The Infestation of Hard Ticks (Acari: Ixodidae) Hyalomma Scupense and Hyalomma Excavatum on Buffaloes of Larkana, Sindh, Pakistan

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Abstract

A parasitic investigation was carried out from April 2021 to December 2021 to measure the diversity of hard ticks parasitizing farm buffaloes in the Larkana division of Sindh, Pakistan. The diversity of the hard ticks, their distribution and monthly infestation, and species-wise infestation rate with the variation in male and female population of the ticks were observed. In the present study, 450 randomly selected buffaloes were examined; among them, 226 were found to be infested with the parasite, with a prevalence of 50.22%. In this study, two species of genus Hyalomma were recorded: Hyalomma scupense Schulze, 1919) and Hyalomma excavatum Koch, 1844. The male ticks were more abundant than the female ticks.

Keywords: Ticks, Hyalomma scupense, Hyalomma excavatum, Larkana, Sindh, Pakistan

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Introduction

Ticks (Acari: Ixodidae) are found everywhere in the world, but two regions are important, tropical and subtropical, where they are preferably found (Soulsby, 1982). They belong to the class Arachnida, order Ixodida and phylum Arthopoda. Universally dispersed ticks (Acari: Ixodidae) have the blood of birds and mammals as their primary food and reptiles and amphibians as a secondary source. Additionally, they have a direct adverse impact on the health of their hosts and are vectors of many diseases of animals and humans in the northern hemisphere (Sonenshine, 1993). Ticks (Acari: Ixodidae) can give rise to minor to severe allergies, fatal anaphylactic reactions and skin irritation. They are also an indirect source of infections by transmitting nematodes, bacteria, protozoa and viruses (Estrada, 1999 and Jogejan, 2004).

Ticks parasitize all forms of livestock in much greater quantity in developing countries (Minjauw and McLeod, 2003). After mosquitoes, ticks play a significant role in the transmission of diseases and are spread in the tropical and subtropical regions of the world (Le Bars, 2009). Throughout the world, the foremost veterinary problem is infestation by ticks (Hourrigan, 1979). A single female adult tick can suck 0.5-2.0ml of blood. However, the amount of sucking of blood varies from species to species and blood loss decreases the weight of cattle (Pegram and Chizuka, 1990). Globally, ticks infest 80% of the cattle population (Bowman et al. 1996). Food and Agricultural Organization of the United Nations reported that hard tick infestation results in a loss of US $7.0 billion annually in the world. Ticks spread viral, bacterial, and protozoan pathogens, which results in diseases such as hemorrhagic fever, ehrlichiosis, anaplasmosis, theileriosis, and babesiosis (Rajput et al. 2006). Animals infected by the ticks face many problems, such as wounds on the skin and hides, disturbance in the immune system, stress, and irritation (Ghosh et al. 2007). The ticks damaged skin about 20-30% (Gharbi et al. 2006). Tick infestation results in a reduction in productivity, severe anaemia, weakness, and disturbed immune function (Gwakisa et al. 2001). The weather in Pakistan is suitable for the immense variety of parasites such as ticks because, except in winter, it remains hot and humid (Razzak and Shaikh, 1969). In Pakistan, the infestation rate by ticks was recorded as up to 50% (Durrani, 2008; Sajid et al. 2009). They can affect buffaloes with diseases and malnutrition, but the main reason for the mortality, retarded growth, and reduction in milk and meat production is parasitism, which results in financial losses (Shahnawaz et al. 2011). Pakistan has many genera and species of ticks (Rasul and Akhtar, 1975). *Hyalomma scupense* Schulze, 1919 is a two-host tick that shows endophilic behavior (Sergent E., 1956), and it is the vector of *Theileria annulata*, which causes theileriosis in cattle, and it is a monotrophic tick species. It is also responsible for the transmission of the bacterium *Coxiella burnetii* to livestock and causes Q fever in small domestic animals and humans. On the other hand, *Hyalomma excavatum* Koch, 1844 can be a two-host or three-host tick depending upon the availability of hosts. *Hyalomma excavatum* Koch, 1844 is the vector of *Babesia ovis* (Friedhoff KT, 1997; Dumler JS et al. 2001); it transmits *Anaplasma marginale* and *Anaplasma centrale* to cattle under laboratory conditions (Shkap V. et al. 2009). There is no report available on tick infestation from Larkana, Sindh, Pakistan. Agriculture and livestock farming are the major sources of income for the rural population of the division. One of the most

kept livestock in Larkana is buffalo. Local newspapers often report a variety of diseases in livestock, which implicates substantial loss to the livelihood of folks in the form of decreased production of milk, meat and hides, especially and overall health of an animal. Therefore, the study was designed to investigate hard ticks in the ruminants of Larkana. The purpose of this research paper is to describe the prevalence and occurrence of two distinct species, *Hyalomma scupense* Schulze, 1919 and *Hyalomma excavatum* Koch, 1844, in buffaloes of Larkana, Sindh, Pakistan.

Materials and Methods

Study area

Larkana is situated in the northwest of Sindh, Pakistan. The Indus River runs from the south of the city. The latitude of Larkana, Sindh, Pakistan, is 27°33′18″ N, and the longitude is 68°12′50″ E. Larkana lies under a monsoon climatic region in which summer is hot up to 53 °C, while in winter, the temperature drops up to 2°C, and humidity falls up to 80%.

Collection of samples and preservation

Randomly selected farms of Larkana were visited fortnightly from April 2021 to December 2021, as shown in the map (Figure 1). The infected animals were investigated thoroughly. The history and acaricide treatment of the infected animals were recorded. Ticks were collected with the help of forceps and by hand-picking methods from the various parts of the body, including the head, neck, ear, leg, belly, and tail of each infected buffalo. Collected specimens were brought to the Parasitology Laboratory, Department of Zoology, University of Sindh, Jamshoro. Collected specimens were preserved in 70% ethanol. Bottles were labeled, mentioning the sex of the buffalo (male and female) and various parts of the body, head, neck, ear, leg, belly, udder, teats and tail from which the ticks were collected.

Identification

The morphological characters of ticks were carefully observed with the help of dissecting (4X) and compound (10X) dissecting microscopes. Collected tick species were identified sex wise by using the standard keys published by Sen and Fletcher (1962), Kaiser and Hoogstral (1964), Carthy (1967), Estrada-Pena et al. (2004), Walker et al (2003), Latif and Walker (2004), and scanning electron micrographs from Coley et al. (2015). The infestation rate was calculated by using the formula given by Thrushfeild (1995) as total host animals infested/total host animals observed x100 P= prevalence. The data was analyzed using Excel 2010.

Results

During the present study, 450 buffaloes were observed for tick infestation. The investigated buffaloes had not gone through acaricide treatment. In total, 226 buffaloes were found to be infested, representing 50.22% (Table 1). It was noticed that during August, buffaloes were at higher risk of infestation, possibly because during this month, temperature and humidity were ideal for the tick's growth. These ticks were identified as *Hyalomma scupense* Schulze, 1919, n-535) and *Hyalomma excavatum* Koch, 1844, n-420) (Table 1). The results revealed that both species, *Hyalomma scupense* Schulze, 1919 and *Hyalomma excavatum* Koch, 1844 were highly prevalent during August as compared to other months, while the month with the lowest prevalence was April 2021, also for both species. This is maybe because, in this month, the weather was not favorable for ticks (Figure 2). During the inspection of buffaloes, ticks were found everywhere on the animal body, ear, legs, head, tail, udder and teats. The mean intensity of *Hyalomma scupense* Schulze, 1919 was highest during June (3.04) and lowest during November (1.57)

(Table 1). The mean intensity of *Hyalomma excavatum* Koch, 1844 was highest during May (2.36) and lowest during October (1.60) (Table 1). The overall prevalence of *Hyalomma excavatum* Koch, 1844 was 43.97% (n=420), and *Hyalomma scupense* Schulze, 1919 was 56.02% (n=535) (Table 2). Regarding male vs female abundance, male adult ticks were found greater in number as compared to female adult ticks. The prevalence of male ticks of *Hyalomma scupense* Schulze, 1919 was 75.60% (n=388) and female ticks 24.39% (n=147) while prevalence in *Hyalomma excavatum* Koch, 1844 was male ticks 73.80% (n=310) and female ticks 26.19% (n=110) (Table 3).

Discussion

The present study revealed that the overall prevalence of ticks was 50.22% and is very close to the findings of Niazi M et al. (2025), who found 54.55% in Mianwali, Punjab, Pakistan. It is very close to previous findings in Pakistan, as Tasawar et al. (2014) reported from Bibipur, Multan 52.5% but a bit lower compared to the studies carried out in Lahore from Durrani et al. (2008) who reported a prevalence of 66.7%. Present findings are also unlike the previous findings of Sajid et al.. (2007), who reported from lower Punjab with a higher prevalence 75.1% in buffaloes. The higher prevalence recorded in August was by Wahid et al. (2004), who reported that the highest prevalence was recorded in August, September and October. This is divergent from Nausheen et al.. (2010), who reported that prevalence was higher at BLPRI from May-July 2009.

The present study disclosed that male ticks were found greater in number as compared to female ticks; this is distinguishable from Sayin et al. (2003) and Aktas et al (2004) as they reported that the prevalence of female ticks was higher than male ticks. A possible explanation for this finding could be that male ticks are more mobile than female ticks, and they remain attached for a prolonged period (Gharbi et al. 2013). During the present study, two distinct species of genus *Hyalomma* from Larkana, Sindh, Pakistan, were collected. *Hyalomma scupense* (56%) is reported for the first time in Larkana, Sindh, as well as from Pakistan, this is unlike the previous report given by Shubber et al. (2013) who made this finding from Iraq in which they revealed that prevalence of *Hyalomma scupense* Schulze, 1919 was found 17.17%. However, in present study *Hyalomma excavatum* Koch, 1844 was found 43.97%, differing from previous findings of Siddiqi and Jan (1986) who conducted a study in north-western frontier province (NWFP) of Pakistan in which they identified 12 species belonging to five genera from buffaloes, sheep, goats, dogs and camels of six districts including Bannu, Dir, Peshawar, Swat and Mardan among them *Hyalomma excavatum* Koch,1844 was found (0.27%), this species was also reported from Sistan and Baluchestan, Iran (19%).

Conclusion

Hyalomma scupense Schulze, 1919 is first time reported from Larkana, Sindh, Pakistan. Both species are highly prevalent in buffaloes of Larkana with percentage of *Hyalomma scupense* Schulze, 1919 56% and *Hyalomma excavatum* Koch, 1844, 43.97%. In this study, it was noticed that August was the most favorable month and April was the least favorable month for infestation. The information provided in this paper suggests that awareness programs for farmers should be initiated to overcome the danger caused by ticks.

Table No: 1 showing month wise (n=50) prevalence (%) and intensity of *Hyalomma scupense* and *Hyalomma excavatum* infestation of ticks in

buffaloes (Total=450) from Larkana, Sindh, Pakistan.

Month	Infected animals	Prevalence %	*Hyalomma scupense* Schulze, 1919				*Hyalomma excavtum* Koch, 1844			
			Male	Female	Total	Mean intensity	Male	Female	Total	Mean intensity
April	17	34	30	10	40	2.35	29	10	39	2.29
May	19	38	36	16	52	2.73	32	13	45	2.36
June	23	46	50	20	70	3.04	31	9	40	1.73
July	30	60	51	17	68	2.26	38	10	48	1.6
August	34	68	66	27	93	2.73	47	15	62	1.82
September	29	58	55	20	75	2.58	38	18	56	1.93
October	28	56	34	14	48	1.71	32	13	45	1.60
November	26	52	31	10	41	1.57	33	11	44	1.69
December	20	40	35	13	48	2.4	30	11	42	2.1
Total	226	50.22	388	147	535	2.36	310	110	420	1.85

Table No: 2 Showing overall prevalence (%) of *Hyalomma scupense* Schulze, 1919 and *Hyalomma excavatum*, Koch, 1844 in Larkana, Sindh, Pakistan.

Species	Male ticks	Female ticks	Total	Prevalence %
Hyalomma scupense	388	147	535	56.02
Hyalomma excavatum	310	110	420	43.97
Total	698	257	955	--

Table No: 3 showing month wise prevalence (%) of male and female ticks of *Hyalomma scupense* and *Hyalomma excavatum* from Larkana, Sindh, Pakistan.

	Hyalomma scupense Schulze, 1919					*Hyalomma excavtum* Koch, 1844				
Months	Male ticks	Female ticks	Total	Prevalence %		Male ticks	Female ticks	Total	Prevalence %	
				♂	♀				♂	♀
April	30	10	40	75	25	29	10	39	74.35	25.64
May	36	16	52	69.23	30.76	32	13	45	71.11	28.88
June	50	20	70	71.42	28.57	31	9	40	77.5	22.5
July	51	17	68	75	25	38	10	48	79.16	20.83
August	66	27	93	70.96	29.03	47	15	62	75.80	24.19
September	55	20	75	73.33	26.66	38	18	56	67.85	32.14
October	34	14	48	70.83	29.16	32	13	45	71.11	28.88
November	31	10	41	75.60	24.39	33	11	44	75	25
December	35	13	48	72.91	27.08	30	11	42	71.42	26.19
Total	388	147	535	72.52	27.47	310	110	420	73.80	26.19

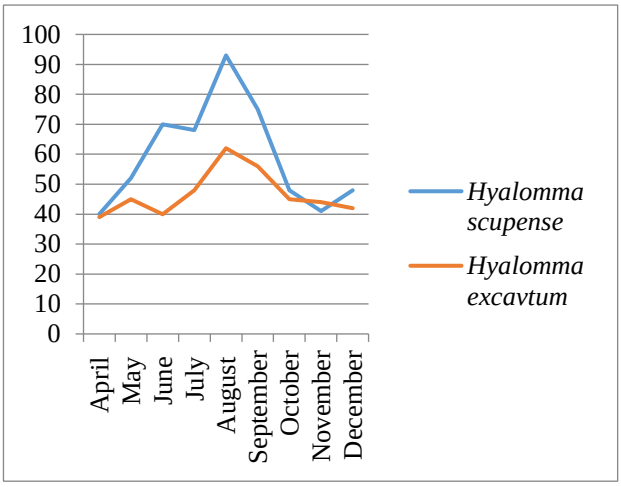

Figure: showing month wise fluctuation in the prevalence of *Hyalomma scupense* Schulze, 1919 and *Hyalomma excavatum*, Koch, 1844 in Larkana, Sindh, Pakistan.

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