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Prevalence of Haemoprotozoan Disease in Cattle in Rainy Season

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A B S T R A C T

Prevalence of haemoprotozoan disease in cattle during rainy season was studied by examining 803 blood smears of suspected cases, received on the reference of field veterinarians from July 2016 to November 2016. Mostly the cases were with general clinical symptoms of pyrexia, anorexia, anaemia, pale conjunctiva membrane, corneal opacity, swollen lymph node, haemoglobinurea, nasal discharge and coughing, circling movement, grinding of teeth, reduced milk yield and abortion. Out of which, 598(74.47%) cases were found positive for haemoprotozoan disease by using Giemsa staining technique. Among different haemoprotozoan diseases, the highest prevalence of theileriosis (42.59%) was recorded followed by anaplasmosis (7.97%), trypanosomosis (1.62%) and babesiosis (1%). However, 21.29% of the cases were found positive for mixed infection. Most of the cases of mixed infection were observed concomitant infection of theileriosis and anaplasmosis. Such type of cases was found more severe than the cases with single infection.

Introduction

Haemoprotozoan disease especially theileriosis, babesiosis, trypanosomosis and anaplasmosis are considered some of the major impediments in livestock production. It cause devastating losses to the livestock industry and so poses major constraints to the dairy industry throughout the world. They cause significant morbidity and mortality in cattle and buffaloes.

These are vector borne disease of tropical and subtropical parts of the world including India (Salih *et al.*, 2015). The hot and humid climate is favourable for the development and survival of potential vectors and acts as a constant source of infection to susceptible animals (Maharana *et al.*, 2016). Most of the haemoprotozoan parasites are tick borne and is of great economic importance in Asia and has always been a formidable barrier to the survival of exotic and crossbred cattle in India (Ananda *et al.*, 2009). Ticks are voracious blood sucking obligate ectoparasites of cattle (Bishop *et al.*, 2004). The worldwide losses due to diseases transmitted by ticks and the costs of tick control have been estimated to be in the range of several billion (10^9) US dollars annually (McCosker, 1979; FAO, 1984; Jongejan and Uilenberg, 1994). In absence of appropriate control strategies, the haemoprotozoan diseases have serious economic impact in view of mortality, reduced milk yield and lowered animal draft power which presents a major constraint to bovine production and thus hindering agricultural and socio-economic development of vast area in India (Suryanarayana, 1990; Vahora *et al.*, 2012; Meenakshisundaram *et al.*, 2014). Devendra (1995) reported the annual loss of US $800 Million due to tropical theileriosis.

Previously the disease has been reported from different parts of India by various workers in several years, Karnataka (Murlidharan *et al.*, 2005; Ananda *et al.*, 2014), Odisha (Acharya *et al.*, 2016; Singh *et al.*, 2017; Acharya *et al.*, 2017), Punjab (Shahanawaz *et al.*, 2011; Kumar *et al.*, 2015; Sharma *et al.*, 2015a), Hariyana (Chaudhri *et al.*, 2013), Gujarat (Vahora *et al.*, 2012; Maharana *et al.*, 2016), North Bangalore (Ananda *et al.*, 2009) and Tamil Nadu (Arun kumar *et al.*, 2013; Velusamy *et al.*, 2014). The impact of diseases caused by these parasites on health and productivity of farm animals and human beings is huge, though a fair economic assessment on the quantum of incidental economic loss is yet to be worked out from India (Maharana *et al.*, 2016). With early diagnosis and effective treatment, the mortality rate can be reduced. Tentative diagnosis in field is mainly based on clinical signs and tick infestation on the infected animals. However confirmatory diagnosis based on microscopic examination of Giemsa stained thin blood smears.

The aim of present study was to estimate the prevalence of haemoprotozoan disease in cattle during rainy season.

Materials and Methods

Study area

Bihar is located in eastern region of India between latitude 24°-20'-10"N ~ 27°-31'-15"N and longitude 83°-19'-50"E ~ 88°-17'-40"E and is an entirely land-locked state, in a subtropical region of the temperate zone. Bihar’s land has an average elevation of 173 feet above sea level. Patna city in Bihar is situated on the Southern banks of Holy River Ganga at an altitude of 53m above sea level. The study was conducted in and around Patna, Bihar, India.

Climate of Bihar

In Bihar rainy season commences soon after mid June and continue till the end of September. The commencement of monsoon may be as early as the last week of May or as the first or second week of July. The beginning of this season occurs when a storm from the Bay of Bengal passes over Bihar. July and August are the rainiest months in Bihar. However, September- November months retreated as monsoon season due to the invasion of tropical cyclones originating in the Bay of Bengal at about 12° N latitude. The climate of Patna is humid and subtropical. The climate of tropical and subtropical regions favours incidence, growth and multiplication of ticks predisposing the animals to parasitic ailments and consequently declining dairy production (Sajid, 2007; Khan *et al.*, 2017).

Study period

The data recorded in parasitology section of Institute of Animal Health and Production, Bihar, Patna during rainy season from July 2016 to November 2016 were compiled and analysed for prevalence of haemoprotozoan diseases.

Sample collection

A total of 803 blood samples suspected for haemoprotozoan disease were received at parasitology section of Institute of Animal Health and Production, Bihar, Patna in rainy season. Generally samples were referred by field veterinarians. Samples were received in EDTA vial for haemoprotozoan disease diagnosis. Details of cases like age, sex, breed, season and clinical symptoms were recorded. Mostly the blood samples were from female animals of all age group. Most of the cases were with general clinical symptoms of pyrexia, anorexia, anaemia, pale conjunctiva membrane, corneal opacity, swollen lymph node, haemoglobinurea, nasal discharge and coughing, circling movement, grinding of teeth, reduced milk yield and abortion.

Smear preparation

Thin blood smears were prepared, air dried, fixed with methanol, stained with Giemsa stain and examined under the oil immersion lens (100X) of microscope (Zafar *et al.,* 2006, Qayyum *et al.,* 2010). Giemsa staining technique is the traditional method that involves microscopic examination of piroplasm in blood smear as well as in lymph node smears and is differentiated from other parasites by morphological properties (Aktas *et al.,* 2006; Gul *et al.,* 2015). This method is frequently used for detection of parasites as it is comparatively inexpensive.

Microscopic examination

The stained smears were examined under oil immersion lens (100X). The parasites were identified (Fig. 1) according to the morphological characters described by Soulsby (1982). Blood smears were examined carefully and even the presence of few piroplasms was considered positive for haemoprotozoan diseases. However, expertise in microscopic detection of piroplasm is required in subclinical or chronic infection because parasitemia is often extremely low and may otherwise miss (Maharana *et al.,* 2016). Low parasitemia recorded in positive cases indicated the chronic form of diseases. Wet drop method was also used for screening of *Trypanosoma spp.*

Results and Discussion

By using Giemsa staining technique, a total of 803 suspected cases of haemoprotozoan disease were screened during rainy season from July 2016 to November 2016. Out of which, the overall prevalence of the disease was 74.47% (598) in the study area (Table 1). It was higher than the incidence reported by Chaudhri *et al*.(2013), Velusamy *et al.*(2014), and Maharana *et al.,* (2016), who estimated over all prevalence of 11.1%, 17.68% and 46.55% respectively in rainy season. These variations are might be due to different geographical distribution. However, variation in geo-climatic condition, breed, exposure of vectors and age of the animals might contribute to variable prevalence of haemoprotozoan diseases in the study areas (Muhanguzi *et al.,* 2010).

Among different haemoprotozoan diseases, the prevalence of theileriosis was highest (42.59%) followed by anaplasmosis (7.97%), trypanosomiosis (1.62%) and babesiosis (1%) (Table 1). Our observations was in agreement with the result of Velusamy *et al*.(2014) and Bhatnagar *et al*.(2015), who reported higher prevalence of bovine theileriosis followed by anaplasmosis and babesiosis in cattle. However, Maharana *et al.,* (2016) reported highest prevalence of babesiosis followed by theileriosis, anaplasmosis and trypanosomosis.

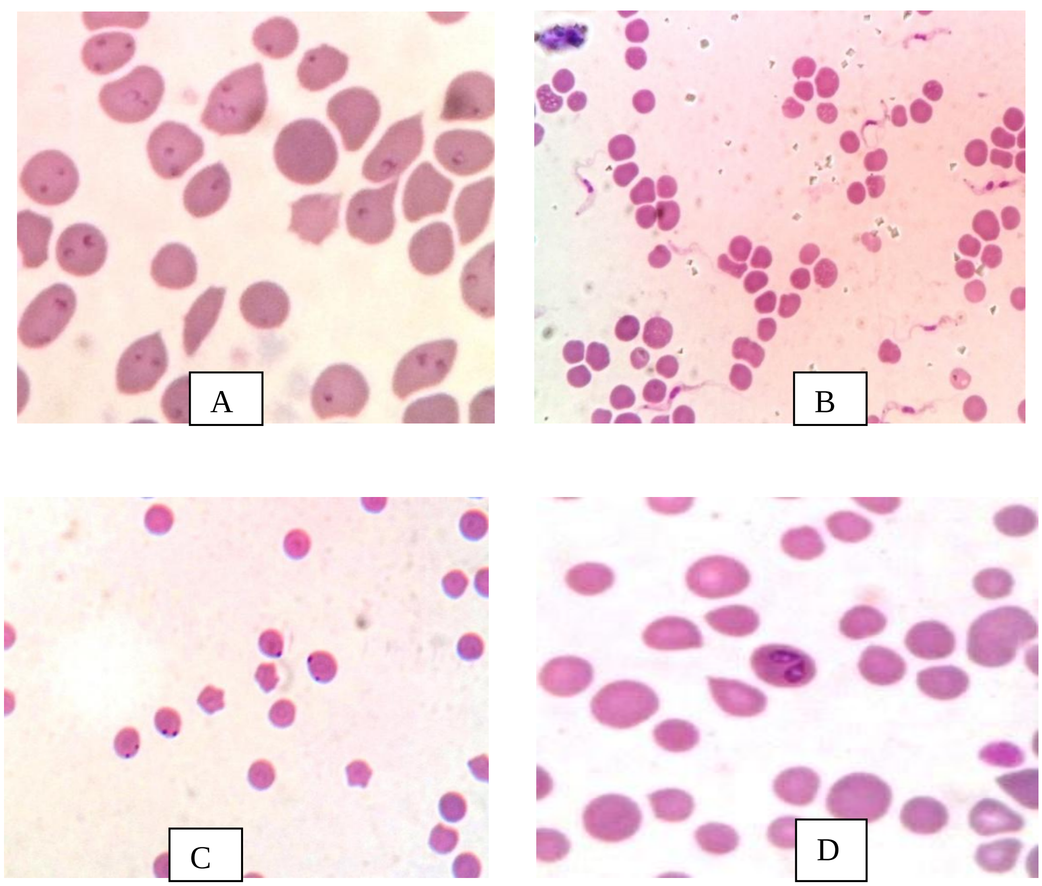
The lower prevalence of babesiosis is might be due to lower occurrence of vector *Rhipicephalus microplus* or might be due to easily diagnose by field veterinarians on the basis of their peculiar symptoms of haemoglobinurea unlike other haemoprotozoan disease and not presented to our laboratory. The prevalence depends largely on the distribution and density of the reservoir hosts, season, and vectors (Singh *et al.,* 2000; Ogden *et al.,* 2002).

Table.1 Month wise prevalence of haemoprotozoan disease in cattle in rainy season from July 2016 to November 2016

Month	The.	Bab.	Try.	Ana.	Mixed Infection	Total No. of positive cases	Total No. of cases	% of positive cases
July	57	3	4	13	48	125	163	76.69
August	70	1	2	15	62	150	193	77.72
September	71	1	3	22	47	144	175	82.28
October	81	2	4	9	11	107	171	62.57
November	63	1	0	5	3	72	101	71.29
Total	342	8	13	64	171	598	803	74.47
%	42.59	1	1.62	7.97	21.29	74.47	-	-

The. - Theileriosis, Bab. - Babesiosis, Try. - Trypanosomosis, Ana. -Anaplasmosis

Fig.1 Showing A. *Theileria spp*. B. *Trypanosoma spp*. C. *Anaplasma spp*. D. *Babesia spp*. in 100X



The presence of mixed infections was also observed in 21.29% of the cases. The observation of mixed infection was in support of previous finding of Vahora *et al.*, (2012), who found 2.73% mixed infections in crossbred cattle during study period. Generally, the cases of mixed infections include theileriosis and analasmosis. Such type of cases was found more severe than the cases with single infection. Sometimes death may observed which might be due to the endogenous pyrogens liberated by *Theileria spp*. and *Anaplasma spp*. causing destruction of erythrocytes and triggering various haemopoietic and thermoregulatory centres of the body.

On the basis of blood smear examination it was concluded, the prevalence of overall haemoprotozoan disease during rainy season was 74.47% and imposes major constraints in livestock health and production. Therefore keeping in view of controlling prevalence and incidence of the disease, appropriate control strategies should be adopted and also need to diagnose carrier state by molecular diagnostic technique.

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