

Original Research Article

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Prevalence of Bovine Babesiosis and Theileriosis in Kerala, India

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ABSTRACT

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The prevalence of bovine babesiosis and theileriosis in northern, middle and southern regions of Kerala was studied. A total of 246 apparently normal/healthy crossbred adult cattle blood smears were screened by microscopy after Giemsa's staining. Among 246 animals screened, 26.82 per cent were positive for *Theileria orientalis* and 8.13 per cent were positive for *Babesia bigemina*. The present study revealed, higher prevalence of *T. orientalis* in northern Kerala (40 per cent) and middle Kerala (39.28 per cent), whereas *B. bigemina* was highly prevalent in southern Kerala (14.94 per cent).

Introduction

India is an agricultural country and over 70 per cent of rural households depend on livestock farming for supplementary income. Livestock population in India is threatened by infectious disease outbreaks, floods, draught and other climatic factors. Infectious diseases cause morbidity, mortality, reduced body weight gain, decreased draught power, decreased production (milk, meat, wool) and fertility thereby collectively causing economic losses to the livestock and dairy industry (Saminathan *et al.*, 2016). Among the various infectious diseases, parasitic diseases cause significant effect on growth and production of animals.

Among the top ten diseases of livestock reported from thirty states of the country (Annual report 2014-15, NIVEDI), five were parasitic diseases, viz., fasciolosis, coccidiosis, trypanosomosis, babesiosis and theileriosis. Bovine babesiosis and theileriosis are the tick transmitted haemoprotozoan diseases in India which are considered economically most important. The annual control cost for tick and tick borne diseases (TTBDs) of livestock in India was approximately US\$ 498.7 million, which included 384.3 million US\$ for *Theileria annulata* and 57.2 million US\$ for babesiosis (Minjauw and McLeod, 2003).

The early diagnosis of haemoprotozoan diseases and proper treatment may reduce the mortality and losses. The diagnosis of babesiosis and theileriosis in acute cases is mainly based on clinical findings and microscopic examination of thin blood smears. Hence, an attempt was made in the present study to find prevalence of tick borne haemoprotozoan diseases of cattle in Kerala.

Materials and Methods

A total of 246 apparently normal / healthy crossbred adult cattle (Jersey/Holstein Friesian/Swiss Brown) from three different regions of Kerala *viz.*, northern (Wayanad, n=106), middle (Thrissur, n=28) and southern region (Idukki, n=87 and Thiruvananthapuram, n=25) were screened for haemoprotozoan parasites.

Two thin blood smears were made from the ear vein of each animals and air dried. The blood smears were fixed with methanol for 5 minutes and stained with Giemsa's stain for 30 minutes. Stained thin blood smears were examined microscopically for protozoan parasites under the oil immersion (100 X magnification) objective of the microscope.

Even the presence of single piroplasm was considered as a positive case and a minimum of 5000 red blood cells (RBCs) were screened before proclaiming negative for any blood parasites.

Results and Discussion

Results of the screening of blood smears by microscopy after Giemsa's staining are shown in table 1. Among the 246 cattle screened by microscopy, 86 (34.95 per cent) were positive for haemoprotozoan parasites. Out of 246 cattle samples screened, 26.82 per cent were positive for *Theileria orientalis* and 8.13 per cent were positive for *Babesia bigemina*.

In all the positive smears screened, theilerial piroplasms were observed with different morphological appearances. They were intraerythrocytic thin and thick rod shaped or annular piroplasms (Fig. 1).

The *Babesia* organisms were discerned as paired pear shaped or single pear shaped piroplasms or single oval/irregularly shaped amoeboid forms within the RBCs (Fig. 2).

The haemoprotozoan diseases in cross-bred cattle are the major constraints for livestock development which causes devastating losses to the livestock and dairy industry throughout the world. The bovine babesiosis caused by *B. bigemina* and theileriosis by *T. annulata* and *T. orientalis* are the important tick borne haemoprotozoan diseases in the tropical and subtropical countries of the world including India.

Previously, *Trypanosoma evansi*, *B. bigemina* and *Theileria* species were identified as the major haemoprotozoan organisms of cattle in Northern Kerala (Nair *et al.*, 2011). Later *Theileria orientalis* was identified as the organism causing fatal disease in crossbred adult cattle of Wayanad district of Kerala, South India (Aparna *et al.*, 2011). Aparna *et al.*, (2013) conducted phylogenetic analysis of the field populations of *T. orientalis* and identified types 1, 3 and 7 from Kerala.

Similarly, a high seroprevalence of 67.6 per cent was recorded for *B. bigemina* (Ravindran *et al.*, 2002) using indirect fluorescent antibody test (IFAT) and 70.9 per cent using SELISA (Ravindran *et al.*, 2007).

The present study revealed low prevalence status (3.77 per cent) for *B. bigemina* in Wayanad, a northern district of Kerala. Very high prevalence status for the same parasite was observed in Idukki (14.94 per cent), a southern district of Kerala.

Table.1 Results of blood smears screening by microscopy after Giemsa's staining

Place of collection	Number of samples examined	<i>Theileriaorientalis</i>	<i>Babesia bigemina</i>
Wayanad	106	43 (40%)	4 (3.77%)
Idukki	87	7 (8.04%)	13 (14.94%)
Thrissur	28	11 (39.28%)	2 (7.14%)
Thiruvananthapuram	25	5(20%)	1 (4%)
Total	246	66	20

Fig.1 *Theileria orientalis* in bovine blood smear (1000X)

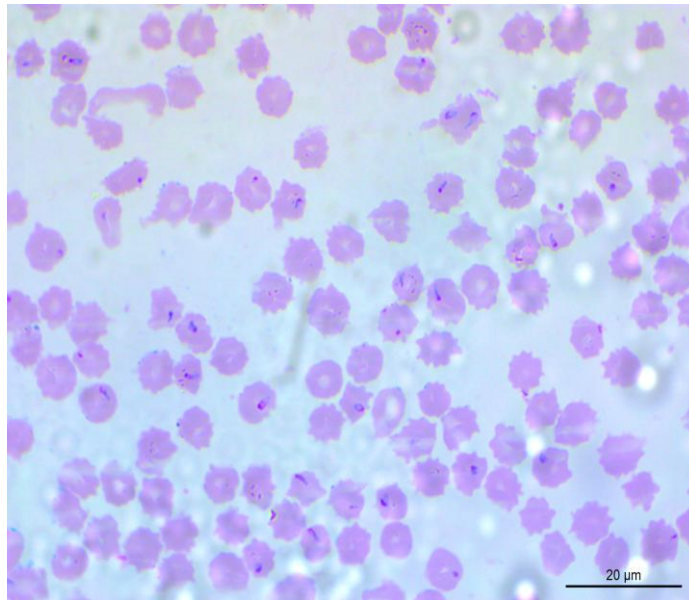
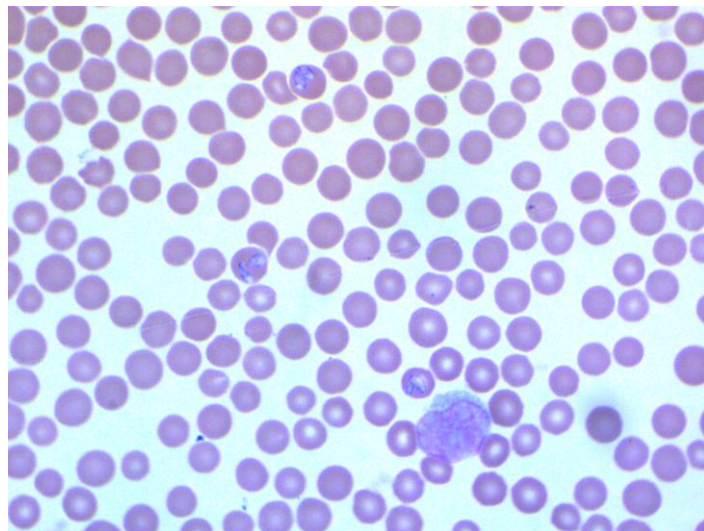


Fig.2 *Babesia bigemina* in bovine blood smear (1000X)



Previously, different per cent prevalence rates for of babesiosis in Kerala based on blood smear examination *viz.*, 2.66 (from Northern Kerala: Nair *et al.*, 2011), 12.5 (from Ernakulum and Thrissur Central Kerala: Rejitha, 2003) were recorded. In addition, prevalence rate of 22.83 per cent from Gujarat (Maharana *et al.*, 2016), 0.25 to 8.33 per cent from Punjab (Aulakh *et al.*, 2005; Sharma, 2013; Singh *et al.*, 2013), 0.6 to 16 per cent from Karnataka (Muraleedharan, 2015), 1.3 per cent from Maharastra (Kolte *et al.*, 2017) were also reported for *B. bigemina*.

In the present study, a high prevalence status for *Theileria orientalis* from Wayanad (40.57 per cent) and Thrissur (39.28 per cent) districts, whereas low prevalence status from Idukki (8.04 per cent) districts were observed. Previously, a per cent prevalence of 33.33 from Wayanad (Aparna, 2011) and 40.66 from Northern districts of Kerala (Nair *et al.*, 2011) were reported for *T. orientalis*.

The present study suggests that Kerala is endemic for theileriosis due to *T. orientalis* and babesiosis in bovines. There is a need for further investigation and identification of carrier status of babesiosis using molecular techniques.

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