



Short Communication

Prevalence of Tick Born *Babesia* Infection in Domestic Cattle of Khyber Pakhtunkhwa, Pakistan

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ABSTRACT

Looking into the importance of tick born diseases in the livestock sector, the present study was conducted to find out the prevalence of babesiosis among domestic cattle of Southern Khyber Pakhtunkhwa. Blood samples (1500) were collected from clinically suspected cattle in span of one year. All blood samples were examined through microscope. Overall incidence of babesiosis was 54.80%. *B. boves* showed high prevalence (35.46%) than *B. bigemina* (19.33%). Females were more prone as compared to male cattle for both *B. boves* and *B. bigemina*. Cattle having age less than two years showed high positivity for both *B. boves* (49.23%) and *B. bigemina* (26.15%). Similarly rate of positivity for both *B. boves* (47.12%) and *B. bigemina* (25.13%) was reported high during summer season.

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Authors' Contribution

KU designed the study. AK collected samples and conducted the lab experiments. RN, MA and SNK analyzed and interpreted the results. RH supervised data collection. MA drafted the manuscript. FUD, FUR, MI and KU helped in preparation of final draft.

Key words

Babesia, Prevalence, Microscopy, Cattle, KP

Babesiosis is a tick-born disease of animals which is generally characterized by considerable mortality and morbidity. It is a life threatening disease to cattle industry, mostly affecting the productivity of cattle in many Asian countries including Pakistan (Herrera *et al.*, 2017). Other domestic animals like sheep, horse, goats, dogs and pigs are also affected by babesiosis (Chaudhry *et al.*, 2010).

Babesiosis is highly pathogenic, especially in cattle and buffaloes, causing acute to chronic infections. The severity of the *Babesia* infection and clinical signs vary depending on the infected species, age and host immune status. The disease is generally characterized by jaundice, anemia, hemoglobinuria and fever. Bovine babesiosis and other tick borne diseases are considered responsible for more than 50% losses in the crossbred cattle (Chaudhry *et al.*, 2010; Khetrana *et al.*, 2019).

There are more than 100 *Babesia* species infecting a wide range of mammals. Among them *Babesia bigemina*

and *Babesia bovis* can cause huge mortality and morbidity in cattle population (Hunfeld *et al.*, 2008; Saad *et al.*, 2015).

Both *B. bigemina* and *Babesia bovis* are transmitted from infected to healthy cattle through tick vectors. In tropical and subtropical countries especially in India, Pakistan and Bangladesh ticks are widely spread due to environmental condition which favors their growth and development (Chaudhry *et al.*, 2010; Irshad *et al.*, 2010).

Babesiosis affected about 1.2 billion cattles in several countries like South and Central America, Australia, United States and Asia (Zulfiqar *et al.*, 2012). Studies conducted in various parts of Pakistan showed that prevalence of babesiosis infection was 20% in Hyderabad (Khetrana *et al.*, 2019), 61% in Peshawar (Saad *et al.*, 2015) and 35% in Dera Ghazi Khan (Zia and Nazir, 2019). In the light of above mentioned context, it is necessary to diagnose and treat it well in time to reduce the economic losses in cattle industry. Considering the impact of babesiosis on the cattle industry the present study was conducted to find out the prevalence of babesiosis among domestic cattle of Khyber Pakhtunkhwa, Pakistan

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Material and methods

Around 1500 blood samples were collected from the jugular vein of cattles in sterile vacuonier having capacity of 5ml and placed in ice jar. Samples were collected from clinically suspected cattle in span of one year from Southern Khyber Pakhtunkhwa (Bannu, Karak, Kohat, Lakki Marwat and Dera Ismail Khan). Samples were labeled showing date of collection, age, sex and area. Samples were transported to Molecular Parasitology and Virology Laboratory of Department of Zoology, Kohat University of Science and Technology and were kept at -20C⁰ for further processing. Clinical data of animals were recorded on pre-designed questionnaire. Thin and thick blood smears were prepared, fixed with methanol for one minute and then stained with Giemsa stain. Stained slides were observed under 200x magnification using microscope (Olympus Japan) for detection of *B. boves* and *B. bigemina*. Prevalence rate of babesiosis was determined by the following formula:

Prevalence rate = No of positive samples/Total number of samples examined×100

Ethical approval of the study was obtained from the Institutional Review Board of the Kohat University of Science and Technology, Kohat. SPSS statistical software version 20 was used for data entry and analysis.

Results and discussion

Examination of blood samples showed that overall 822 (54.80%) domestic cattle were positive for babesiosis. It was found that *B. boves* (35.46%) was more prevalent than *B. bigemina* (19.33). Study conducted in southern Punjab showed that 35% cattle were positive to *Babesia* infection (Zia and Nazir, 2019), southeastern Punjab showed 20% positivity (Saad *et al.*, 2015) and Khyber Pakhtunkhwa 61% (Khetran *et al.*, 2019). Similarly, study conducted in China revealed 7.24% prevalence rate of *Babesia* infection (Zhuo *et al.*, 2019) and Philippines 11.49% (Herrera *et al.*, 2017).

Furthermore, results obtained from the present study showed that prevalence of babesiosis was higher in district Dera Ismail Khan compared to other districts as shown in Table I. This high prevalence in D. I. Khan may be due to their hot and wet environmental conditions which favors the growth and development of ticks.

The prevalence of *B. boves* and *B. bigemina* in cattles was also analyzed based on their age. The study showed that rate of babesiosis decreased with age. High incidence of *Babesia* species was found in cattles having age less than two years (49.23% *B. boves* and 26.15% *B. bigemina*) as shown in Table II. This high incidence in younger cattles may be due to their thin and soft skin which makes it easy for the ticks to transmit the infection comfortably and may

be due to their low level of immunity (Zia and Nazir, 2019; Ahmad *et al.*, 2014).

Table I. Overall prevalence of babesiosis in domestic cattle of different areas of KP.

Localities	No. of sample	<i>B. boves</i> %	<i>B. bigemina</i> %	Total/%	P-value
Bannu	300	114(38.00)	62(20.66)	176(58.66)	
Karak	300	100(33.33)	48(16.00)	148(49.33)	
Chat	300	110(36.66)	58(19.33)	168(56.00)	0.0008*
Lakki Marwat	300	82(27.33)	54(18.00)	136(45.33)	
D.I Khan	300	126(42.00)	68(22.66)	194(64.66)	

*paired t test was used.

Table II. Prevalence of babesiosis in relation to the age of domestic cattle of KP.

Age group (Years)	No. of sample	<i>B. boves</i> %	<i>B. bigemina</i> %	Total/%	P-value
>2	260	128(49.23)	68(26.15)	196(75.38)	
2>4	296	112(37.83)	62(20.94)	174(58.78)	
4>6	366	126(34.42)	68(18.57)	194(53.00)	0.0060*
6>9	338	102(30.17)	56(16.56)	158(46.74)	
<9	240	64(26.66)	36(15.00)	100(41.66)	

* Unpaired t test was used.

Relationship of *Babesia* infection with gender was also determined replacement to the present study showed that females were more prone to *B. boves* (41%) and *B. bigemina* (23.24%) than male cattles. The high prevalence of babesiosis in female cattle may be due to the use of contaminated needles used for the injection of drugs to let down milk. Similar results were also reported elsewhere (Zia and Nazir, 2019).

Seasonal variation of *B. boves* and *B. bigemina* in domestic cattles was also determined. High incidence of both species was found in summer season (47.12% *B. boves* and 25.13% *B. bigemina*) followed by spring, autumn and winter (Fig. 1). More invasions in summer season may be due to the association of high ticks activity with increased temperature and humidity of the environment (Zia and Nazir, 2019).

Conclusions

Babesia boves (35.46%) were more prevalent in cattle of the study area than *B. bigemina* (19.33%). Younger cattles were more prone to disease than older animals.

Both species of Babesia were more prevalent in summer season. It is clear from the study that *Babesia* infection is present in cattle in the study, hence putting them at high risk leading to great economic losses to livestock industry of the country.

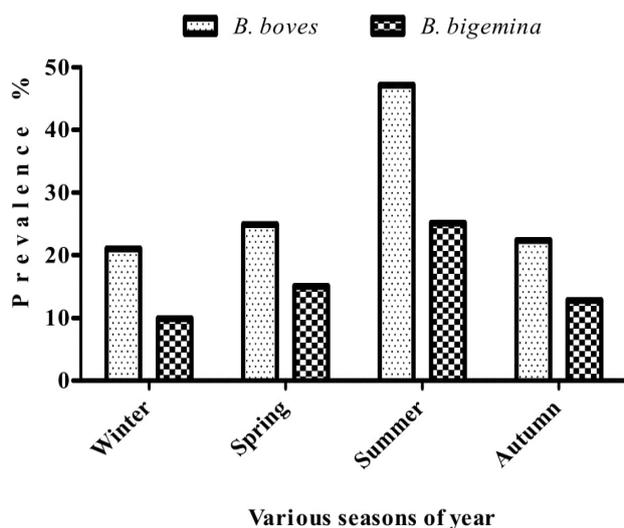


Fig. 1. Prevalence of babesiosis among domesticated cattle in relation to various seasons.

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Statement of conflict of interest

The authors have declared no conflict of interest.

References

- Ahmad, I., Khwaja, A., Shams, S., Ayaz, S., Khan, S., Akbar, N.U., Waqar, M., Alam, S., Khan, M.A., Rehman, A. and Zakir, M., 2014. *Int. J. Bioassays*, **3**: 3195-3199.
- Chaudhry, Z.I., Suleman, M., Younus, M. and Aslim, A., 2010. *Pakistan J. Zool.*, **42**: 201-204.
- Herrera, P.C.T., Vilorio, V.V., Balbin, M.M. and Mingala, C.N., 2017. *Annls Parasitol.*, **63**: 309-316.
- Hunfeld, K.P., Hildebrandt, A. and Gray, J.S., 2008. *Int. J. Parasitol.*, **38**: 1219-1237. <https://doi.org/10.1016/j.ijpara.2008.03.001>
- Irshad, N., Qayyum, M., Hussain, M. and Khan, M.Q., 2010. *Pak. Vet. J.*, **30**: 178-180.
- Iseki, H., Zhou, L., Kim, C., Inpankaew, T., Sununta, C., Yokoyama, N., Xuan, X., Jittapalpong, S. and Igarashi, I., 2010. *Vet. Parasitol.*, **170**: 193-196. <https://doi.org/10.1016/j.vetpar.2010.02.038>
- Khetran, I.B., Arijo, A.G., Buhtto, M.B., Gadahi, J.A. and Laghari, Z.A., 2019. *Veterinaria*, **68**: 25-30.
- Saad, F., Khaisroon, M., Khan, K. and Akbar, N., 2015. *Int. J. Curr. Microbiol. appl. Sci.*, **4**: 1030-1036
- Zhou, Z., Li, K., Sun, Y., Shi, J., Li, H., Chen, Y., Yang, H., Li, X., Wu, B., Li, X. and Wang, Z., 2019. *PLoS One*, **14**: 1-11. <https://doi.org/10.1371/journal.pone.0215585>
- Zia, A. and Nazir, Q., 2019. *Buffalo Bull.*, **38**: 485-489.
- Zulfiqar, S., Shahnawaz, S., Ali, M., Bhutta, A.M., Iqbal, S., Hayat, S., Qadir, S., Latif, M., Kiran, N., Saeed, A., Ali, M. and Iqbal, F., 2012. *Asian Pac. J. trop. Biomed.*, **2**: 104-108. [https://doi.org/10.1016/S2221-1691\(11\)60202-5](https://doi.org/10.1016/S2221-1691(11)60202-5)