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Morphological Study of Hard Ticks Infested Sheep and Goats in Al-Muthanna Province, Iraq

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Abstract: Ticks are important ectoparasites from the economic and human health point of view. They are blood-sucking insects that can carry some diseases that are widespread all over the world. The current study were collected from October to March.tick specimens were The Total 600 samples (400 samples sheep and 200 samples goat) were collected from Al-Muthanna province. Total Infestation rate in sheep was (59%) while in goats (45.5%) respectively, females showed a significantly higher infestation than males, infestation rate differed significantly among body sites in both hosts the ears show high infested site (78.81% and 86.81%) in sheep and goats respectively, while the front limbs were the least infested (32.62% and 25.27%) in sheep and goats respectively. According of the identified tick species, *Hyalomma anatolicum* was the most abundant, accounting for 49.47% and 77.31% of ticks collected from sheep and goats, respectively. In contrast, *Rhipicephalus turanicus* was the least abundant species, representing 2.63% and 4.12% in sheep and goats, respectively.

Keywords: Hard Ticks, *Hyalomma*, *Rhipicephalus*, Sheep, Goat, Al-Muthanna Province, Iraq.

Research Paper

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INTRODUCTION

Ticks are classified into two main groups: hard ticks Ixodidae and soft ticks Argasidae [1]. There are approximately 877–878 known tick species worldwide, the majority of which belong to these two main families [2]. Ticks are important ectoparasites from the economic and human health point of view. They are blood-sucking insects that can carry some diseases that are widespread all over the world. Tick-borne pathogens are able to cause severe diseases in humans and animals, including viruses, bacteria and protozoa [3]. Examples are theileriosis, babesiosis, anaplasmosis, ehrlichiosis, Lyme disease and Crimean-Congo hemorrhagic fever. Ticks infest a large number of hosts including mammals, birds and reptiles [4]. Theileriosis, a tick-borne hemoprotozoan disease caused by parasites of the genus Theileria, is the primary victim of cattle in tropical and subtropical regions [5].

Aims of the Study:

1. Isolation and identification of hard ticks from infestation sheep and goats in AL-Muthanna province by dissecting microscope.
2. Estimate the effect of some risk factors sex, the sites of infestation to prevalance rate.

MATERIAL AND METHOD

Sample Collection

Tick samples were collected from Al-Muthanna Governorate the samples were collected from October to March. They were removed using pointed-tip forceps, with a cotton swab moistened with 70% ethyl alcohol used to facilitate the collection process. Following collection, the samples were preserved in 70% ethyl alcohol pending morphological examination [6].

Microscopic Examination

After collecting the tick samples and recording the required information, microscopic examination was performed using a dissecting microscope to identify the morphological characteristics of the ticks and classify them [7].

Preparation and Fixation of Tick Samples

Tick specimens preserved in ethanol were washed to remove host tissue remnants. The specimens

were treated with a potassium hydroxide solution (10%) then washed with water and dehydrated through a graded series of ethanol concentrations (70%, 80%, 90%, 95%, and 100%). Subsequently, the specimens were cleared in xylene for 15–30 minutes, mounted on glass slides using Canada balsam, covered with cover slips, and examined under a light microscope after drying at room temperature [8].

THE RESULTS

The species were identified using dissecting microscope based on standard taxonomic keys and morphological characteristics used in hard tick classification. These characteristics included head shape (capitulum), dorsal shield decoration (scutum), coxa l spurs, festoons, anal plates, respiratory plates, and leg shape and segmentation. Based on microscopic identification, two genera, Hyalomma and Rhipicephalus, were prevalent on infested sheep and goats, and five species were identified.

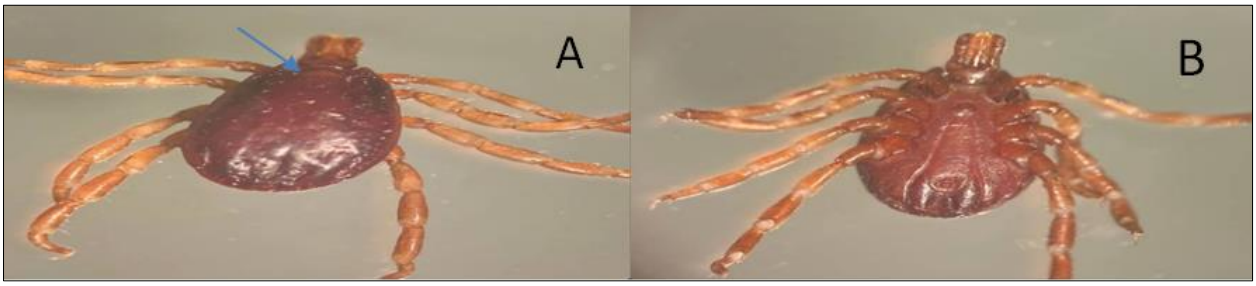


Figure 1: Male Hyalomma anatolicum: (A) dorsal view and (B) ventral view.

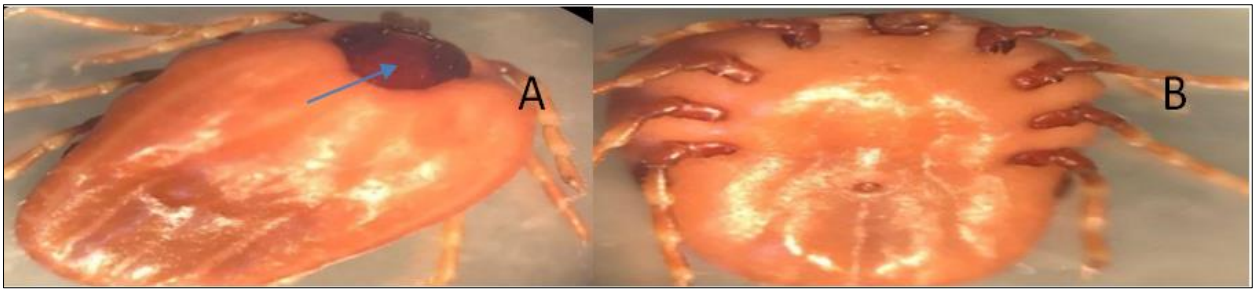


Figure 2. Female Hyalomma anatolicum: (A) dorsal view and (B) ventral view

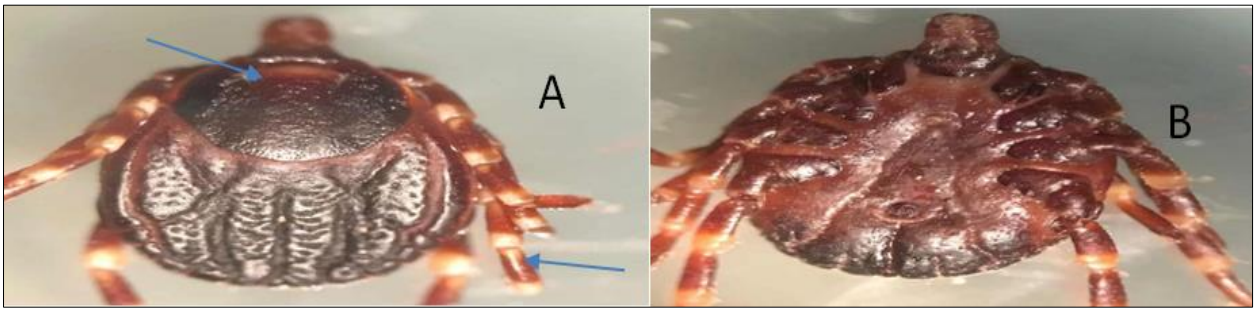


Figure 3: Female Hyalomma marginatum: (A) dorsal view and (B) ventral view

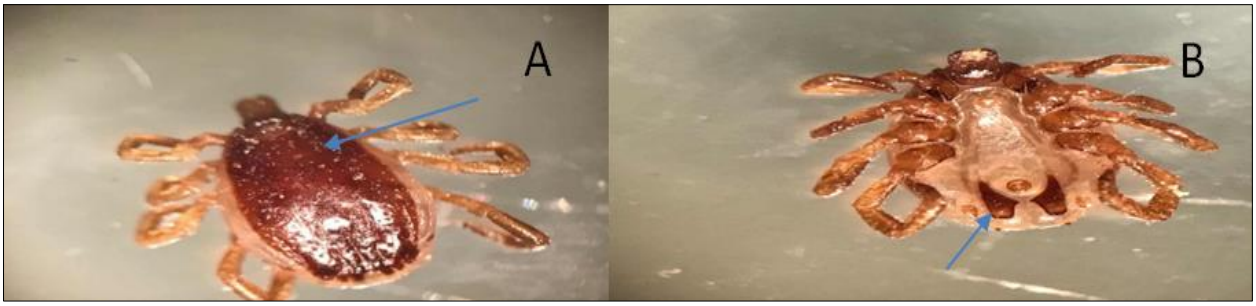


Figure 4: Male Hyalomma asiaticum: (A) dorsal view and (B) ventral view

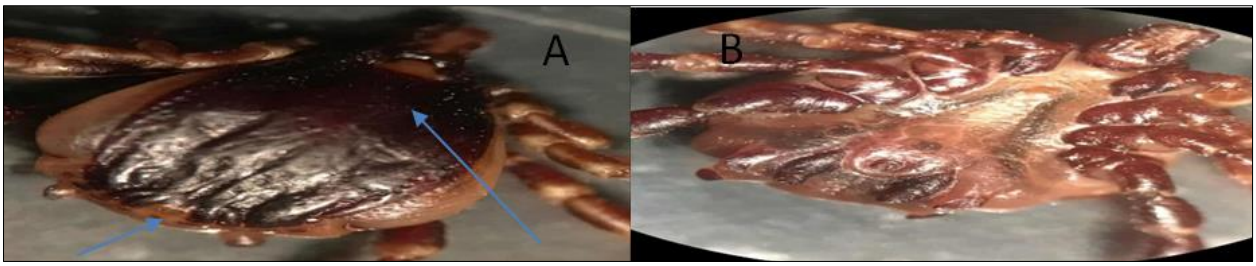


Figure 5. Male Hyalomma dromedarii: (A) dorsal view and (B) ventral view

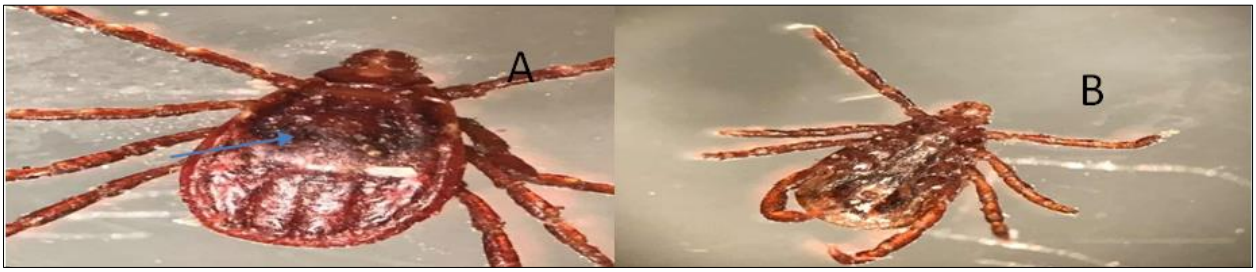


Figure 6: Female Rhipicephalus turanicus: (A) dorsal view and (B) ventral view

The Totel infestation rate was (59% and 45.5%) in both sheep and goats with significantly (P<0.01) respectively. (Table 1)

Table 1: Infestation rates of hard ticks in sheep and goats

Host	No of animals	No. of Infestation Animals	Percentage (%)
Sheep	400	236	59a
Goats	200	91	45.5b
Chi-Square (χ2)	**9.79**		
P value	**0.002***		

***Statistically significant difference (P < 0.01)**

The Totel infestation rate according the sex in sheep was (61.49% and 48.71%) respectively, Females higher than Males with significantly (P<0.05) respectively. (Table 2)

Table 2: The infestation rate of hard ticks according to sex of infested sheep

Sex	Total No.	No. of Infestation	Percentage (%)
Males	78	38	48.71b
Females	322	198	61.49a
Total	400	236	59
Chi-Square (χ2)	**4.23**		
P value	**0.040***		

***Statistically significant difference (P < 0.05)**

The Totel infestation rate according the sex in goats was (46.83% and 40.47%) respectively, Females higher than Males with significantly (P<0.05) respectively. (Table 3)

Table 3: The infestation rate of hard ticks according to sex of infested goats

Sex	Total No.	No. of Infestation	Percentage (%)
Males	42	17	40.47a
Females	158	74	46.83a
Total	200	91	45.5
Chi-Square (χ2)	**0.541**		
P value	**0.462***		

***No significant difference (P > 0.05)**

The Totel infestation rate according to the sites of infestation on sheep was highest in the ears (78.81%) and lowest in the front limbs (32.62%) with highly significant difference (P < 0.01). (Table 4)

Table 4: The infestation rate of hard ticks according to the sites of infestation on sheep

Sites of the body	Number of positive animals	Percentage (%)
Head	116	49.15b
Ears	186	78.81a
Neck	87	36.86c
Hind limbs	183	77.54a
Front limbs	77	32.62c
Genitals and Udder	156	66.10a
Calculated chi-Square ($\chi 2$)	**196.41**	
Calculated p value	0.0001	

Highly significant difference (P < 0.01)

The Totel infestation rate according to the sites of infestation on goats was highest in the ears (86.81%) and lowest in the front limbs (25.27%) with highly significant difference (P < 0.01). (Table 5)

Table 5: The infestation rate of hard ticks according to the sites of infestation on goats

Sites of the body	Number of positive animals	Percentage (%)
Head	45	49.45c
Ears	79	86.81a
Neck	43	47.25c
Hind limbs	32	35.16d
Front limbs	23	25.27e
Genitals and Udder	56	61.53b
Calculated chi-Square ($\chi 2$)	84.57	
Calculated p value	<0.0001	

Highly significant difference (P < 0.01)

DISCUSSION

The microscopic examination of hard ticks revealed that two genus *(Hyalomma* and *Rhipicephalus*) which was isolated from infested sheep and goats were identified, comprising five species: *Hyalomma anatolicum, Hyalomma marginatum, Hyalomma dromedarii, Hyalomma asiaticum, and Rhipicephalus turanicus.* According to (Figures 1). *Hyalomma anatolicum* male,dorsal views(A)Adult ticks are approximately in length 3.5–4.5 mm in males, Note revealed it to be a medium-sized tick with elongated mouthparts and the scutum is light brown in colour , Cervical fields depression is apparent, The lateral grooves are short, It has a prolonged, narrow groove in the posterior medium , The legs are pale ringed, but the rings aren't highly visible because the legs themselves are also pale, the presence of festoons along the posterior margin of the idiosoma, Ventral Views (B) The coxa 1 had two unequal projections, and the anal plates and genital opening were clearly visible in males This is consistent with the findings [9-11]. According to (Figures 2). *Hyalomma anatolicum* females ticks (engorged) Adult ticks are approximately 6–15 mm in length in females, dorsal views (A) ticks are approximately 6–15 mm in length in females, revealed it to be a medium-sized tick with elongated mouthparts and The scutum is light to brownish in colour and lacks distinct ornamentation, The legs are pale with rings, ventral views (B) coxa 1 also had two unequal projections, and the anal plates and genital opening were clearly visible. Subanal plates alignment with the adanal plates. Subanal plates are indistinct (they are very small and may be absent). Adanal plates shape has a round end this is consistent with the findings [12-14]. According to (Figures 3). *Hyalomma marginatum* female ticks Adult Under a dissecting microscope, dorsal views (A) ticks are approximately 4 –5 mm in length in female, was characterized by a long mouthparts and the scutum is dark brown and lacks pale ornamentation. Lateral grooves are long, distinctly banded legs and Long, were also important diagnostic features. Ventral views (B) the respiratory plates ranged in shape from oval to comma-shaped. Adanal plates shape has square ends, this agrees with the findings [11-14]. According to (Figures 4). *Hyalomma asiaticum* male ticks Adult Under a dissecting microscope, dorsal views (A) are approximately 3.5–5.5 mm in length in male, characterized by an elongated body, long mouthparts, The scutum is dark reddish-brown, and the lateral grooves extended towards the posterior end of the body. The presence of festoons along the posterior margin of the idiosoma. Ventral views (B) its respiratory plates were comma-shaped. Males exhibited distinct anal plates and deep cervical grooves the presence of festoons along the posterior margin of the idiosoma this is consistent with the findings in China [9]. According to (Figures 5). *Hyalomma dromedarii* male ticks Under a dissecting microscope, dorsal views (A) are approximately 5– 7 mm in length in male , It has the appearance of cervical field depression. The scutum has a dark colour. The lateral grooves are short, The central festoon colour is quite light Anteriorly, paracentral festoons are distinct. There is a posteromedian groove, Leg colouration is with

pale rings. ventral views (B) Genital aperture anterior groove is deep, Subanal plates alignment is outside the adanal plates, Adanal plates shape has round ends, Spiracle areas have sparse setae. This is consistent with the findings in [15-21]. According to (Figures 6) *Rhipicephalus turanicus* ticks Adult Under a dissecting microscope are approximately 3–4 mm in length in female, short mouthparts, Basis capituli is hexagonal in shape, Scutum colour is dark and a uniform reddish-brown colour. Cervical fields shape is large and curved, the presence of festoons along the posterior margin of the idiosoma, ventral views (B) Spiracle plate areas have sparse setae, Genital aperture posterior lips have a narrow U- shape. This is consistent with the findings in [9-14]. All species identified in the present study were previously reported in Iraq, suggesting that they are established in the Iraqi environment and well adapted to its local ecological conditions. According to (Table 1) Sheep are generally more heavily infested with ticks than goats, mainly because of wool it creates a warm, humid, sheltered environment that helps ticks attach and feed, while goats' short hair offers less protection. Grooming goats scratch and bite at themselves more, removing ticks before they attach. grazing Sheep graze close to the ground where ticks quest, while goats browse shrubs and move more. Management sheep flocks are often larger, more crowded, and treated less with acaricides. The findings of the present study are consistent with those reported by [22-24], Furthermore, finding that disagrees with the results of the present study (25, 26, 27, 28). According to (Table 2) Higher infestation in females may reflect hormonal changes during pregnancy and lactation that can reduce immune response, and their longer retention in the flock for breeding, whereas males are usually culled or sold early, which increases females' exposure to ticks. The results of the present study are in accordance with the reports by [29-31], In contrast, the results of the present study do not agree with those [32]. According to (Table 3) the infestation is higher in females, this may be due to several physiological and behavioural factors, including most significantly, hormonal fluctuations that occur during pregnancy, parturition and lactation. In females, the cycles result in a temporary decrease in the efficiency of immune response, with males.Females are also kept for a longer productive period in addition. The cumulative exposure of the flock to these ticks is greater when they are females, unlike males, who are more common to be in the area. Fertility rate of culled or sold younger. Contrary to this, this result agrees with the findings [30-35], and the present result is not in agreement with [36]. According to (Table 4) the high tick prevalence on the ears and genital regions may relate to their thin skin, sparse wool coverage, and skin folds, which provide suitable attachment sites, though site preference varies with tick species and host characteristics. This is consistent with observations made by [22-37], and these results are in contrast to those obtained by [38]. According to (Table 5). The higher tick infestation on the ears and genital regions of goats may relate to their sparse hair coverage, accessible skin, and skin folds, which facilitate tick attachment and feeding, though infestation patterns vary with tick species, host characteristics, and environmental conditions. These findings agree with those [22-39]. Conversely, the current results disagree from those [38].

CONCLUSIONS

Hard ticks infested both sheep and goats in Al-Muthanna Province, with a significantly higher infestation rate in sheep (59%) than in goats (45.5%) ($P < 0.01$). Five species from two genera were identified morphologically (*Hyalomma anatolicum*, *H. marginatum, H. asiaticum, H. dromedarii,* and *Rhipicephalus turanicus*), with *H. anatolicum* the most abundant (49.47% in sheep, 77.31% in goats) and *R. turanicus* the least (2.63% and 4.12%). Females were more heavily infested than males, significantly so in sheep ($P < 0.05$) but not in goats ($P > 0.05$). Infestation also differed significantly among body sites, with the ears most infested (78.81% in sheep, 86.81% in goats) and the front limbs least infested (32.62% and 25.27%).

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