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Kiran Akhtar

Department of Zoology,
Government Post Graduate
College, Karak, KP, Pakistan

Rida Anees

Department of Zoology,
Government Post Graduate
College, Karak, KP, Pakistan

Tahira Karim

Department of Zoology,
Government Post Graduate
College, Karak, KP, Pakistan

Shafi Ullah Gul

Department of Zoology,
Government Post Graduate
College, Karak, KP, Pakistan

Hameed Ur Rehman

Department of Zoology, Kohat
University of Science &
Technology, KUST-26000, Kohat,
KP, Pakistan

Asif Ali

PMAS Arid Agriculture University
Rawalpindi, Pakistan

Muhammad Ijaz Wazir

Department of Zoology, Kohat
University of Science &
Technology, KUST-26000, Kohat,
KP, Pakistan

Faizan Khan

Department of Zoology, Kohat
University of Science &
Technology, KUST-26000, Kohat,
KP, Pakistan

Safiullah Khan Achakzai

Center for Advance Studies in
Vaccinology & Biotechnology
(CASVAB) University of
Balochistan Quetta, Pakistan

Correspondence

Shafiullah Gul

Department of Zoology,
Government Post Graduate
College, Karak, KP, Pakistan

Prevalence of tick infestation in cows of various Regions of district Karak, Pakistan

Kiran Akhtar, Rida Anees, Tahira Karim, Shafi Ullah Gul, Hameed Ur Rehman, Asif Ali, Muhammad Ijaz Wazir, Faizan Khan and Safiullah Khan Achakzai

Abstract

The aim of this study was to determine the tick's infestation and identification of different species of tick in the cows of three different villages (Tarkha Koi, Angoor Abad, and Kach Banda) district Karak, Khyber Pakhtunkhwa province of Pakistan. The study was conducted from August 2018 to November 2018. A total of 400 cows were observed in these three villages and 100 cows out of 400 does not contain any ticks. While from the rest 300 cows the 1000 ticks were collected. These ticks were collected from different body parts of cows. The primary body area of infestation by ticks (head, thorax, abdomen, udder and tail) ranged highest in tail and udder as compared to the lower abdomen, head and tail. In addition, we identify the five species of ticks (*Rhipicephalus avertisi*, *R. appendiculatus*, *Hyalomma truncatum*, *Ixodes ricinus*, *Boophilus microplus*) in district Karak, Pakistan.

Keywords: prevalence, ticks, species, ruminant

Introduction

Ticks are arthropods which belong to the phylum: Arthropoda; class: Arachnida; Order: Acari and three major families viz: Ixodidae (hard ticks), Argasidae (Soft ticks) and Nuttallellidae (of which little is known about), with approximately 899 species [1]. The medical and economic importance of ticks has been recognized a long time ago, due to their ability to transmit diseases in humans and animals by transmitting certain pathogens such as: protozoan, rickettsia and viral diseases of livestock [2]. Ectoparasitism cause weight loss, low hide quality and reduced milk production in domestic animals [3]. The systemic effects of tick bites can be very dangerous. Many species of ticks can cause fatal paralysis in their hosts [4]. The ticks are the most common external parasites and can be found in both hilly and plain areas. Which causing the blood loss and involve in the spreading of different diseases. Ticks act as a vector for some protozoan diseases such as babesiosis. Many researcher has been documented the importance of ticks and tick- borne diseases throughout the world. And also as well as in Pakistan many researchers worked on the prevalence of tick infestation and economical losses [5]. In Pakistan, the prevalence of tick infestation has been observed that will be approximately 50% [6]. Most of livestock owner's sale their animals and also their products to earn money for their survival. But there are certain factors which affect badly the production potential of their animals. Among these factors, the parasitic infestations are common, which affect the different livestock species throughout the world. These causes the economic loss in term of low productivity in some small ruminants [7]. Cattles are used as a main source of meat, dairy animals used for milk and other dairy products of animals. And there are some other products such as leather while the dung used as fuel [8]. Tick damage the skin of animals and also interfere with meat and milk production. The most commonly tick borne diseases are anaplasmosis, babesiosis, theileriosis and heart water; ticks also cause non-specific symptoms such as anemia, toxicosis and paralysis [9]. Pakistan produces about 1.6 billion tons of milk and 4 million hides per year from buffaloes [10]. The ticks are actively found during summer and spring as compare to other season [11]. In Pakistan, there were limited research reports related to the prevalence of tick infestation found in domestic animals specially ruminants. And this study were conducted only in few climatic regions [12-19]. A recent study conducted in two districts of lower Punjab indicates that the prevalence of bovine tick infestation (BTI) exceeds 50% [20-21]. The winter tick is one-host species that feeds large ungulate animals.

The larvae first attack on host animals from early October through April, molt to nymphs on the host, feed then molt to the adult stage while still they are present on their host. Both male and female take food and mate, then the female drop to the ground and lay eggs. The tick populations on the host reach to peak between late October and mid-February^[22]. The objectives of the present study were to determine the prevalence of tick infestation in the study area, and identify the different species of ticks.

Material and Methods

Study area

Karak is north-south district of Kpk. It is situated at 70.40° to 71.30° at longitudes 32.48° to 33.23° north latitudes. The total area of district Karak is 3372 sq-km. the total population 4, 30,000. Between 1940 and 1982 it was part of a district Kohat, but on July 1, 1982, it has been upgraded is an independent district. Topographically Karak consists of broken hills and some 600–1400 meter above the sea level. Karak is the most educated and richest city of abundance deposits of oil, gas, uranium and salt in Pakistan which have a main role in the economy of the country. The weather of district Karak hot in summer and very cold in winter, it is a

semi-arid region.

Tick collection

The ticks were collected from cows during the months of August to November of year 2018. A total 400 cows was observed and about 1000 ticks were collected. The ticks were collected from various body regions of animals such as (head, thorax, abdomen, udder and tail) with the help of forceps without giving any harm to them. Tick’s burden was divided into three categories i.e. low, moderate and high burden groups. Animals having 1-25, 26-50 and >50 ticks were designated as low, moderate and high burden groups, respectively^[23]. The collected tick’s specimens were stored in labeled disposable containers having 70% ethanol solution to preserve their morphological features.

Ticks identification

Identification of tick species and morphological study for species identification of ticks was conducted with the help of a microscope in the laboratory of the zoology department of GPGC Karak. The tick genera naming was made according to the keys and descriptions^[24-26].

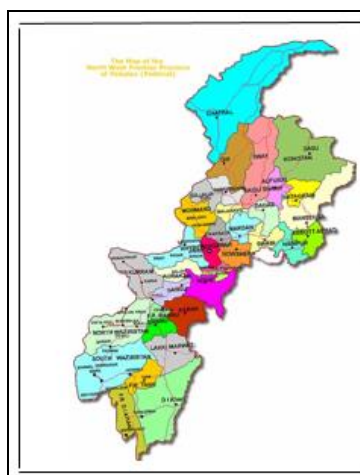


Fig 1: Map of KP districts Pakistan.



Fig 2: Map of district Karak KP Pakistan.

Results

A total 400 hundred ruminants were examined in three villages of district Karak. Only 300 hundred cows contain 1000 ticks’ species while the one hundred cows are free from ticks.

In total, 1000 ticks representing five species were collected from 300 buffaloes. These ticks were collected from different

body parts of cows such as (head, thorax, abdomen, udder, tail). *Hyalomma truncatum* (n=500), *Rhipicephalus Avertsi* (n=250), *Rhipicephalus appendiculatus* (n=120), *Ixodis ricinus* (n=100), *Rhipicephalus microplus* (n=30). *Hyalomma truncatum* was the most abundant species in these three villages of district Karak KP Pakistan.

Table 1: Species of ticks found in the district Karak

S. No	Kingdom	Phylum	Class	Order	Family	Genus	Species
1	Animalia	Arthropoda	Arachnida	Ixodida	Ixodidae	Ixodes	<i>I. ricinus</i>
2	Animalia	Arthropoda	Arachnida	Ixodida	Ixodidae	Hyalomminae	<i>H. truncatum</i>
3	Animalia	Arthropoda	Arachnida	Ixodida	Ixodidae	Rhipicephalus	<i>R. appendiculatus</i>
4	Animalia	Arthropoda	Arachnida	Ixodida	Ixodidae	Rhipicephalus	<i>R. avertsi</i>
5	Animalia	Arthropoda	Arachnida	Ixodida	Ixodidae	Rhipicephalus	<i>R. boophilus</i>

Table 2: Total count of tick species on different body parts of domestic cows.

Body parts	No. of ticks
Head	200
Tail	150
Abdomen	300
Udder	310
Thorax	40

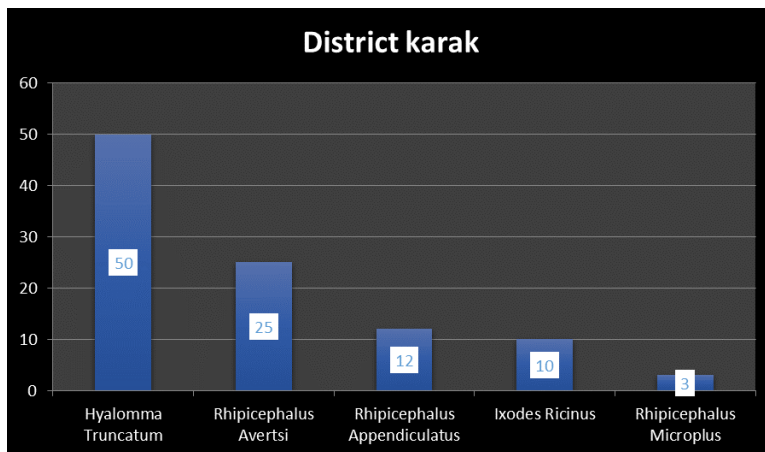


Fig 3: Graphical representation of tick species in district Karak.

Morphological characteristics of the Ticks different species.



Fig 4: *Rhipicephalus Avertsi*



Fig 5: *Ixodes Ricinus*



Fig 6: *Rhipicephalus Appendiculatus*



Fig 7: *Hyalomma truncatum*



Discussion

The aim of the present study was to find out the tick fauna of three villages of district Karak. During the present survey, one thousands of ticks in the three villages of district Karak were observed. The ticks were explained up to species level and their systematic representation was given in the table 1. During this study five species of ticks were identified, these species belong to one class Arachnida, one order Ixodida, one family Ixodidae, three genus Ixodes, Hyalomminae and Rhipicephalus and five species *I. ricinus*, *H. truncatum*, *R.*

appendiculatus, *R. avertsi* and *R. boophilus*. Out of which five hundred of tick species (n=500) belong to *Hyalomma truncatum*, two hundred fifty (n=250) belongs to *Rhipicephalus avertsi*, one hundred twenty (n=120) belong to *Rhipicephalus appendiculatus*, one hundred (n=100) belong to *Ixodis ricenus*, and thirty ticks (n=30) belong to *Rhipicephalus microplus*. The tick infestation is a worldwide problem also found in Pakistan. Excluding winter the hot and humid condition were suitable for the wide variety of blood sucking parasites especially for ticks [27]. The relationship between host and ticks was depending on the season and time for the growth and development of ticks [28]. The summer temperature of Pakistan is generally suitable for the activity, growth, development, and reproduction of ticks. The variation may be due to the change in environmental conditions that greatly affect the natural balance of ticks. Change in temperature and rainfall have been reported to affect the distribution of ticks vectors [29]. Reported 85% humidity and 26 °C to 37 °C temperature requirements for growth and reproduction of ticks [30]. This is in contrast to previous studies and suggests that it is not favorable for the ticks to be present in higher humidity [31]. As the ticks were exposed to in excess of saturation thus limiting their activities [32]. The temporal zones of the KP province of Pakistan exhibited non-significant difference with tick burden and tick infestation which is contradicted to the studies conducted in other provinces of Pakistan [33-35]. Broad research studies were conducted on the prevalence of the tick fauna and related risk factors in different districts of Pakistan. Seven tick species were obtained from sixteen districts of Pakistan, with a prevalence ranging from 6.99% to 86.50% in the bovine and caprine populations of various study areas during 1971 to 2015 [36-47]. Male having high tick infestation rates as compare to female cattle, this result agrees with reports of Hitchcock who reported that male are more infested, because males are mostly used for forming activities and moved from place to place to search food and get infested with ticks, while female are mainly confined for breeding purposes so less exposed to tick infestation [48]. The prevalence of tick infestation changes from region to region. There are some factors that influence the prevalence of ticks such as Host, management and environmental factors (agro-ecological and geo-climatic conditions) [49]. Some of cattle linked with ticks genera like *Hyalomma*, *Rhipicephalus* and *Amblyomma* were presented in previous study proposed by [50]. Lack of awareness and lack of veterinary facilities about the treatment of infested animals are major reason for higher tick infestation. It was also observed that the cattle's inhygienic condition the infestation rate are less as compare with the poor hygienic condition. Furthermore, it was observed that the farms most effective control of tick infestations, Acaricide treatment should be suggested twice in rainy period and once each in summer and winter seasons.

Conclusion

From current study, it was concluded that the ticks causes the weight loss and reduce the milk production in cows. Absence of rural poultry, not performing acaricide treatments, traditional rural housing systems and grazing were important risk factors associated with higher tick prevalence in livestock farms. Age, gender, breed and animal species significantly affected the intensity of tick infestation. The outcomes of this study will be useful in the planning of integrated control strategies for ticks and tick-borne diseases in Pakistan.

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