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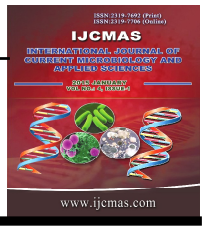

Original Research Article

Incidence of Haemoprotozoan diseases in Cattle in Southern Rajasthan, India

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Keywords

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A B S T R A C T

The present study aimed to investigate the occurrence of blood parasites (Protozoa and Rickettsia) infecting cattle in Southern Rajasthan from April 2005 to March 2014 in clinically suspected (febrile, anorectic,) cattle by examining 5257 blood samples. Out of these, 473 (9%) were found positive for blood parasites. Among the positive samples Theileriosis recorded in 42.28% samples, Anaplasmosis recorded in 42.07% samples, and Babasiosis was recorded in 15.65% samples. Highest incidence were recorded in rainy season (from June to September) (47.99%) followed by summer (26.01%) and winter season (26.0%).

Introduction

Haemoprotozoan diseases, especially Babesiosis, Anaplasmosis, Theileriosis and Trypanosomiasis are considered some of the major impediments in the health and productive performance of cattle (Rajput *et al.,* 2005). Tick-borne diseases cause substantial losses to the livestock industry throughout the world (Ananda *et al.,* 2009) as these have got a serious economic impact due to obvious reason of death, decreased productivity, lowered working efficiency (Uilenberg, 1995), increased cost for control measures (Makala *et al.,* 2003) and limited introduction of genetically improved cattle in an area (Radostits *et al.,* 1994).

Haemoprotozoan diseases cause devastating losses to the livestock industry and thus pose major constraints to the dairy industry throughout the world.

In this regard, ticks are mostly related to initiation of many diseases. Hot and humid climate is highly favorable for the development and survival of ticks (Kohli *et al.,* 2014). The agro-ecological and geoclimatic conditions of the area are highly favourable for growth and multiplication of ticks which act as natural vectors of Theileriosis, Babesiosis and Anaplasmosis. Certain Ixodid ticks such as *Hyalomma*

anatolicum anatolicum, H. m. marginatum, and *H. a. excavatum,* known to transmit *Theileria annulata*, are found in large numbers in the Mediterranean region, especially in semi-arid areas.

Bovine theileriosis is caused by the protozoan parasite of *Theileria sps* (*Theileria annulata* and *Theileria parva*) which are round ovoid rod like or irregular shaped organism found in lymphocytes, histiocytes and erythrocytes (Soulsby, 1982) (Durrani *et al.,* 2008). Organisms of babesiidae family are round to pyriform, amoeboid form occurring in the erythrocytes. Its development occurs in erythrocytes by asexual division it is transmitted by Ixodid ticks (*Boophilus annulates*). Anaplasmosis is essentially a disease of adult cattle caused by *Anaplasma marginal* and *Anaplasma central*. It's a Rickettsial parasite which resides in erythrocytes and appears as small spherical bodies, red to dark red in colour with Giemsa stain (Soulsby, 1982).

Prevalence of blood protozoa such as *Babesia bigemina, Theileria annulata, Theileria mutans* and blood rickettsia such as *Anaplasma marginale, Anaplasma centrale* has been reported in animals of India (Banerjee *et al.,* 1983, Ananda *et al.,* 2009 and Vahora *et al.,* 2012).

This is a primary study of the southern Rajasthan for the last nine years, indicating the occurrence of Blood parasites in cattle (Table 3). Epidemiological surveillance is an important aspect to control Thileriosis, Anaplasmosis and Babesiosis in the area. Hence this report will be helpful in making control strategy against these diseases.

Materials and Methods

Sample collection: The study was carried out in 5257 blood samples from clinically suspected indigenous and crossbred cattle which were clinically ill varying range of symptoms, received from veterinary polyclinics, hospitals and sub centers located in southern Rajasthan during period from April 2005 to March 2014. These samples were collected from clinically suspected cases of illness in EDTA containing vial from Juglar vein and two or three thin peripheral blood films by puncturing ear vein from each cattle.

Staining method: Smears were then fixed with methanol and stained with Giemsa's stain and examined under microscope (100 X) with immersion oil for the identification of blood parasites as described by Benjamin (1978) and Soulsby (1982).

Result and Discussion

The study was conducted for about 9 years to observe the overall & seasonal prevalence of blood parasites in cattle. Microscopic examination of 5257 blood smears from cattle, reveled 473 (9%) samples positive for blood parasites (Table 1). Our finding is lower than previously reported by Alim *et al* (2011) who reported 16.18% and 12.02% in crossbreed and indigenous cattle, respectively. While Singh *et al.* (2012) reported 22.9% occurrence in Punjab. Report of Lalchandani (2001) cited overall occurrence of 39.21% these variations are might be due to different geographical distribution.

Lower prevalence of hemoprotozoan diseases in the current study might be due to sampling from clinically ill animals rather than selection of clinically susceptible cattle. However, variation in geo-climatic condition, breed, and exposure of vectors

and age of the animals might contribute to variable prevalence of hemoprotozoan diseases in the study areas (Muhanguzi *et al.*, 2010).

Further out of 473 positive samples (200) 42.28% were of *Theileria spp*., which lower than previously reported by Lalchandani (2001) 58.82 % where as slightly higher than Durrani *et al.*, (2008) 39.9% who reported these in buffalo and higher than Kohli *et al.* (2014) 27.2% and Oliveira *et al.* (1995) 22%. These differences are due to species and geographical variations.

Further out of 473 positive samples 199 (42.07%) were positive for Anaplasma *spp*. Our findings correlate well with Rajput *et al.* (2005) who reported 41% occurrence of *Anaplasma spp*. While Talukdar *et al.* (2001) reported 33%, which is slightly lower than our findings. However, our results vary greatly from findings of Chowdhury *et al.* (2006) who reported 70% occurrence in Bangladesh.

Further, out of 473 positive samples 74 (15.65%) found positive for *Babesia spp*. Our findings are in accordance with Banerjee *et al.*, (1983) who reported occurrence 14.53% while our findings is higher than previously reported by Ibrahim *et al.* (2012) 8.8% and Alim *et al.* (2012) 9.25% and 7.17% respectively in cross breed and indigenous cattle. Lower occurrence of Babsiosis was reported by Chowdhury *et al.* (2006) 3.3%.

There is a considerable seasonal variation with occurrence of haemoprotozoans. The highest prevalence is found during rainy season with 47.99% prevalence rate. Hemoprotozoan diseases vary greatly according to season. Observation of rainy season of this study is in accordance with the report of Ananda *et al.* (2009) and Radostits *et al.* (1994) who observed that higher incidence of hemoprotozoan diseases is found soon after peek of tick population, which is depending on temperature, humidity, rainfall, etc. which might be accounted for higher prevalence of such infections in the rainy season of the study. Lower temperature and humidity of winter months were less favorable for the growth and multiplication of tick vectors which might contribute to lower frequency of such diseases in the study population (Muhammad *et al.*, 1999; Zahid *et al.*, 2005).

During rainy season, among positive samples highest incidence has been recorded for *Theileria spp* which is 49.78% (Table 2). This supports the earlier study of Theileriosis infestation. Vahora *et al.* (2012) and Kohli *et al.* (2014) reported that 82.94% and 45.4% cases of theileriosis are generally observed during summer or rainy season when the ticks have higher activity although sporadic outbreaks have been recorded year round.

The present study suggests that overall occurrence of blood parasites were 9%. Among the positive samples Theileriosis recorded in 42.28% samples, Anaplasmosis recorded in 42.07% samples, and Babasiosis was recorded in 15.65% samples. Highest incidence were recorded in rainy season (from June to September) (47.99%) followed by summer (26.01%) and winter season (26.0%). There is a need for further investigation using molecular technique and making program for control to the tick population in the area.

Table.1 Overall scenario of prevalence of blood parasite

Total number of samples	5257
Total number of positive samples	473
Anaplasma	199
Babesia	74
Theileria	200

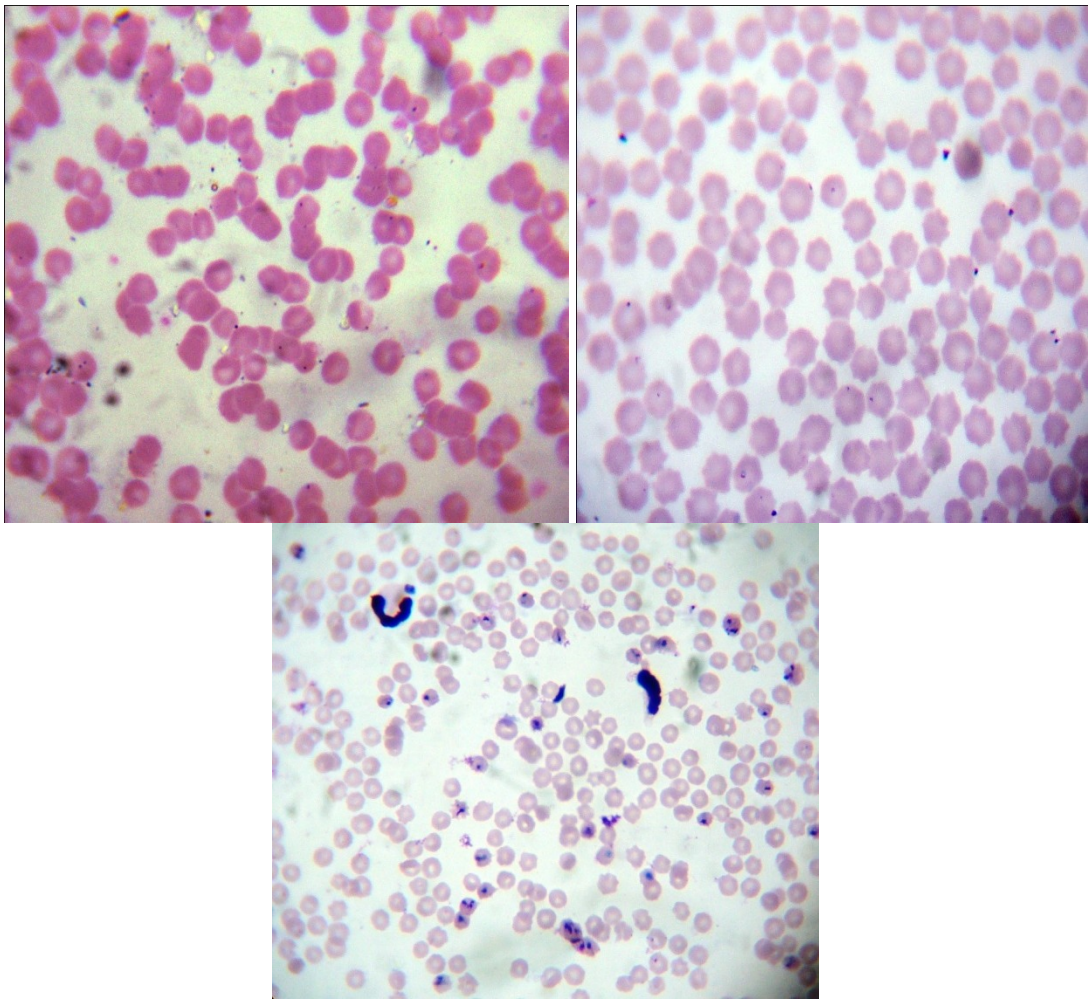
Table.2 Seasonal incidence of blood parasites

Seasons	Samples	2005-06	2006-07	2007-08	2008-09	2009-10	2010-11	2011-12	2012-13	2013-14	Total	%
Rainy season	Total samples	149	400	125	145	306	132	269	258	319	2103	
	Positive	12	15	24	8	15	5	24	21	103	227	47.99
	Anaplasma	11	6	14	6	6	4	15	1	50	113	49.78
	Babesia	1	1	4		7	1	3	1	5	23	10.13
	Theileria		8	6	2	2		6	19	48	91	40.09
Winter season	Total samples	170	101	123	167	142	136	174	186	261	1460	
	Positive	1	7	16	13	3	16	24	19	24	123	26.00
	Anaplasma	1	2	10	8		6	10	1	10	48	39.02
	Babesia		1	5	4	3	3	3	1		20	16.26
	Theileria		4	1	1		7	11	17	14	55	44.72
Summer season	Total samples	88	115	105	169	233	169	153	403	259	1694	
	Positive	5	11	7	6	22	13	11	22	26	123	26.01
	Anaplasma	5	2	1	3	7	2	7	3	8	38	30.90
	Babesia		2	4	1	12	6	2	3	1	31	25.20
	Theileria		7	2	2	3	5	2	16	17	54	43.90

Table.3 Year-wise occurrence of blood parasites

Samples	2005-06	2006-07	2007-08	2008-09	2009-10	2010-11	2011-12	2012-13	2013-14	Total	Percentage
Total no. of samples	407	616	353	481	681	437	596	847	839	5257	
Anaplasma	17	10	25	17	13	12	32	5	68	199	43.07
Babesia	1	4	13	5	22	10	8	5	6	74	15.65
Theileria		19	9	5	5	12	19	52	79	200	42.28
Total no. of positive	18	33	47	27	40	34	59	62	153	473	9.00

Fig.1 Slides of blood Smear showing the presence of Anaplasma Spp. Fig: 1, Theileria Spp. Fig: 2 and Babesia Spp. Fig: 3. (100 X magnification)



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