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## Studies on the prevalence of clinical resistant *Babesia* and *Theileria* organisms in murrah buffaloes

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### Abstract

Studies on the prevalence of hemoprotozoan parasites in Murrah buffaloes under natural conditions were carried out in order to know the epidemiological status of blood parasites in this area. The Murrah buffaloes were chosen randomly and confirmed for their disease free status for inter-current infections and for their milk yield. On this basis a total number of 22 buffaloes aged between 3-5 years from 4 villages in and around Jaipur were included in this study. The buffaloes were subjected to blood smear examination and hemoto-biochemical studies which revealed the presence of *Babesia bigemina* and *Theileria annulata* organisms in 14 buffaloes out of 22, with normal biochemical parameters, which indicated the prevalence of clinical resistant *Babesia bigemina* and *Theileria annulata* organisms in Murrah buffaloes in this area. On epidemiological point of view, the prevalence of clinical resistant *Babesia bigemina* and *Theileria annulata* organisms are likely to be a risk factor, posed for development of *Babesia bigemina* and *Theileria annulata* infections in this buffaloes.

**Keywords:** Murrah Buffaloes-Natural infections-hemato-biochemical studies

### Introduction

Worldwide vector borne hemo-protozoans are numerous, which represents serious problem for both animal production and human health (Rosenberg *et al.* 2018) [19]. Wool house (2001) [23] reported that these hemopathogens are highly dependent on vector activities, preferential hosts and virulence of the pathogen. The development of emerging and re-emerging diseases were mainly due to changes in earth's temperature and low level of water resources. Over and above interactions between pathogens and endosymbionts. *i.e.* arthropod vectors and hosts may create new vector potency, virulent pathogens and dominant animal hosts. (Walther *et al.* 2002; Moutailler *et al.* 2016) [21, 14]. Animals are hosts or reservoirs for many pathogens and they are responsible for economic losses. Prevalence of *Babesia bigemina*, *Theileria annulata*, *Anaplasma marginale* and *central* are the major tick borne diseases reported in India. (Ananda *et al.* 2009; Vohora *et al.* 2012) [4, 20]. Ramadevi *et al.* (2017) [18] reported the prevalence of *B. bigemina* in West Godavari district, Andhra Pradesh, India. Bhatnagar *et al.* (2015) [6] reported 42.28% Theileriosis, 42.07% Anaplasmosis and 15.65% Babesiosis in Southern Rajasthan, India. Memon *et al.* (2016) [12] reported the prevalence of *Theileria annulata* in buffaloes at Hyderabad, Pakistan at 70% level. Eman Sayed Mohammed and Elshahawy (2018) [7] reported the loss of productivity due to *Babesia* and *Theileria* Sp infection in cattle population in Egypt. *Babesia* and *Theileria* Sp.infections are transmitted by ticks and are observed to be devastating parasites affecting the production of livestock, mainly cattle. These infection are worldwide in occurrences and are characterized by anemia, icterus, hemoglobinuria, and death. Odedara *et al.* (2021) [16] reported that the hematological and biochemical parameters provide more information about the status of infection. Rahman *et al.* (2015) [17] emphasized the need for epidemiological data on hemoprotozoan parasites in order to formulate and to implement preventive measures. The infection of these parasites create high economic impact in several parts of the world including tropical and temperate countries. Hematological and biochemical parameters provided useful information about the velocity of the infection and its diagnosis; identifying such buffaloes to start an early treatment intervention before the infections becoming severe and causing untoward morbidity and mortality losses in these animals (Julie *et al.* (2021) [10].

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The study of identifying the organisms in subclinical status for blood parasites by hemogram and biochemical tests would help to analyze the health status of the animals and to estimate the level of risk posed by these *Babesia* and *Theileria* parasites. Hence an attempt was made by this study to know the prevalence of *Babesia* and *Theileria* Sp. infection in Murrah buffalo population under natural conditions in and around Jaipur on epidemiological point of view.

## Materials and Methods

### Selection of Murrah buffaloes

Murrah buffaloes, 22 in numbers, under normal health status in the age group of 3-5 years were selected from 4 different villages after ascertaining the absence of inter current infections. All the animals were vaccinated for B.Q, H.S & FMD and absence of tick infestations ascertained by clinical examination of the buffaloes. The clinical signs of these buffaloes were recorded.

### Laboratory examination for hemogram and biochemical reactions.

Blood smear examinations of all the 22 buffaloes were carried out using Giemsa staining. After confirmation of Babesiosis and *Theileria* blood parasites in 14 buffaloes, hemato-biochemical tests carried out in these buffaloes.

## Results

Blood smear examination of these normal 14 Murrah buffaloes revealed *Babesia* and *Theileria* Sp infection out of 22 Murrah buffaloes (Fig 1&2). The hemogram and biochemical tests carried out in these 14 Murrah buffaloes did not reveal any hemato-biochemical parameter changes. (Table 1 & 2).

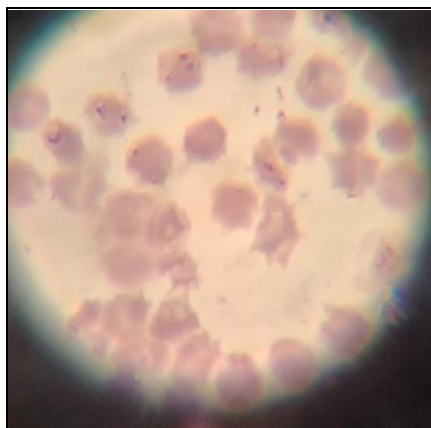


Fig 1: *Babesia* Sp.

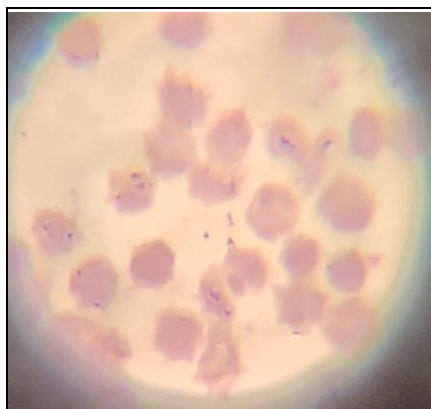


Fig 2: *Theileria* Sp.

Table 1: HEMOGRAM

Haemogram	Mean value	Normal value
Haemoglobin (g/dl)	12.15	10.1-16.1
TLC (thou/mm <sup>3</sup> )	7850	5.6-12.1
Neutrophils (%)	67.5	52-70
Lymphocytes (%)	25	21.0-42.0
Eosinophils (%)	4.5	2-7.0
Basophils (%)	00	0-2.0
Monocytes (%)	03	3-6.0
Haematocrit (%)	34.35	27.63
TRBC (million/mm <sup>3</sup> )	5.60	6.0-10.4
MCV (fl)	59.15	37-59
MCH (pg)	15.7	13.7-18.2
MCHC (g/dl)	37.0	35.3-39.3
Platelets count (thou/mm <sup>3</sup> )	223000	117-256

Table 2: Biochemical Studies

Liver function test	Mean value	Normal value
Bilirubin total (mg/dl)	0.34	0.1-6.2
Bilirubin direct (mg/dl)	0.11	0.1-0.4
Bilirubin indirect (mg/dl)	0.23	0-0.3
SGOT (U/L)	165.00	160-412
SGPT (U/L)	39.57	2.7-21
Alkaline phosphatase (IU/L)	145.15	70-227
Total protein (g/dl)	5.99	5.6-7.6
Albumin (g/dl)	2.91	2.6-4.1
Globulin (g/dl)1	2.86	2.6-4.0
A/G ratio	0.86	

Renal profile test	Mean value	Normal value
Serum BUN (mg/dl)	16.94	11-27
Serum creatinine (mg/dl)	0.92	0.4-2.2
Serum uric acid (mg/dl)	0.13	0.1-0.6
Sodium (mmol/L)	131.5	128-142
Potassium (mmol/L)	3.40	2.9-4.6
Chloride (mmol/L)	106.5	96-109
S. Phosphorus (mg/dl)	2.55	1.5-4.7

## Discussion

In domestic animals, the clinical signs depends on the infecting species and susceptibility of the hosts. Signs generally include anemia, as well as fever, anorexia, and depression. Apurba Debbarna *et al.* (2017) [3] reported 5.8% of the cattle population in West Bengal infected by mixed infection with *Theileria*, *Babesia* and *Anaplasma* Sp with altered hemogram and biochemical parameters. Ahmed Elsify *et al.* (2015) reported 2% prevalence rate of mixed infection of *B. bovis* and *T. orientalis* in buffaloes in Egypt. WHA (2024) reported the prevalence of non-pathogenic *Babesia* and *Theileria* in wildlife species and development of clinical stages in the immunosuppressed hosts. Mghirbi *et al.* (2008) [13] reported positive cases of *Theileria* in healthy buffaloes without clinical signs. Julie *et al.* (2021a) reported significant percentage of cows with *Babesia*, *Theileria* and *Anaplasma* in apparently healthy cows with no overt clinical examination and had anemia, monocytosis, hypo-proteinemia and gamma-globulinaemia. Eamens *et al.* (2013) [8] reported that subclinical infections are common among animals that are resistant to clinical piroplasmiasis. Ayadi *et al.* (2017) [5] reported that the hematology and biochemical parameters altered by several factors such as host immunity, age, infectious dose, virulence and infecting blood pathogen species. Acharya *et al.* (2015) [1] reported that the indigenous breeds are quite resistant to infection and they act as potential reservoirs /carrier and are dangerous to other breeds of cattle. Jabbar S. Ahmed *et al.* (2008) [9] reported the first line of

defense in innate immunity provided by epithelial barriers, specialized cells, natural antibiotics in epithelia, and they block the entry of microbes and further supported by the inflammatory cells and in addition, the innate immune response enhances adaptive immune responses against the infectious agents. In this study also the prevalence of *Babesia* and *Theileria* organisms were diagnosed in the normal Murrah buffaloes as natural infection, without clinical signs, which coincides with the observations of Eamens *et al.* (2013)<sup>[8]</sup>, Julie *et al.* and (2021)<sup>[10, 11]</sup>, Ayadi *et al.* (2017)<sup>[5]</sup>, Acharya *et al.* (2015)<sup>[1]</sup> Jabbar S. Ahmed *et al.* (2008)<sup>[9]</sup> and Mghirbi *et al.* (2008)<sup>[13]</sup>. This study provides an additional information on the epidemiology of *Babesia* and *Theileria* parasites in Murrah buffaloes and to implement a concept on the integrated practices for vector management

### Conclusion

The study revealed the prevalence of clinical resistant *Babesia* and *Theileria* species organisms in normal Murrah buffaloes without any changes in their hemato-biochemical parameters. Identification of such buffaloes will help to start an earlier treatment intervention before the infections becoming severe and cause untoward losses in these animals due to morbidity and mortality.

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