was used to evaluate the blood samples. Only Anaplasmosis was found in these tests where overall 16% prevalence was found. In Boalkhali and Kabirhat upazila prevalence of *Anaplasma spp.* was found 17.18% and 16.00%, respectively where no positive sample was found in Companigonj upazila. Moreover, the highest prevalence of Anaplasmosis was found in calf (23.08%) than young (14.00%) and adult (16.22%). In case of sex, males had a greater infection rate (19.35%) than female animals (14.55%). In this study fatty animals (BCS 3) were more infected (18.00%) than others. Here, dewormed buffalo had less infection (14.55%) than non-dewormed buffalo (17.78%). These data found out from this study will give a complete scenario of blood parasite of buffalo of some parts of Chattogram district which will be helpful for the farmers to find out the cause of illness of animals and to take effective preventive measures.

Key Words: Buffalo, Chattogram District, Haemoprotozoa, Giemsa's stain, Prevalence

Chapter 1: Introduction

1.1 Background of the study

In Bangladesh, 70% of the population is employed in agriculture, either directly or indirectly. A substantial portion of agriculture which accounts for 1.47% of GDP is livestock. Bangladesh has 145 large ruminants per square kilometer, one of the highest livestock population densities in the world (Amin et al., 2015).

In Bangladesh, parasitic infections, such as blood parasites transmitted by ticks, are thought to be a significant hindrance to the well-being and productivity of buffaloes and cattle. The common hemoprotozoa that might harm buffaloes include *Anaplasma*, *Babesia*, and *Theileria*. The two most significant species are *Anaplasma marginale* and *Anaplasma centrale*. (Rajput et al.,2005). Bangladesh's hot, humid environment is ideal for arthropod development, multiplication, and survival which are vectors for a variety of blood-borne protozoan diseases.

Chattogram division's geography was highly varied. The area is made up of plane, coastal, semi-hilly, and hilly areas. In addition, Chattogram is one of the Bangladesh's most significant dairy belts, with a notable expansion of the dairy industry. However, previous research on hemoprotozoan infections was less concentrated in the Chattogram region, particularly in the coastal and hilly areas. Conversely, the climate and topography of the regions may encourage growth and multiplication of different vectors. In order to ascertain the prevalence of hemoprotozoan diseases in buffaloes, the current study was conducted, taking into account the buffaloes' age, sex, deworming status, BCS, and three distinct sites within the Chattogram division (Boalkhali, Kabirhat, and Companigonj).

The results of this study will provide a general understanding of the distribution of hemoprotozoan diseases in the area, helping physicians to identify these conditions and alerting farmers to the need of taking necessary precautions against tick vectors.

1.2 Objectives

Given all of these facts, the following goals guided the current study's conduct:

➢ To assess the prevalence of hemoprotozoal infection at Chattogram division.

- ➢ To determine the various risk factors connected to hemoprotozoal infections

Chapter 2: Materials and methods

2.1 Study area and study period

The study was conducted for a seven-month period, from May to November 2023, in the Boalkhali, Kabirhat, Companigonj upazila of Chattogram division.

2.2 Sample size

Total 100 blood samples of buffalo were collected from the intensive farms of Boalkhali, Kabirhat, Companigonj of Chattogram division.

2.3 Study design

A pre-made questionnaire was used to record the following information: nutritional status, presence of ticks or other arthropods, deworming history, age, breed, sex, farm size, farm type, disease status and management practices of the animals. The buffalos were split into three age groups (calf, young, and adult) in order to determine the effect of age. The calf was the most infectious age.

2.4 Examination of animals and sample collection

The examination of the animal was focused on a few characteristics, including rectal temperature, visible mucous membrane, body conformation score, lymph node palpation, tick presence, and urine color. Each animal's ear vein was punctured with a sterile needle to obtain blood smears. The blood on the slides was touched, and then another slide distributed the blood. After air drying, the slides were fixed for two minutes with 100% methyl alcohol.

Figure 1: Farm visiting for sample collection

Figure 2: Collected blood sample

2.5 Microscopic examination of blood samples

Giemsa's stain was applied to the prepared thin smears and left for 25 to 30 minutes. The dried blood smears were rinsed with water, allowed to air dry, and then viewed under a microscope (100X) using immersion oil to identify blood parasites, as per Soulsby's (1982) description.
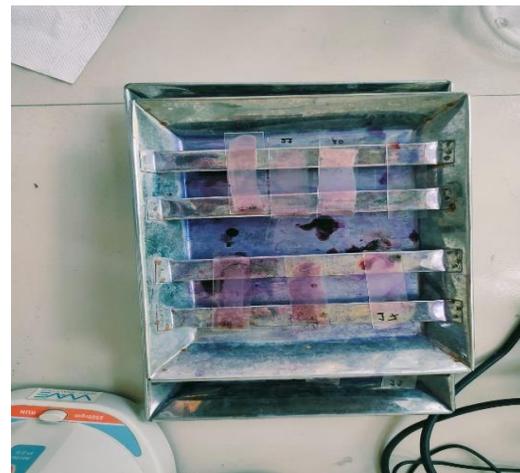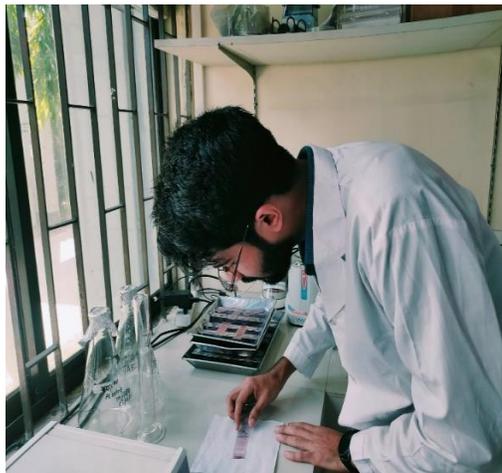
Figure 3: Blood smears preparation technique

2.6 Statistical analyses

The collected data were organized, processed, and input into a Microsoft Excel spreadsheet for further study. For the Chi-Square test, the data were exported to STATA 13 (STATA Corporation College Station, Texas). At the 5% level, the result was considered as significant (p-Value = 0.05).

2.7 Ethical consideration

The survey was conducted with ethical considerations in mind, and after being made aware of its purpose, each respondent orally gave their consent.

Chapter 3: Results

Overall prevalence of haemoprotozoan parasite in buffalo along with its association with risk factors

After testing 100 buffalo samples, the total prevalence of *Anaplasma sp*. found 16% in this study. Boalkhali had the highest infection rate (17.78%), while Kabirhat and Companigonj had the lowest rates (16% & 0%). The infection rate for calves was the highest (23.08%) than for young (14%) and adults (16.22%). The prevalence of male and female affected buffaloes in the group was 19.35% and 14.49%, respectively. According to BCS, the highest infection rates among the buffaloes were 0% of <2 BCS, 14,29% of 2-3 BCS, and 18.00% of >3 BCS. Animals that had not been dewormed showed higher infection rates (17.78%) compared to non-dewormed buffaloes. Dewormed buffaloes were less prone to infection (14.55%) (Table 1).

Table-1: Prevalence of Anaplasmosis in Buffalo along with associated risk factors

Traits		Anaplasmosis		Percentage
		Frequency		
Overall prevalence (N=100)		16		16%
Traits	**Categories**	**Frequency**	**percentage**	**p- Value**
Age	Calf (N=13)	3	23.08%	0.728
	Young(N=50)	7	14.00%	
	Adult (N=31)	6	16.22%	
Sex	Male (N=31)	6	19.35%	0.540
	Female (N=69)	10	14.49%	
Deworming status	Dewormed(N=55)	8	14.55%	0.661
	Not dewormed (N=45%)	8	17.78%	
Location	Boalkhali (N= 45)	8	17.78%	0.589
	Kabirhat (N=50)	8	16.00%	
	Companigonj (N=5)	0	0%	
BCS	<2	0	0%	0.800
	2-3	7	14.29%	
	>3	9	18.00%	
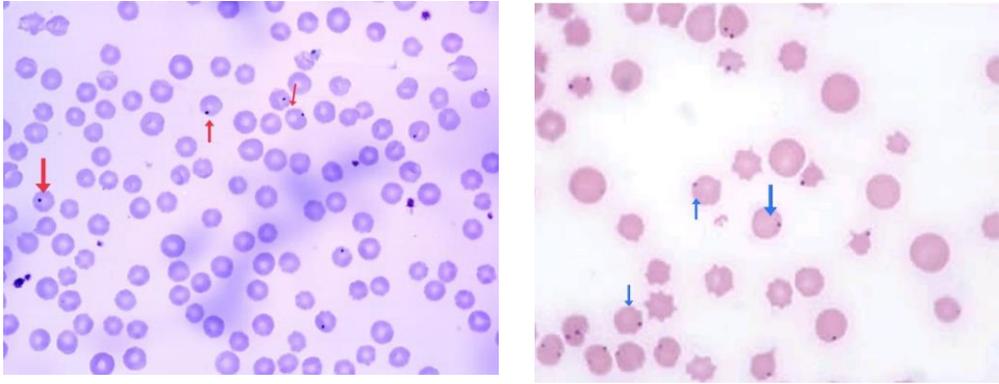
Figure 4*: Anaplasma marginale* **in blood smear**

Chapter 4: Discussion

4.1 Overall prevalence of haemoprotozoan parasite in buffalo

The overall prevalence of hemoprotozoan diseases in our study was 16%, which contradicted with the reports of Kamani et al., (2010) in Nigeria (25.9%) and Ananda et al., (2009) in Bangalore, North India (43.18%). These differences observed in the prevalence might be due to the difference in geographical locations of the studies, time periods, and various methods of sample analysis.

4.2 Sex related prevalence of haemoprotozoan parasite in buffalo

In current study higher prevalence of Anaplasmosis was observed in male cattle (19.35%) compared to female cattle (14.49%). The findings of our study are not similar with the findings of Rahman et al., (2022) who also reported higher prevalence of anaplasmosis in female animal (2.59%) than male animal (1.60%). This partial contradiction could be happened because of the limited sample size, fluctuation of the temperature and humidity of the areas or hygienic conditions of the farms.

4.3 Age related prevalence of haemoprotozoan parasite in buffalo

In our present study calves had the highest prevalence of Anaplasmosis (23.08%)%) followed by young (14.00%), and adult (16.22%). In similar works on anaplasmosis implemented in Uganda by Byaruhanga et al., (2018), higher prevalence was found in calves (34.19%) followed by young (20.51%), and adult (14.11%). Observation of this study was not supported by the findings of Kamani et al., (2010) who observed higher prevalence in adult than young animal. Prevalence of anaplasmosis in this study was not supported the reports of Chowdhury et al., (1970) who observed comparatively higher prevalence in adult than calves. This contradiction could be happened because of breed, immunity in the body, management practices of the animals, farm size and season.

4.4 Deworming related prevalence of haemoprotozoan parasite in buffalo

Animals that had not been dewormed showed higher infection rates compared to non-dewormed buffaloes. Dewormed buffaloes were less prone to infection. This data corroborates that of Bashar

et al., (2020), who also noted that the condition's occurrence increases when anthelmintic therapy was stopped. This could be the case because the immunity and ability to tolerate illness of non-dewormed animals is lower than that of dewormed animals.

Chapter 5: Conclusion

The present state of buffalo hemoprotozoan parasites in Boalkhali, Kabirhat, and Companiganj of Chattogram division was demonstrated by this study. Compared to Companiganj, the infection rates were higher in Boalkhali and Kabirhat areas. This study also showed that hemoprotozoan diseases were more common in males than in females. In addition, calves were more susceptible to infection than young animals and adults. Furthermore, an animal's deworming status was a major risk factor since dewormed animals were demonstrated to be less prone to infection than non-dewormed animals.

An overview of the current state of hemoprotozoan parasites in these areas of Chattogram is given to us by this study. With the information gathered from this study, an appropriate prophylactic and curative strategy against hemoprotozoan infection can be developed.

Limitations of the study

- Too little time was spent studying to get the job done well.
- Farmers were neither amiable or cooperative. They frequently refused to cooperate so that the blood samples from their animals could be taken. In several instances, the wrong individual engaged in the animal's upbringing was interviewed.

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Biography

As the son of Md. Shahab Uddin Sarkar and Sabina Akhter, I am A. K. M. Ashraful Islam. I completed the exams for the Secondary School Certificate (SSC) at Ahammad Uddin Shah Shishu Niketon School & College in Gaibandha in 2014 and the Higher Secondary Certificate (HSC) at Gaibandha Govt. College in 2016. Currently I am an Intern Student under the Faculty of Veterinary Medicine in Chattogram Veterinary and Animal Sciences University (CVASU). In future I would like to work as a veterinary practitioner and do research on clinical animal diseases in Bangladesh.