

Occurrence of Haemoprotozoan Diseases in Cattle in Hassan, Karnataka

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Abstract

A total of 476 blood samples of cattle, sent from the various units of Teaching Veterinary Clinical Complex (TVCC), Veterinary College, Hassan was examined from March 2018 to February 2021 for haemoprotozoan parasites at the Department of Veterinary Parasitology, Veterinary College, Hassan for expounding the trend of haemoprotozoan diseases in cattle. Blood smears were stained with Giemsa stain and examined for the presence of haemoprotozoan parasites. The results revealed that among 476 samples, 332 samples were positive for various haemoprotozoan parasites. Of this, the highest incidence was observed for *Theileria* spp. (78.6 %), followed by *Anaplasma* spp. (14.45 %) and *Babesia* spp. (6.9 %). The percentage of positive cases of *Theileria* spp. has shown a progressive increase in these three years, the percentage from March 2018 to February 2019 was 45.53 percent, March 2019 to February 2020 was 46.7 percent and from March 2020 to February 2021 was 64.3 percent. However the percentage of positive cases of *Babesia* and *Anaplasma* has not shown any progressive increase in these three years, the percentage of positive cases of *Babesia* and *Anaplasma* spp. From March 2018 to February 2019 was 10.71 percent and 7.14 percent, from March 2019 to February 2020 it was 8.75 percent and 5.10 percent and from March 2020 to February 2021 it was 10.5 percent and 3.52 percent. The increase in cases of hemoprotozoan diseases in cattle warrants an effective vector control strategy to be implemented to control the menace.

Keywords: Anaplasma, Babesia, Cattle, Haemoprotozoa, Theileria.

Introduction

Haemoprotozoan diseases have a serious economic impact on the livestock industry throughout the world and due to inappropriate control strategies, these diseases cause innumerable losses in terms of mortality and reduced milk yield. However, it is known that most of the haemoprotozoan diseases cause anaemia in affected animals. Most of the haemoprotozoan diseases like Babesiosis, Theileriosis, and Anaplasmosis are mainly tick-borne and have always been a formidable barrier to the survival of cross-bred and exotic cattle in India. A characteristic feature of many of these vector-transmitted haemoparasitic diseases is that the animals which recover from acute infection, become carriers, creating a potential source of infection in healthy susceptible populations (Nair *et al.*, 2011). Hence diagnosis of these infections in carrier animals has huge epidemiological significance, as they are the sources of infection for the vectors. The humid climate of Hassan, Karnataka is favourable for the development, multiplication, and survival of arthropods, which serve as vectors for haemoprotozoan diseases. Hence, this study was undertaken to investigate the prevalence of haemoprotozoan parasites in cattle in Hassan.

Materials and Methods

A total of 476 cattle blood samples from animals suspected of haemoprotozoan diseases with clinical signs such as pyrexia, anorexia, enlarged superficial lymph nodes, pale mucus membrane, nasal discharge, and anaemia were sent from the various units of the Teaching Veterinary Clinical Complex (TVCC), Veterinary College, Hassan to the Department of Veterinary Parasitology, Veterinary College, Hassan, Karnataka. The blood samples were examined from March 2018 to February 2021 for haemoprotozoan parasites. A thin blood smear was prepared, fixed by methanol, and stained with Giemsa's stain as per the protocol (Benjamin Maxine, 2005). The slides were allowed to air dry and then examined under oil immersion. Then the species of haemoprotozoan parasites were identified based on morphology. (Soulsby, 1982; Bowmann and Dwight 2009).

Results and Discussion

In the present study, a total of 476 blood samples of cattle were examined, and 332 samples were found to be positive for various haemoprotozoan parasites with an overall incidence of 69.74 percent (Table 1). Whereas Ananda *et al.* (2009) and Krishna Murthy *et al.* (2016) have observed an overall prevalence of 43.1 percent and 43.3 percent in Bangalore North and Shivamogga, respectively. These differences observed in the prevalence may be due to the number of samples screened, different geographical locations of the study areas, and the periods.

On morphological identification, *Theileria* organisms (Fig. 1) were rod-shaped and comma-shaped present in the red blood cells (RBCs), *Anaplasma* spp. (Fig.02) were found to be small spherical bodies with a faint halo around them, present inside the RBCs and *Babesia* spp. (Fig.03) were pear-shaped and lay in pairs at an angle in the RBCs. These findings were by (Soulsby, 1982; Bowmann and Dwight 2009).

Table 1: Year-wise occurrence of haemoprotozoan parasites in cattle

Year	No. of samples examined	<i>Theileria</i>	<i>Anaplasma</i>	<i>Babesia</i>	No. of positive samples	% positive
2018	112	51	12	08	71	63.4
2019	137	64	12	07	83	60.5
2020	227	146	24	08	178	78.41
Total	476	261	48	23	332	69.74

Table 2: Species-wise occurrence of haemoprotozoan parasites in cattle

Species	Total number of positive samples	No. of positive samples	% positive
<i>Theileria</i>	332	261	78.6
<i>Anaplasma</i>		48	14.45
<i>Babesia</i>		23	6.9

Table 3: Season-wise occurrence of haemoprotozoan parasites in cattle

Season	No. of samples	<i>Theileria</i>	<i>Anaplasma</i>	<i>Babesia</i>	No. of positive samples	Total % positive
Pre-monsoon	103	61	13	01	75	72.8
Monsoon	189	120	18	13	151	79.8
Post monsoon	184	80	17	09	106	57.6

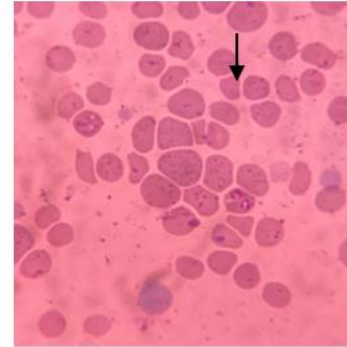
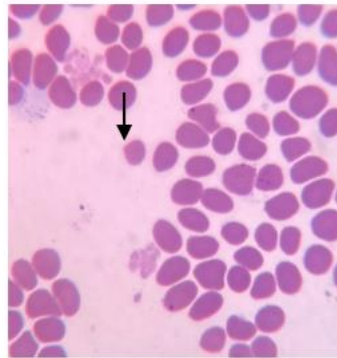
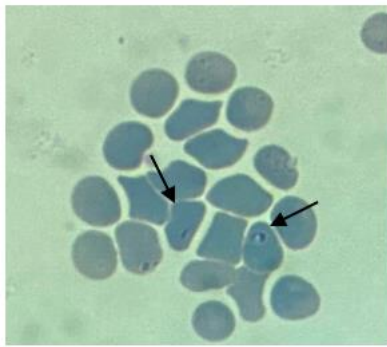


Fig.1 Arrow showing piroplasms of *Theileria* spp. (100 X). **Fig.2** Arrow showing *Anaplasma* spp. (100 X). **Fig.3** Arrow showing *Babesia* spp. (100X).

Out of 332 samples, the highest incidence was observed for *Theileria* spp. (78.6 %), followed by *Anaplasma* spp. (14.45 %) and *Babesia* spp. (6.9 %) (Table 2). Among the haemoprotozoan parasites, the occurrence of *Theileria* species is significantly higher when compared to *Anaplasma* and *Babesia* species. Similar observations were made by Velusamy *et al.* (2014) in Tamil Nadu who also observed the highest prevalence of *Theileria* (13 %), followed by *Anaplasma* (2.64 %) and then *Babesia* (1.0 %). In this study, the percentage of positive cases of *Theileria* spp. has shown a progressive increase in these three years, the percentage from March 2018 to February 2019 was 45.53 percent, March 2019 to February 2020 was 46.7 percent and during March 2020 to February 2021 was 64.3 percent. The occurrence of *Theileria* species is significantly higher in 2020 when compared to 2018 and 2019. This may be due to an increase in the density of the vector population which could be attributed to climate change. However, the percentage of positive cases of *Babesia* and *Anaplasma* has not shown any progressive increase in these three years, the percentage of positive cases of *Babesia* and *Anaplasma* spp. From March 2018 to February 2019 was 10.71 percent and 7.14 percent, from March 2019 to February 2020 it was 8.75 percent and 5.10 percent, and from March 2020 to February 2021 it was 10.5 percent and 3.52 percent. There is no significant difference in the occurrence of *Anaplasma* and *Babesia* species between the years 2018 to 2020.

The present study was conducted for three years to observe the seasonal incidence, there was a considerable seasonal variation found with the occurrence of haemoprotozoan diseases in animals. The prevalence of haemoprotozoan parasites was significantly high during monsoon season (79.8 %), followed by moderate in pre-monsoon (72.8 %) and less in post-monsoon (57.6 %) (Table 3). This is by the observations made by Ananda *et al.* (2009, 2014), Vahora *et al.* (2012), and Krishna Murthy *et al.* (2016), who also found the highest prevalence in monsoon months. Most of the animals suffered during monsoon months, which might be due to a greater number of ticks in monsoon which were developed during summer months. The occurrence of *Theileria* species is significantly higher in monsoon when compared to other seasons, there is no significant difference in the occurrence of *Anaplasma* and *Babesia* species between seasons.

Conclusion

The current study concluded that the Hassan district of Karnataka was highly endemic for Theileriosis, Anaplasmosis, and Babesiosis. Of this, the highest incidence was observed for *Theileria* spp. (78.6 %), followed by *Anaplasma* spp. (14.45 %) and *Babesia* spp. (6.9 %). The occurrence of these diseases was higher during monsoon,

which may be due to increased vector population. Epidemiological surveillance is an important aspect of controlling vector-borne haemoprotozoan diseases. Diagnosis of the carrier state is important for early diagnosis of the disease and an effective vector control strategy to be implemented to prevent economic losses.

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Contribution by Authors

Equal contribution. All authors declared that ‘written informed’ consent was obtained from the approved parties for the publication of this article and accompanying images.

Conflict of Interests

There is no conflict of interest.

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