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Study of the Prevalence of Babesiosis in Domesticated Animals with Suspected Signs in Mazandaran Province, North of Iran, During 2008

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Abstract: Babesiosis or Texas fever is a zoonotic, acute hemolytic and feverous disease that is more prevalent in domesticated animals and is transmitted by hard tick's bite. Clinical diagnosis of this disease is hard and should be differentiated from other diseases such as leptospirosis and anaplasmosis. Aim of this study was to determine prevalence of this disease in Mazandaran province, north of Iran, during 2008. With the help of statistical consultant and after determining approximate number of livestock in province, several cities were selected and sampling was done. After recording characteristics of animals and farms, blood samples of different animals were stained with Gimsa method and then were evaluated by 100x lens. In this study mean contamination rate was 18.13% in cows, 16.03% in sheep and 22.27% in goats. Since diagnosis of babesiosis in many parts of Iran is done by clinical findings and peripheral blood smear and these methods often don't seem to be exact and complete, it is suggested that first serologic diagnostic methods be used along with these methods. Educating farmers about ways of transmission of babesiosis and ways of defending against it can also be useful for fighting this disease.

Key words: Babesiosis, zoonotic, cattle, Mazandaran, Iran, anaplasmosis

INTRODUCTION

Babesiosis or Texas fever is an acute hemolytic feverous disease which is more prevalent in domesticated animals and is transmitted by hard tick's bite. Prevalence of this disease in tropical and subtropical regions is more and it causes severe loss of sensitive animals. Mortality of this disease in absence of treatment in case of *Babesia bigemina* is about 30% in cows and in case of *Babesia bovis* is about 70-80% in sheep (Hosseini, 2003).

Babesia is a small protozoan found in vertebrates red blood cells. This protozoan can be found in many species of animals such as cow, sheep, goat, pig, horse and buffalo and even human being. This protozoan doesn't have extra corpuscular cycle in vertebrates body. Asexual forms in circular, elliptical, spindle or amebic shapes can be seen. Size of small species is 1-2.5 μm and large species is 2.5-5 μm.

This parasite is common between human and animals; first case of human babesiosis was reported from Yugoslavia in 1957 and till 1995 >400 human cases of this disease were reported from USA and other parts of world. Till now worldwide *B. divergence*, *B. cabali*, *B. microti* and *B. bovis* have been transmitted from animals to humans (Anderson *et al*., 1991). Clinical diagnosis of babesiosis is hard and it should be differentiated from leptospirosis and anaplasmosis. First time in Iran, Delpi in 1936 was reported this parasite in sheep and goat in which he recognized *B. ovis* in their blood.

Then in 1966 Rafeei showed distribution of this disease in north west of Iran (Rafeei, 1978). Mazandaran province is located in north of Iran and has humid climate which is becomes appropriate for hard ticks activity from beginning or middle of April and till beginning of November and December ticks can be seen on suspected domestic animals especially in those that are kept in forests. So we decided to investigate on prevalence of babesiosis in these animals in Mazandaran Province during 2008.

MATERIALS AND METHODS

This study was conducted in 2008 on 3761 domesticated animals blood samples including 575 cows, 2894 sheep and 292 goats in Mazandaran province. At the beginning of 2008 approximate number of domesticated

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animals of this province was estimated from documents of Iranian veterinary organization of Mazandaran province located in Sari and according to suggestions of statistical consultant sampling was done using n formula as cluster sampling in several cities of Mazandaran province from middle of March-December 2008. After going to selected regions first some data (including number of animals, species of animal, history of animal and genus) were recorded.

For sampling from herds with the help of farmers samples were obtained from animals with signs of lethargy, anorexia, fever, tachycardia and hematuria (haemoglubinuria) or according to what farmers said had these signs in their history.

Then using alcohol external edges of ear and veins of ear were disinfected and a scratch was made by lancet on ear, first drop of blood was wiped away by a piece of cotton and from the second drop of blood a smear was made on a slide. Then it was fixed by methanol and transferred to laboratory. In laboratory samples were stained with Gimsa and then parasites inside the RBCs were evaluated with 100x lens and emersion oil. After observation of parasites inside the RBC and definitive diagnosis of contamination, collected results were analyzed by SPSS software and Chi square test with confidence index of 95%.

RESULTS AND DISCUSSION

During this study which was performed on 3761 domesticated animals blood samples including 575 cows, 2894 sheep and 292 goats in Mazandaran province, for examining cows 2 cities, Savadkooh and Tonekabon in east and west of Mazandaran province were chosen in which 16.66 and 19.6% contamination was observed, respectively. For sheep 5 cities, Savadkooh, Jooybar, Behshahr, Tonekabon and Neka were studied in which 5.75, 20.51, 8.88, 32.22 and 12.82% contamination was observed, respectively.

In Savadkooh and Tonekabon cities, totally 292 goats were examined and 9.96 and 35.48% contamination were observed, respectively (Table 1). Most (96.17%) of samples taken from cows were from female cows. Also about 61.4% of samples were taken from cows which were older than 2 years. Samples of sheep and goats were also from female animals (Table 2 and 3). No significant difference between domesticated animals of east and west of Mazandaran province in prevalence and incidence of this disease was observed ($p>0.05$).

In cows significant difference by aging was seen ($p>0.05$). In this study number of female animals was more than male because male animals were slaughtered in younger ages but females were kept longer. Because of this imbalance in sex, statistical analysis on basis of sex was not done.

Table 1: Distribution of frequency of contamination with Babesia parasite in domesticated animals in Mazandaran Province, north of Iran, during 2008

Name of city	Type of animal	No. of studied animals	No of affected animals, No. (%)
Savadkooh	Cow	515	101 (19.61)
Tonekabon	Cow	60	10 (16.66)
Savadkooh	Sheep	2519	145 (5.75)
Jooybar	Sheep	156	32 (20.51)
Behshahr	Sheep	90	8 (8.89)
Tonekabon	Sheep	90	29 (32.22)
Neka	Sheep	39	5 (12.82)
Savadkooh	Goat	261	26 (9.96)
Tonekabon	Goat	31	11 (35.48)
Total	-	3761	367 (9.76)

Table 2: Distribution of frequency of studied cows according to age and sex with Babesia contamination in Mazandaran province, north of Iran, during 2008

	Sex		Age		
Type	Female	Male	<1 year	1-2 years	>2 years
Number	553.00	22.00	63.00	159.00	353.0
Percentage (%)	96.17	3.83	10.95	27.65	61.4

Table 3: Distribution of frequency of studied sheep and goats according to age and sex

	Sex		Age			
Animal type	Female	Male	<6 month	6-12 month	1-2 years	>2 years
Sheep						
Number	1763.00	1131.00	323.00	1091.00	963.00	517.00
Percentage (%)	60.91	39.09	11.16	37.69	33.27	17.88
Goats						
Number	176.00	116.00	42.00	86.00	109.00	55.00
Percentage (%)	60.27	39.73	14.38	29.45	37.32	18.85

Babesiosis is categorized as one of the tick born diseases and one of important factors in transferring this disease is contaminated ticks with this protozoan which can keep babesia for several generations and transfer it to sensitive animals. Animals which are in predisposing conditions such as parturition, starvation or affection to other diseases show intensified clinical signs (Blood *et al*., 1994). Babesiosis in most of domesticated animals of Iran was seen and reported. Sheep babesiosis is caused by *Babesia ovis* and *Babesia mutazi* in Iran and in some cases double contamination with both of them is seen (Manafi, 1971).

One study in Iran was declared that *Theileria* sp. are transferred by Hyalomma ticks while *Babesia* sp. are transferred by Hyalomma, Haemaphysalis, Ixodes and rarely Dermacentor ticks (Hashemi-Fesharaki, 1997). Babesiosis has wide distribution with high mortality in Iran, for example during a retrospective study by referring to Mazandaran province Veterinary Net data, only in 2008, 15 cows and 21 goats were dead because of babesiosis in

this province. During a study which was done in Lenjan region of Isfahan province on sheep in spring and summer 2003, results showed that among 587 sheep, 50 of them (8.51%) were contaminated.

Among 282 male sheep 23 (8.2%) and among 305 female sheep 27 (8.9%) were contaminated and among under 2 years old aged sheep, 16 (6.9%) had the parasite. Highest contamination rate 28% in August and lowest rate was 8% in April (Azizi *et al*., 2005).

According to one study in 1999 and 2000, contamination rate of *Babesia bovis* in South Africa was 63.3 and 62.4%, respectively and for *Babesia bigemina* was 56.1 and 49.3% (Tonnesen *et al*., 2006). Also during a study during 1983-1987 in Cuba on sheep blood parasites, 2397 samples were analyzed and 17.5% were anaplasmosis positive while 11.5% were babesiosis positive (Rodriguez *et al*., 1989). A research in Musal of Iraq was evaluated prevalence of sheep blood parasites in 1987 and was declared 36.3% of animals were theileria and babesia positive (Al-Hadethi and Al-Saffar, 1988).

CONCLUSION

Diagnosis of this disease in most regions of Iran is done by clinical findings and peripheral blood smear and these methods often don't seem to be exact and complete. It is suggested that first serologic diagnostic methods be used along with these methods. Educating farmers about ways of transmission of babesiosis and ways of defending against it can also be useful for fighting to this disease. Considering the great number of carriers of this disease in different regions of Iran more attention from veterinary officials must be paid.

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