

Research Article

Morphological identification and prevalence of hard ticks (family; Ixodidae) in cows at district Pishin, Baluchistan Pakistan

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Abstract

The present work was conducted on various aspects of tick prevalence in different breeds of cows at District, Pishin. The research trial revealed a high prevalence of tick infestation in cows at District, Pishin. A total of 200 cows including from different breeds of varying age was observed. Total prevalence was observed as 29% in different breeds of cows (Sindhi, Sahiwal, Tharparkar, American, and Austrian). In male cows, the prevalence was noted as 33% and in female cows, the prevalence was 25%. Males were found to be more infested than females. A total of 443 numbers of ticks were observed in various parts of the body. Prevalence was 45.59%, 27.53%, 13.76%, 8.80% and 4.28% in-ear, mammary gland, genital organ, tail, and the body region of cow respectively. Eight species of ticks were identified in the study area including *Hylomma anatolicum*, *Hylomma dromedarii*, *Hyalomma truncatum*, *Hylomma scupense*, *Boophilus annulatus*, *Dermacentor andaroni*, *Dermacentor variabilis*, and *Amblyomma americanum*. The male: female ratio was 1:1:1. These findings would be helpful to design applicable and appropriate control measures and prevention to control ticks in cows in the study area.

Key words: Baluchistan; Cows; Ixodidae; Identification; Prevalence; Pishin; Tick

Introduction

Ticks are the most common ectoparasites, which are found on different vertebrates in

different stages. Almost 80% of the cattle population of the world is infested by the infection of ticks [1]. Ticks are found in

moist and warm conditions which help them to undergo metamorphosis [2]. Ticks are divided into two families, Ixodidae (hard tick) and Argasidae (soft ticks). Ixodidae ticks contain 670 identified species and Argasidae has 150 species in the world [3, 4]. Ticks are found on various parts of cows like neck, ear, and belly region [5, 6].

Most species of ticks are vectors of many harmful diseases [7], such as Anaplasmosis, Lyme disease, Babesiosis, Theileriosis, Rocky Mountain spotted fever, Crimean Congo hemorrhagic fever, Relapsing fever and Q fever [8, 9, 10]. Many severe symptoms are reported in the host by tick infestation such as blood loss, stress, toxicosis, tick paralysis, and skin damage in cattle [11, 12].

The socio-economic life of people relies mainly on cattle and their by-products. They not only provide meat and milk but also supply hide and skin and help in raised foreign exchange [13, 14]. All tick requires six weeks to three years to pass through their four life stages i.e. egg, larva, nymph, and adult. Usually, tick required the blood for egg production [15, 16]. Nymphs left the host body when engorged and find a new host from the environment. In three host species, nymphs changed its host after each molt [12, 17, 18].

Different studies have been conducted on various aspects of tick prevalence in various parts of the country and from abroad however, similar information from Pishin was lacking. This study aimed to identify different species of ticks on various breeds of cows, to find out their infestation and prevalence in the study area, to improve health status, milk production and meat quality of cows.

Materials and Methods

Study area and study population

Baluchistan is the largest province of Pakistan, spreading over an area of 350,000 sq/km [19]. This study was conducted at randomly selected livestock farms in the

study area. Geographically, District Pishin is located in the Baluchistan Province with coordinates of 30° 34'49.01 N and 66° 59'46.00 E with an Elevation of 5,102. The area is canal irrigated and heavily populated with livestock.

200 different cows from different breeds (Sindhi, Sahiwal, Tharparkar, American, and Austrian) were randomly selected for study from local farms of Pishin District, Baluchistan to identify and determined the prevalence of hard ticks in different species of cow.

Tick collection and preservation

Ticks were collected from different parts of the body and examined for specie identification. All parts of the animal body (ear, mammary gland, genital organ, tail, and body) were deeply examined for the presence of the tick. After being separated from the body of the host, ticks were preserved in 30% alcohol. They were boiled in potassium hydroxide (KOH) solution for 20-30 minutes then removed and passed through a graded level of ethanol (30%, 50%, 70%, 90%, and 100%). In each grade of ethanol, ticks were kept for 2 hours, before shifting to the higher grade. After 70% of alcohol, ticks were stained than transferred to 90% and then 100% alcohol. Before placing on a slide into Canada balsam, the ticks were dipped in xylol and then clove oil for few seconds.

Tick identification and morphological study

First, a gross identification of the ticks was performed. As a final step, the ticks were classified into different species depending on their morphology and basic structural characteristics. Such as the shape of the scutum, and its ventral structure. After genera identification of collected ticks, female adult ticks of each genus had been separated by observing small areas of scutum on the anterior dorsum [20].

Results

A total 200 cows from different breeds were observed at different areas of Pishin, in which percentage of prevalence was 36%, 24%, 18.9%, 15.5%, 5% in Sindhi, Sahiwal, Tharparkar, American and Australian breeds of cow respectively. The total prevalence was observed as 29% in different breeds of the cow as shown in (Table 1).

13 males and 8 females were found to be infested in Sindhi cows, 9 males and 5 females in Sahiwal cows, 6 males and 5 females in Tharparkar cows, 4 males and 5 females in American cow and only 1 female with 2 males were infested in Australian cows as shown in (Fig 1).

A total of 200 cows including (100 males and 100 females) from different breeds of the cow of varying age were observed in which 33 were males and 25 were females as shown in (Table 2).

A total population of different tick species was found to be 443. *Hylomma anatolicum* was the highly infested tick specie with several 134 which was followed by *Hylomma dromedarii* (87). The maximum number of males was found in *Hylomma anatolicum* (117). While the maximum number of females were found *Boophilus annulatus* (60). The minimum number of males were found in *Boophilus annulatus* (4) while female in *Hylomma truncatum* (7).

The total male and female ratio was 1.1:1 as shown in (Table 3).

The maximum number of Larvae were found in *Hylomma anatolicum* (37), while the maximum number of nymphs and adults were found in *Hylomma anatolicum* as 27 and 71. The minimum number of Larvae was found in *Hylomma truncatum* (7) while Nymphs were found in *Hylomma truncatum* (3) and the Adult was found in *Hylomma scupense* and *Dermacentor andaroni* (9) as shown in (Table 4).

The maximum number of the cow was found to be infested by tick infection in the summer season (N: 133). A total of 238 ticks were collected in summer. The infestation was highest in July (N: 56), which was followed by June (N: 50). The minimum infestation was noted in the winter season in which only 2 cows were found to be infested with a total of 7 ticks as shown in (Table 5).

A total of 443 ticks were observed in different breeds of cows at various parts of the body. 202 ticks were found in ear region, 122 were captured from the mammary gland, 61 from a genital organ, 39 from the tail, and 19 from abdomen and body. Prevalence was 45.59%, 27.53%, 13.76%, 8.80, and 4.28% in the ear, mammary gland, genital organ, body region, and tail respectively as shown in (Table 6).

Table 1. Prevalence of Ixodidae ticks in different breeds of the cow at a different area of Pishin, District

Breeds of cow	Observed	Infested (%)	Prevalence*(%)	Male	Female
Sindhi	60	21 (36)	35	11	10
Sahiwal	50	14 (24)	28	5	9
Tharparkar	20	11 (18.9)	55	9	2
American	30	9 (15.5)	30	6	3
Australian	40	3 (5)	7.5	2	1
Total	200	58 (100)	29	33	25

*Prevalence: n/N; n = Animals infested by ticks, N = Total Observed animals

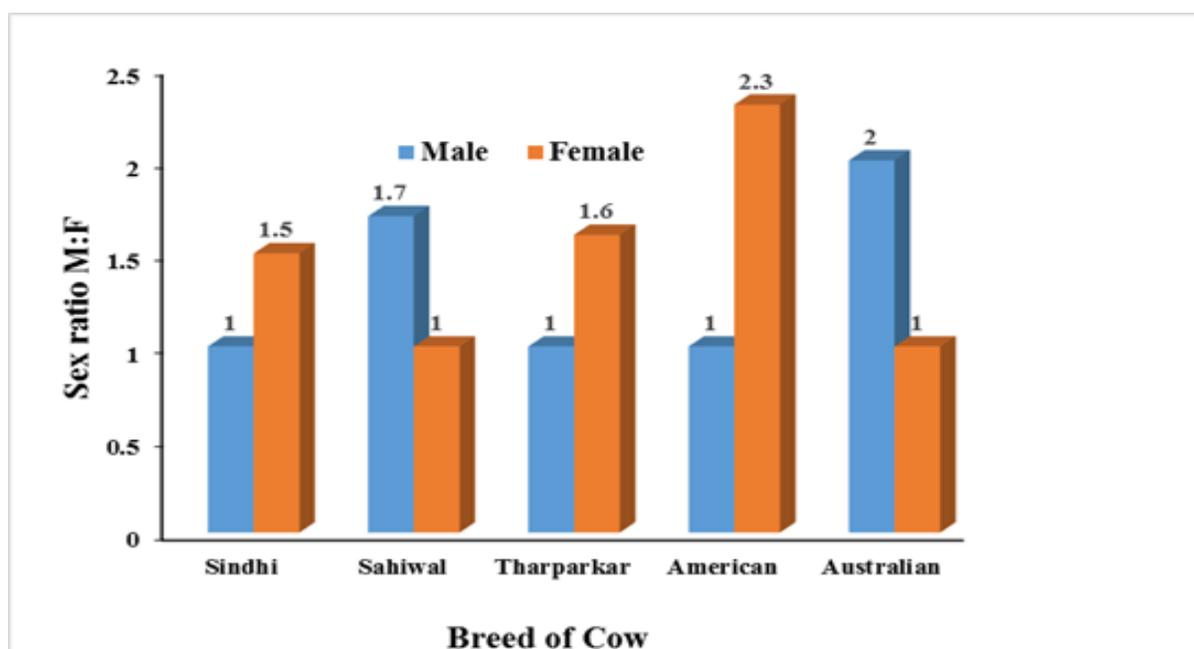


Figure 1. Sex wise ratio of infested host species

Table 2. Total sex-wise distribution and Prevalence of tick infestation

Age of cow	Observed			Infested			Prevalence*		
	Total	Male	Female	Total	Male	Female	Total. (%)	M. (%)	F. (%)
≤3 month	41	21	20	10	8	2	24.39	38.09	10
≤1 year	73	50	23	19	11	8	26.02	22	34.78
≤3 year	86	29	57	29	14	15	33.72	48.27	26.31
Total	200	100	100	58	33	25	29	33	25

*Prevalence: n/N; n = Animals infested by ticks, N = Total Observed animals

Table 3. Total Population of different tick species

Tick specie	Tick Population	Percentage %	M: F ratio
<i>Hylomma anatolicum</i>	134	30.24	6.5:1
<i>Hylomma dromedarii</i>	87	19.63	4.8:1
<i>Hylomma scupense</i>	25	5.64	2.1:1
<i>Hylomma truncatum</i>	17	3.83	1.4:1
<i>Dermacentor andaroni</i>	22	4.96	1:2.1
<i>Dermacentor variabilis</i>	52	11.73	1:5.5
<i>Boophilus annulatus</i>	64	14.44	1:5.8
<i>Amblyomma americanum</i>	41	9.25	1:15
Total	443	100	1.1:1
Tick Burden/ Animal	7.63		

Table 4. The total number of ticks in the following life stage

Tick specie	Larvae	Nymph	Adult
<i>Hylomma anatolicum</i>	37	27	71
<i>Hylomma dromedarii</i>	31	19	35
<i>Hylomma scupense</i>	7	17	9
<i>Hylomma truncatum</i>	3	3	5
<i>Dermacentor andaroni</i>	8	5	9
<i>Dermacentor variabilis</i>	14	14	24
<i>Amblyomma americanum</i>	7	9	25
<i>Boophilus annulatus</i>	19	11	34
Total	126	105	212

Table 5. Seasonal activity of ixodid ticks in different areas of Pishin, District

Season	Month	No of infested cows	No. of ticks
Spring	March	9	13
	April	15	43
	May	19	69
	Total	43	125
Summer	June	50	71
	July	56	134
	August	27	33
	Total	133	238
Autumn	September	12	45
	October	6	20
	November	4	8
	Total	22	73
Winter	December	1	5
	January	1	2
	February	0	0
	Total	2	7
Total		200	443

Table 6. Distribution of ticks in various body parts of cows

Location	No. of ticks	Percentage (%)
Ear	202	45.59
Mammary gland	122	27.53
Genital organ	61	13.76
Tail	39	8.80
Body	19	4.28
Total	443	100

Discussion

Ticks are the main source of diseases in livestock. Ticks are responsible for massive economic loss either by transmitting diseases through blood or by causing anemia through bloodsucking. Cattle are more susceptible to tick infestation than other animals [21].

The present study described that the prevalence was observed as 29% in different breeds of cows. Many researchers reported a higher prevalence of 45.28%, 21.67%, 18.33% & 7.5% for cattle, buffalo, sheep, and donkey, respectively [21]. The study's results were also similar to the present study [22]. A very high prevalence of tick

infestation was observed in Pishin, which might be due to the topographical dissimilarities, and the weather conditions which may favor the growth of the ticks.

Maximum prevalence was found in adult cows (≤ 3 years) as 33.72%, while in calves (≤ 3 months and ≤ 1 year), the prevalence was approximately equal as 24.39% and 26.02% respectively. The observed tick burden/Animal in Pishin was 7.63%. Different researchers found higher tick infestation in adult cows (60.8%) than calves (20%) in Oshnavich [23]. The percentage of tick infestation in young cattle was lower than the adult cattle. The different studies opposed this idea as they concluded that ticks prefer young animals due to their tender skin which makes sucking of blood easy for ticks [24-26].

The maximum numbers of cows were found to be infested by tick infection in the summer season (N: 133). A total of 238 ticks were collected in summer. The infestation was highest in July (N: 56), which is followed by June (N: 50). The minimum infestation was noted in the winter season in which only 2 animals were found to be infested with a total of 7 ticks. Who noted the highest peak of infestation in July (57.3%). In the meantime, the infestation rate was observed a minimum in November as 36.4%. The study of the different researchers also confirmed our results [27, 28].

A total of 443 number of ticks were observed in different breeds of a cow at various parts of the body. Prevalence was 45.59%, 27.53%, 13.76%, 8.80, and 4.28% in the ear, mammary gland, genital organ, tail, and the body region of cows respectively. The study results described the face and ears of the host as the most advantageous predilection site for ticks with a prevalence of 62%, whereas they also been found on udder, scrotum, tail, leg, and belly in cattle [14].

Eight species of ticks were identified in the study area including *Hylomma anatolicum*, *Hylomma dromedarii*, *Hyalomma truncatum*, *Hylomma scupense*, *Boophilus annulatus*, *Dermacentor andaroni*, *Dermacentor variabilis*, *Amblyomma Americanum*. *Hylomma anatolicum*, was the most abundant species of tick, infesting cows followed by *Boophilus annulatus*. *Hylomma truncatum* was the lowest in numbers, followed by *Dermacentor variabilis* and *Hyalomma scupense*. In most breeds of cow, the infestation of *H. anatolicum* was found to be maximum. In research [29] on 740 sheep and goats, the most abundant species were found to be *Rhipicephalus* and *Hyalomma*. Also, there was another research done in Kerman, which showed that the major kind of ticks is *Hyalomma* [30]. The male: female ratio was 1.1:1.

Conclusion

The present research trial revealed a high prevalence of tick infestation in cows and their significant relationship with age and sex in District, Pishin. Unsatisfactory veterinary amenities, optimum climate for tick growth, lack of awareness about the influences of ticks, and lack of systematized controlling techniques could be the reasons for this high prevalence in Pishin, District.

Authors' contributions

Conceived and designed the experiments: K Iqbal, N Rafique & A Karim, Performed the experiments: A Ijaz, MK Taj, A Kakar & Z Hanif, Analyzed the data: S Bibi & G Ghafoor, Contributed materials/ analysis/ tools: A Ghafoor, M Shafiq Wrote the paper: K Iqbal.

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