Available online at www.ijpab.com

DOI: http://dx.doi.org/10.18782/2582-2845.8857

ISSN: 2582 – 2845

Ind. J. Pure App. Biosci. (2022) *10*(6), 17-22

Indian Journal of Pure & Applied Biosciences

Peer-Reviewed, Refereed, Open Access Journal

Research Article

Prevalence of Tick Species Infesting Domesticated Animals in Pakistan

Ammar Haider[1*], Saba Ayaz[2], Amna Rafaaqat[3], Ghulam Fatima[2]

[1]Department of Zoology Wildlife and Fisheries, University of Agriculture, Faisalabad, Pakistan

[2]Department of Biochemistry, Rapha International University, Faisalabad, Pakistan

[3]Institute of Molecular Biology and Biotechnology, University of Lahore, Pakistan

*Corresponding Author E-mail: ammarhaider4052@gmail.com

Received: 22.09.2022 | Revised: 26.11.2022 | Accepted: 7.12.2022

ABSTRACT

Ticks transmit a variety of pathogens, including viruses, spirochetes, bacteria, rickettsia, protozoa, filarial nematodes, and others, only behind mosquitoes, that result in human and animal mortality. Tick infestation poses severe threats to livestock farming, which plays a crucial role in Pakistan's rural economy. However, more research needs to be done in the study area of Pakistan on the diversity of tick species and the pathogens carried by ticks. This study aimed to determine the prevalence of ticks in Pakistan. A total of 226 tick specimens were collected from 1023 animals (136 sheep and 147 goats, 329 cows, 411 buffaloes), examined in the study area. It showed that total eight species belonging to four genera were collected and identified. The identified species were Dermacentor marginatus, Hyalomma anatolicum, Hy. Dromedarii, Rhipicephalus sanguineus, R. turanicus, R. appendiculatus, R. annulatus and Haemaphysalis punctate. Among collected tick species, Hy. anatolicum was the most widely distributed tick species. The maximum tick prevalence was recorded on buffaloes 87 (38.49%) followed by goats 53 (23.45%), cattle or cows 51 (22.56%) and sheep 36 (15.92%). Male animals were least infested with tick species than female animals while maximum female ticks were recorded in the study area than male. In order to control ticks in the study area, appropriate methods are required.

Keywords: *Ticks; Dermacentor; Hyalomma; Rhipicephalus; Haemaphysalis; Pakistan.*

INTRODUCTION

Pakistan, a predominantly agricultural nation, has an agriculture sector that employs 43.4% of the total workforce and contributes 20.9% of the country's gross domestic product. As the second largest sector, it employs 45% of the workforce and contributes 21.2% of GDP (Gross Domestic Product). According to Mather and Abdullah (2015), the majority of its population—more than 70%—lives in villages and typically earns their living from animal husbandry.

Cite this article: Haider, A., Ayaz, S., Rafaaqat, A., & Fatima, G. (2022). Prevalence of Tick Species Infesting Domesticated Animals in Pakistan, *Ind. J. Pure App. Biosci. 10*(6), 17-22. doi: http://dx.doi.org/10.18782/2582-2845.8857

This article is published under the terms of the Creative Commons Attribution License 4.0.

According to Khan (2004), livestock includes a variety of domesticated animals, including camels, buffaloes, cattle, goats, sheep, poultry, horses, and donkeys (Mehmood et al., 2017; & Batool et al., 2019).

Numerous ways in which ectoparasites and endoparasites devastate the livestock sector. Ticks (Acari) are blood-sucking ectoparasites that infect both domestic and wild animals worldwide, including cows, sheep, buffalo, and calves, with protozoal, bacterial, and viral illnesses. Ticks are the carriers of the diseases ehrlichiosis, ricketsiosis, and anaplasmosis. In domestic animals, ectoparasitism results in weight loss, poor-quality hide, and decreased milk supply (Naqvi et al., 2017). The long-term effects of tick bites can be extremely harmful. Numerous tick species have the potential to paralyze their victims fatally. The most prevalent external parasites are ticks, which are present in both plain and hilly areas, resulting in blood loss and spreading various diseases. Among these elements, parasite infections are frequent and impact several livestock species globally. Due to their low output, certain tiny ruminants suffer economic losses. The primary source of meat, milk and other animal-derived dairy products comes from cats. Additionally, there are some additional goods like leather and the excrement is utilized as fuel. Ticks cause animal skin damage and impede meat and milk production (Sajid et al., 2007; Rehman et al., 2017; Ramzan et al., 2018; Mulugeta et al., 2019; & Sultana et al., 2015).

There were few research publications on tick infection incidence in Pakistan's household animals. This study aimed to determine the frequency of tick infection in animals raised in the study region. The findings of this study will be useful in managing these ectoparasites throughout the nation, but particularly in the study area.

MATERIALS AND METHODS

In Pakistan, this investigation was conducted from April 2020 to April 2021. After obtaining permission from the herdsmen in the study area, a total of 226 ticks were collected from 1023 domesticated animals, including large (buffaloes and cows) and small ruminats (sheep and goats). After carefully seizing the animals, the forecep was used to remove the ticks from different body parts of the host. Then ticks were taken to a laboratory, where they were examined under a microscope and their species was determined using previous morphological keys. All parameters like age, location, sex of hosts and ticks were noted on the separate sheet. Then tick prevalence was determined using previous researchers' procedures (Lihou et al., 2020; & Khan et al., 2019).

RESULTS AND DISCUSSION

A total of 226 tick specimens were collected from 1023 animals (136 sheep and 147 goats, 329 cows, 411 buffaloes), examined in the study area. Table 1 shows the host-wise data. It showed that total eight species belonging to four genera were collected and identified. The identified species were *Dermacentor marginatus, Hyalomma anatolicum, Hy. Dromedarii, Rhipicephalus sanguineus, R. turanicus, R. appendiculatus, R. annulatus* and *Haemaphysalis punctate.* Among collected tick species, *Hy. anatolicum* was the most widely distributed tick species. Many other researchers around the globe have reported the similar findings about dominancy of *Hy. anatolicum.* Genus Hyalomma is widely distributed and found in almost all types of hosts as reported by scientists or acarologists (Karim et al., 2017). Ramzan et al. (2019) had reported the similar findings that *Hy. anatolicum* is the most dominant species on small and large ruminants.

In the current study, no soft tick species belonging to Argasidae were collected and identified all were hard ticks. It was recorded that among identified species, *Hy. anatolicum* was found in the maximum population with a prevalence of 31.41%, while the minimum population of *R. turanicus* was recorded with 3.53% prevalence, as shown in figure 1.

Table1. Tick species caught from domesticated animals

Tick species	Buffaloes	Cattle	Goat	Sheep
Dermacentor marginatus	√	×	√	√
Hyalomma anatolicum	√	√	√	√
Hy. dromedary	√	×	√	√
Haemaphysalis punctata	√	×	√	√
Rhipicephalus sanguineus	√	√	√	√
R. annulatus	×	√	×	×
R. appendiculatus	×	√	×	√
R. turanicus	√	√	×	√

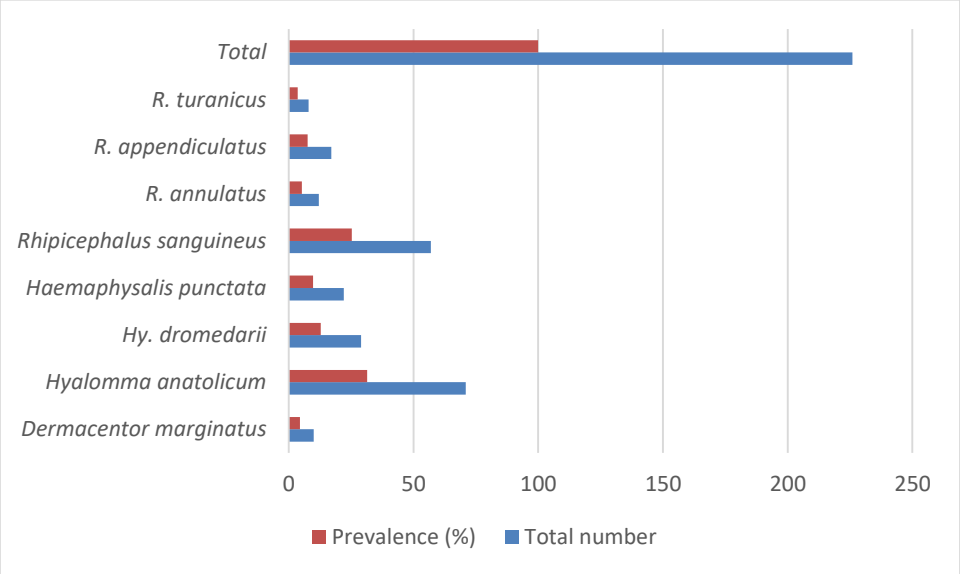

Figure1. Overall prevalence of tick species in the study area

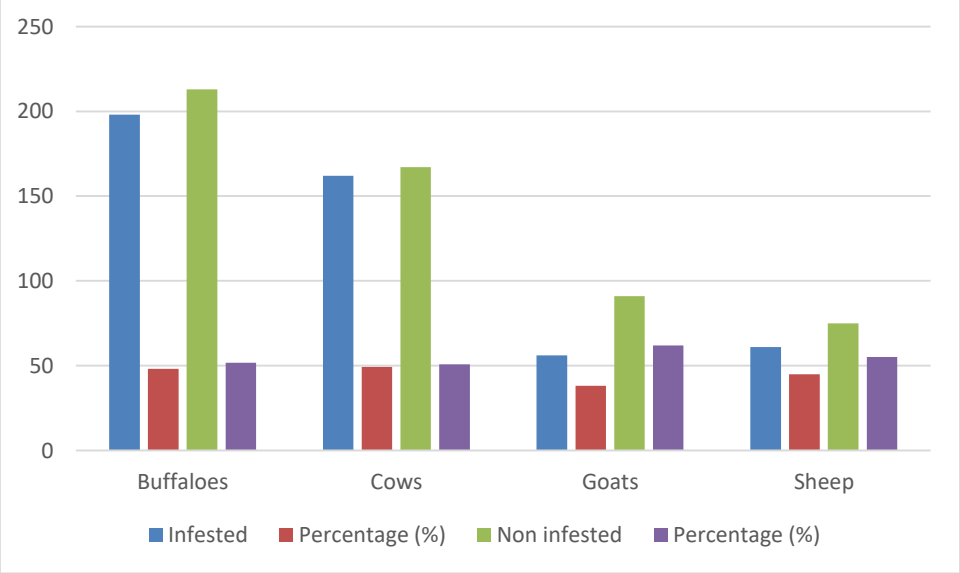

Figure2. Number of infested and non-infested animals in the study area

Among the total examined animals 48.17, 49.24, 38.09 and 44.85% buffaloes, cows, goats and sheep were found infested as shown in figure 2. Kabir et al. (2011), Shoaib et al. (2021), Gul et al. (2021) and Wolde and Mohamed (2014) reported similar findings about tick infestation on the host.

Table2. Host wise tick prevalence in the study area

Species	Buffaloes		Cattle		Goat		Sheep	
	Infested	%	Infested	%	Infested	%	Infested	%
D. marginatus	5	2.21	0	0.00	3	1.32	2	0.88
Hy. anatolicum	26	11.50	20	8.84	15	6.63	9	3.98
Hy. dromedarii	14	6.19	0	0.00	6	2.65	10	4.42
Hae. punctata	9	3.98	0	0.00	5	2.21	8	3.53
R. sanguineus	22	9.73	19	8.40	9	3.98	7	3.09
R. annulatus	0	0.00	12	5.30	0	0.00	0	0.00
R. appendiculatus	11	4.86	0	0.00	7	0.03	0	0.00
R. turanicus	0	0.00	0	0.00	8	0.03	0	0.00
Total	**87**	**38.49%**	**51**	**22.56%**	**53**	**23.45%**	**36**	**15.92**

The maximum tick prevalence was recorded on buffaloes 87 (38.49%) followed by goats 53 (23.45%), cattle or cows 51 (22.56%) and sheep 36 (15.92%) (Table 2). It was also recorded that among the buffaloes breed, neli ravi was most affected breed, among cattle breed, sahiwal was most infested breed, among goat breed beetal carried high burden of ticks while among sheep, the buchi breed carried high infestation. Sex wise data showed that the maximum population of female ticks were recorded in this study area which is mostly found on female animals than male animals. The different body parts, such as ear, tail, neck, genitalia and udder were found infested with more than one tick species. Among the body sites, udder was recorded the most preferable sites for tick feeding followed by tail, ears, genitalia and dewlap. In the male animals, testes were recorded most infested site for ticks attachment.

Our current study findings are almost similar to the previous study findings. Buffaloes accounted for the majority of livestock with tick infestations. This could be because of their thin skin and Pakistan's favorable climate and habitat for ticks. Our findings, which show that buffalo have higher tick infestation rates than other hosts, are not consistent with previous findings, which showed that cattle had higher tick infestation rates than buffalo did (Ullah et al., 2018; Shah et al., 2017; & Naz et al., 2012).

CONCLUSION

Ticks are obligate ectoparasites of different animals, birds, and humans. These feed on various body parts of their hosts**.** In this study, *Dermacentor marginatus, Hyalomma anatolicum, Hy. Dromedarii, Rhipicephalus sanguineus, R. turanicus, R. appendiculatus, R. annulatus* and *Haemaphysalis punctate* were identified. Among collected tick species, *Hy. anatolicum* was the most widely distributed tick species.

Acknowledgement:
The authors are highly thankful to the Zoology Department of concern Institute.

Funding:
The author(s) received no financial support for this article's research, authorship, and publication.

Conflict of interest:
The authors have no conflict of interest.

Author contribution:
All authors play equal contributions.

REFERENCES

Batool, M., Nasir, S., Rafiq, A., Yousaf, I., & Yousaf, M. (2019). Prevalence of tick infestation in farm animals from Punjab, *Pakistan. Pak Vet J, 39*(3), 406-410. http://dx.doi.org/10.29261/pakvetj/2019.089.

Gul, S., Ahmed, S., Usman, T., Khan, K., Ayaz, S., Gul, S., & Ali, N. (2021). Prevalence of *Anaplasma marginale* in tropical area of Khyber Pakhtunkhwa, *Pakistan. Pak. J. Zool. 53*, 1977–1980.

Kabir, M. H., Mondal, M. M., Eliyas, M., Mannan, M. A., Hashem, M. A., Debnath, N. C., Miazi, O. F., Mohiuddin, C., Kashem, M. A., Islam, M. R., & Elahi, M. F. (2011). Epidemiological survey on investigation of tick infestation in cattle at Chittagong district, *Bangladesh Africa Journal of Microbiology Research 5*(4), 346-352.

Karim, S., Budachetri, K., Mukherjee, N., Williams, J., Kausar, A., & Hassan, M. J. (2017). A study of ticks and tick-borne livestock pathogens in Pakistan. *PLoS Negl Trop Dis 11*(6), e0005681.

Kemal, J., Muktar, Y., & Alemu, S. (2016). Distribution and prevalence of tick infestation in cattle in Babille district, eastern Ethiopia.

Khan, A., Nasreen, N., Niaz, S., Shah, S. A. S., Mitchell, R. D., Ayaz, S., Naeem, H., Khan, L., & De León, A. P. (2019). Tick burden and tick species prevalence in small ruminants of different agencies of the Federally Administered Tribal Areas (FATA), Pakistan. *Int. J. Acarol. 45*, 374–380.

Lihou, K., Vineer, H. R., & Wall, R. (2020). Distribution and prevalence of ticks and tick-borne disease on sheep and cattle farms in Great Britain. *Parasites Vectors 13*, 406.

Mather, T. N., & Abdullah, G. A. (2015). Building molecular biology capacity for preventing tick-transmitted diseases in Pakistan. *Pak-USA Sci Technol Coop Program 11*, 23-15.

Mehmood, K. H., Zhang, A. J., & Sabir, R. Z. (2017). A review on epidemiology, global prevalence and economical losses of fasciolosis in ruminants. *Microb Path 109*, 253-62.

Mulugeta, A., Beredu, Y., & Biruk, A. (2019). Ixodidae ticks of bovine; Prevalence and major species identification in Soddo Zuria Districts of Wolaita Zone, Ethiopia. Approaches in Poultry, Dairy & Veterinary Science. 6:000632.

Naqvi, M. A. H., Khan, M. K., & Iqbal, Z. (2017). Prevalence and associated risk factors of haemoparasites, and their effects on hematological profile in domesticated chickens in District Layyah, Punjab, Pakistan. *Prev Vet Med 143*, 49-53.

Naz, S., Maqbool, A., Ahmed, S., Ashraf, K., Ahmed, N., Saeed, K., Latif, M., Iqbal, J., Ali, Z., & Shafi, K. (2012). Prevalence of theileriosis in small ruminants in Lahore-Pakistan. *J. Vet. Anim. Sci. 2*, 16–20.

Ramzan, M., Unsar, N. U., Syed, H. M. B., Ghulam, M., & Alamgir, A. K. (2018). Knowledge, attitude and practices of herdsmen about ticks and tick –borne diseases in district Multan. *Pakistan Entomologist. 40*, 13–18.

Ramzan, M., Naeem-Ullah, U., Abbas, H., Adnan, M., Rasheed, Z., & Khan, S. (2019). Diversity of hard ticks in goats and sheep in Multan, Punjab, Pakistan. *Int. J. Agric. Biol. Res. 35*, 7–9.

Rehman, A., Nijhof, A. M., Sauter-Louis, C., Schauer, B., Staubach, C., & Conraths, F. J. (2017). Distribution of ticks infesting ruminants and risk factors associated with high tick prevalence in livestock farms in the semi-arid and arid agro-ecological zones of Pakistan. *Parasites and Vectors. 10*, 190.

Sajid, M. S., Iqbal, Z., Khan, M. N., Muhammad, G., & Iqbal, M. U. (2007). Effect of *Hyalomma* ticks (*Acari: Ixodidae*) on milk production of dairy buffaloes (*Bos Bubalus Bubalis*) of Punjab (Pakistan). *Italian Journal of Animal Sciences. 6*, 939–941.

Shah, S. S. A., Khan, M. I., & Rahman, H. U. (2017). Epidemiological and hematological investigations of tick-borne diseases in small ruminants in Peshawar and Khyber Agency, *Pakistan. J. Adv. Parasitol. 4*, 15–22.

Shoaib, M., Rashid, I., Akbar, H., Sheikh, A. A., Farooqi, S. H., Asif, M., Khan, M.

A., Mahmood, S., & Khan, F. A. (2021). Prevalence of *Rhipicephalus* and *Hyalomma* ticks in cattle and associated risk factors in three districts of Khyber Pakhtunkhwa, Pakistan. *Pak. J. Zool. 53*, 777.

Sultana, N., Shamim, A., Awan, M., Ali, U., H assan, M., & Siddique, R. (2015). First pilot study on the prevalence of tick infestation in livestock of Tehsil Hajira, Rawalakot, Azad Kashmir. *Advances in Animal and Veterinary Sciences. 3*, 430–434.

Ullah, N., Durrani, A. Z., Avais, M., Ahmad, N., Ullah, S., Ullah, S., Khan, M. A., Haq, I. U., & Khan, N. U. (2018). A first report on prevalence of caprine theileriosis and its association with host biomarkers in Southern Khyber Pakhtunkhwa, Pakistan. *Small Rumin. Res. 159*, 56–61.

Wolde, A., & Mohamed, A. (2014). Prevalence of ixod. id ticks on Bovine in Soddo zuria districts, Wolaita Zone, Ethiopia, *Acta Parasitolgica Globalis 5*(3), 188-197.