OPEN ACCESS

Kashf Journal of Multidisciplinary Research
Vol: 02 - Issue 07 (2025)
P-ISSN: 3007-1992 E-ISSN: 3007-200X
https://kjmr.com.pk

KNOWLEDGE AND PRACTICES REGARDING TICK-BORNE DISEASE AND TICK PREVENTION STRATEGIES AMONG HIGH SCHOOL STUDENTS IN KECH DISTRICT, BALOCHISTAN

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Article Info

Abstract

Ticks are the blood sucking parasitic arthropods, different from other arthropods sub-phylum. Ticks are capable of transmitting tick-borne diseases (TBDs) in domestic and wild animals and human beings. There a serious lack of knowledge among people especially in youth regarding tick and tick-borne diseases (TBDs). This study was a KAP based study performed school students of grade 9th and 10th in different schools in Absor region of Turbat District Kech, Balochistan in April to July 2025. A structured questionnaire was designed to access the knowledge and practice of students towards animals and ticks and face to face interviews also. The study results in 60% participants that were aware of ticks, but a very few of them have knowledge of TBDs. The univariate analysis shows that the participants who practiced in vaccination were only 22% [OR = 0.93 (95% CI: 0.38-2.25)]. Forty five percent observed the tick infestations [OR = 0.91 (95% CI: 0.37-2.26)]. Overall, only 52.50% of respondents have a guidance of veterinary clinics nearby them [OR = 0.91 (95% CI: 0.36-2.29)]. Majority, about 73.75% were the residence of rural areas [OR = 0.80 (95% CI: 0.31-2.04)]. Despite knowing about ticks the knowledge was critical regarding tick and TBPs among the students interviewed. The findings of the study underline the need of fulfilling knowledge gaps and initiating public awareness programs and educating children by organizing workshops in schools regarding tick prevention and tick control strategies.

Keywords:

Tick, tick-borne disease, tick-borne pathogens, ruminants, infestation, students.

Introduction

Tick are the members of the class Arachnida and are distinct from insects. They lack features like antennae and wing pads. There are nine genera and about 53 tick species infesting domestic animals in Pakistan. Majority of these tick specie belongs to three genera including Haemaphysalis, Hyalomma and Rhipicephalus. Not being a seasonal ectoparasite, ticks are prominent in various hot and humid regions around the world. Some tick tick species are capable of tolerating extremely low temperature, for example Ixodes uriae is a tick specie that is reported from Arctic and Antarctic regions, parasitizing penguins (McCoy et al., 2023). Ticks are capable of infesting a various vertebrate host including amphibians, birds, mammals and reptiles (Brites-Neto et al., 2015). The prevalence of ticks is also influenced by several environmental factors such as temperature and humidity, these factors also have an impact on its habitat and lifecycle affecting their growth and reproductively pattern (Hauser et al., 2018).

Pakistan is an agricultural country with a profitable environment for the production of livestock including sheep, goat, cattle and buffalo. Sheep plays a very important role in dairy sector in Pakistan after China and India, which have considerable goat and sheep raising sector (Jabbar et al., 2015). Among the vector borne diseases, the most alarming pathogen is tick-borne pathogen (WHO, 2014). Most of the zoonotic diseases are transmitted by ticks such as tularemia, tick-borne relapsing fever, rocky-mountain spotted fever, anaplasmosis and ehrilchiosis (Hussain et al., 2023). Developing countries like tropical and sub-tropical countries are gathering on a common consent to face the economic challenge exerted by TBDs on livestock sector worldwide (Sajid et al., 2017). Piroplasmosis is a protozoal disease caused by Babesia and Theileria, while Anaplasma and Ricettsia are responsible of causing anaplasmosis and ricettsiosis, and have a considerable loss on livestock. Ruminants are highly vulnerable to TBPs (Khan et al., 2022).

Tick are the blood sucking haemoparsite, and are different from other arthropods. They are not just capable of infesting ruminants but also play a significant role the transmission of numerous tick-borne pathogens in humans, including young and elderly (Bryant & Marshall, 2000). For instance, Lyme disease, when transmitted to humans, can lead to various clinical symptoms. Young individuals may experience the development of circular rashes on different parts of the body, swelling in the knee, facial paralysis, and even drowsiness, which can adversely affect their school performance, particularly in areas where Lyme disease is endemic (Rehman et al., 2017). It is important to note that in regions where the infection is not prevalent, encountering children with these symptoms is rare, and additional diagnostic measures should be considered, unless the individual has visited an endemic area (Bryant & Marshall 2000).

Methodology

Ethical Approval and Consent

The departmental admission committee (DAC) and Advanced Studies & Research Board of University of Balochistan has given the approval on 7th April 2025 for this study (Reg No: UoB/Reg:GSO/135). Students and their parent's consent were taken for sampling and questionnaire filling. The Animal Act, 1890 was followed for not harming any kind of animal during the collection of data and collecting ticks from the infested hosts in the research.

Study Area

District Kech, located in the Balochistan region of Pakistan's southwest corner. This district features an arid climate and faces a significant risk of flooding as well as the potential for drought conditions. It shares its borders with Kech district to the south, Panjgur to the west, and Awaran district to the east. To the north lies the Makran mountain region, while the Arabian Sea stretches to the South. Agriculture predominantly drives the local economy, with numerous fields cultivating crops like dates, mangoes, and other fruits, providing a habitat for various arthropods, including ticks. The study was performed specifically in the Absor area in Turbat district Kech. Four schools were visited for the KAP study including Govt. Higher Secondary School Absor, Govt. Girls Middle School, Balochi bazar, Absor, Khuda Yousaf Boys High School, Absor and Govt. Boys High School, Absor.

Questionnaire Data Collection

No previous research has been conducted on the knowledge and practices of students in Balochistan regarding TBDs. To investigate a KAP survey was performed, a questionnaire was designed with at least 30 questions divided into three sections: the first one gathering demographic information, the second one focused on knowledge, and the third on practices. This questionnaire was created in English, then translated into the local language. To safeguard the accuracy of the results, the questionnaire was piloted with a few students. Names of participants (i.e. students) was remained anonymous and not shared with anyone without their consent. Prior to the research, an oral and written consent was taken from all students. The questionnaire was designed in such a way that it can be completed within half an hour, and participants were given a short training session upon completion of it. The teaching and non-teaching staff was not included in the study because the study was based on the KAP on students only. Students of just 9^{th} and 10^{th} grades were involved in the study, juniors were not because the students of lower classes are not that mature and knowledgeable to fill the questionnaire and answer the questions.

Statistical Analysis

For statistical analysis data was first entered in the Microsoft Excel Sheet and then one sample t-test was applied using Microsoft tool kit (2009). Results were considered significant when $p > 0.05$.

Results

1. Demographic Studies

In our study, a survey was performed consisting of 80 high school students. The majority of respondents ($n = 15$, 81.25%, $p > 0.35$) were between 15-16 years. Majority 73.75% ($n = 59$, $p > 0.28$) of the participants were inhibiting rural areas while some (26.25%) reside in urban areas. The study consists of most 9^{th} standard students 81.25% ($n = 65$, $p > 0.35$) while smaller number (18.75%) were in 10^{th} standard. In terms of family livestock ownership, 38.75% ($n = 31$, $p > 0.28$) of participants reported owning livestock, while 61.25% did not own. Family sizes of the respondents varies, 66.25% ($n = 53$) students were having a family of 5-10 members, 23.75% had more than 10, and 10% had 1-5 family members. Additionally, 75% ($n = 60$, $p > 0.29$) of participants owned pets at home. Regarding the guardian's

occupation of the students, 75% (n = 60, p > 0.29) were self-employed and 25% were government employees.

Table 1. Socio-Demography of Students

Demographic category	Variables	Frequency	%age	p-value
Age of the Students	14-15	15	18.75	0.35
	16-17	65	81.25	
Urbanity of Residence	Urban	21	26.25	0.28
	Rural	59	73.75	
Educational Standard	Ninth	65	81.25	0.35
	Tenth	15	18.75	
Livestock Ownership by Parents	Yes	31	38.75	0.14
	No	49	61.25	
Number of Family Members	1-5	8	10	0.18
	5-10	53	66.25	
	More than 10	19	23.75	
Pet at Home	Yes	60	75	0.29
	no	20	25	
Guardian Occupation	Self-business	60	75	0.29
	Government employee	20	25	

2. Knowledge Related Survey

Knowledge related questions are mentioned in table 2. Most of the respondents were able to identify ticks (n = 48, 60%, p > 0.12). However very few participants (n = 22, 27.5%, p > 0.26) were having a relevant knowledge about tick-borne diseases (TBDs), while majority were unaware of TBDs. Participants reported tick infestation was higher in summer (n = 30, 37.75%, p < 0.03) followed by autumn (n = 25, 31.25%) winter (n = 25, 7.5%) and least in spring (n = 19, 23.75%). Most of the participants (n = 42, 52.5%, p < 0.03) mentioned the location of veterinary clinics near their homes. About 40% (n = 32, p > 0.12) of participants could differentiate between tick and insects. Among the total respondents 77.5% (n = 62, p > 0.27) believe that TBDs are contagious. A very few of them (26.25%, n = 21, p > 0.28) were aware of zoonotic nature of ticks.

Table 2. Summary of Knowledge Related Questions

Questions	Response	Frequency	Percentage	p-value
Identify ticks	Yes	48	60	0.12
	No	32	40	
Awareness about TBDs	Yes	22	27.50	0.26
	No	58	72.50	
Season of tick infestation	Summer	30	37.50	0.03
	Winter	6	7.50	
	Autumn	25	31.25	
	Spring	19	23.75	
Knowledge about veterinary center	Yes	42	52.50	0.03
	No	38	47.50	
Differentiation of ticks and insects	Yes	32	40	0.12
	No	48	60	
Are TBDs contagious?	Yes	62	77.50	0.27
	No	8	10	
	Do not know	10	12.50	
Knowledge of zoonosis	Yes	21	26.25	0.28
	No	59	73.75	

3. Farm practice related response

The response of practices shows that 43.75% ($n = 35$, $p > 0.07$) of participants did not observed the presence of ticks. A low percentage ($n = 22$, 27.5%, $p > 0.06$) of the respondents had vaccinated their animals, while most of them remain their animals unvaccinated ($n = 58$, 72.5%). Only about 22.5% ($n = 18$, $p > 0.02$) of participants follow precautionary measures. The response shows that a very few ($n = 9$, 11.25%, $p > 0.41$) had sold their infested animals in the animal markets. A majority of them ($n = 61$, 76.25%, $p < 0.00$) applied acaricides on infested animals. Mostly the animals ($n = 72$, 90%, $p > 0.42$) were kept in shelter during sunny days.

Table 3. Summary of Practice Related Questions

Questions	Response	Frequency	Percentage	p-values
Ticks Presence	Yes	45	56.25	0.07
	No	35	43.75	
Vaccination Use	Yes	22	27.5	0.06
	No	58	72.5	
Use of Precautionary Measures	Yes	18	22.5	0.02
	No	62	77.5	
Sell Infested Animals	Yes	9	11.25	0.41
	No	71	88.75	
Use of Acaricides	Yes	61	76.25	0.00
	No	19	23.75	
Provision of Animal's Shelter	Yes	72	90	0.42
	No	8	10	

4. Risk Factor Analysis Associated with Ticks

The research analysis of risk factors, as shown in the table, demonstrated that the participants who practiced vaccinations (n = 20) reported an odds ratio of 0.93 (95% CI: 0.38-2.25) compared to those who did not vaccinate (n = 24), with a p-value of 0.52. The presence of ticks (n = 14) resulted in an OR of 0.91 (95% CI: 0.37-2.26) compared to no tick presence (n = 22), with a p-value of 0.51. The availability of veterinary centers (n = 12) showed an OR of 0.91 (95% CI: 0.36-2.29) compared to those without access (20), with a p-value of 0.52. Those living in rural areas (n = 11) had an OR of 0.80 (95% CI: 0.31-2.04) compared to urban residents (n = 22), with a p-value of 0.41.

Table 4. Univariate analysis to identify risk factors was performed using 2X2 contingency tables. Estimated odd ratio (OR), 95% confidence interval (CI), p-value < 0.05 were deemed to have statistical significance.

Risk factors	Level	Yes	No	OR(CI)	p-value
Vaccination	Yes	20	17	0.93(0.38-2.25)	0.52
	No	24	19		
Ticks presence	Yes	14	18	0.91(0.37-2.26)	0.51
	No	22	26		
Veterinary center	Yes	12	19	0.91(0.36-2.29)	0.52
	No	20	29		
Urbanity	Rural	11	18	0.80(0.31-2.04)	0.41
	Urban	22	29		

Discussion

In this study, majority of the respondents were between the ages of 15 and 16 because they were students of ninth and tenth grades. Most of them lives in rural areas. This demographics distribution is consistent with previous research, which highlights the distinct educational challenges faced by children in rural areas, including limited approach to resources and extracurricular activities that limits their academic achievement and participation (Kache, et al., 2023; Boehm, et al., 2025). Most of the 9th standard students participated in this study, these students are at a critical stage in their academic carriers, and where they will face different challenges such as increased stress and concerns related to their studies (Pharris-Ciurej, et al., 2012). In our demographic survey 38.75% respondents reported that their family owned farm animals. This shows a rural agricultural lifestyle; however, this lifestyle can cause negative impact on student's ability to concentrate on studies and to manage time (Luqman, et al., 2022). Regarding to family size, most of participants came from large families with about five to ten members. This suggests that large families may hinder students' academic progress due to limited resources and family responsibilities

(Azumah et al., 2017). Most of the respondent's families were self-employed. This may indicate an emphasis on local economies and possibility of changing income levels, which can influence aid and encouragement for high school (Williams & Horodnic, 2018). On the other hand, the presence of pets in most of the student's homes may indicate a devoted parental environment, which has a direct influence on improved mental health and the educational achievement of students (Endo et al., 2020).

The survey regarding knowledge, suggest that respondent's knowledge of ticks and tick-borne disease (TBDs) is considerably less. While most of the respondents could identify ticks but a concern reveals that only few of them have knowledge of TBDs. Initials studies supports the findings that the public awareness about zoonotic diseases, mainly those transmitted by ticks is drastically less (Cuadera et al., 2023; Namgyal et al., 2021). Reroute with the earlier reports, recognition of the environmental factors that affects tick activity and population, majority of the participants reported maximum tick infestation in summer and fall season (Khan et al., 2022). More than fifty percent of respondents were having knowledge of veterinary clinics which were adjacent to their homes and towns, showing that there is a chance of local veterinarians in there (Nuvey et al., 2023). It is noticed that TBDs spread by our lack of understanding about the biological processes behind its transmissions, because TBDs are definitely spread by tick bites instead of by direct contact between people. Public awareness regarding the spread of pathogens is very necessary (de la Fuente et al., 2023). About 40% of the participants were able to distinguish between tick and insects, showing elementary and entomological understanding gap that can promote the unawareness and inhibit successful preventive measures against tick and TBDs (Kopsco et al., 2021).

The majority of respondents reported that they have never noticed the presence of tick in their surroundings. Which emphasizes the need of awareness campaigns and addition of topics related to ticks and other insects and diseases caused by them in the curriculum (Eleftheriou et al., 2023). A very small percentage of participants reported of having their animals vaccinated. This practice shows a poor approach towards tick control (Hopker et al., 2021). Similarly, few respondents mentioned using precautionary measures in farm despite evidence that proper information on their use can significantly reduce tick infestations (Herrington, 2004). Some participants sell their infested animals. This finding shows a necessity of educating students and their family members regarding the spread of TBDs in order to control the tick prevalence and sell of infested animals (Ullah et al., 2024). About seventy-six percent of respondents reported the use of chemical treatment to prevent tick infestation, which is consistent with standard tick management practices. The previous studies show that, most of the farmers treated tick infestation with traditional acaricides (Mutavi et al., 2021). Another beneficial practice reported in the study that majority of the participants provide shelter to the animals, this will reduce the sun exposure and less favorable environment for tick growth (Gabriel et al., 2025).

Risk factor analysis identified four key contributors to the spread of ticks. Participants shows a positive response regarding participation in vaccination programs. Studies have shown that vaccination along with the prevention to illness, reflects a community behavioral response towards disease prevention (Piot et al., 2019). It was observed that the tick presence is not the sole risk factor for the transmission of disease, other factors such as environment, preference of host for the specific tick specie also play a vital role in transmission of TBDs (de la Fuente et al., 2023). The availability of veterinary clinics proves good for animal health. The findings reported in one study shows an improved access to veterinary clinics improves

animal health outcome in turn, minimize the risk of zoonotic infections (Agrawal & Varga, 2024). Additionally, it was also reported that urban areas may have a decreased tick transmission risk due to a various factor including socioeconomic status, exposure levels and access to healthcare (Brînduşe et al., 2024).

Conclusion

This study conclude that the tick infestation is an emerging issue in study district, which can lead to a significant loss of livestock including domestic small ruminants. Although, half of the participants were able to identify the ticks, on the other hands majority of participants were unaware of TBDs. There is a need to address this issue of tick and TBDs by taking proper campaigning initiatives on government level especially in rural setups. Educating youth and children regarding tick and TBDs is very necessary to control this issue from getting worse in future.

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