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Diversity and seasonal occurrence of ticks from some wild mammals in South of Iraq

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Abstract
This study was conducted to isolate and identification the tick's species of some wild mammals in Basrah, Thi-Qar and Maissan provinces, south of Iraq, during January to December 2017. The survey was done with a total of 73 wild mammals belonging to 10 species, 53 (72.6%) were found infested with one or more of ticks. 11 species of ticks were identified, 10 are hard ticks, namely: *Hyalomma anatolicum* Kotch,1844, *Hyalomma excavatum* Koch,1844, *Hyalomma asiaticum* Schulze & Schlottke,1929, *Hyalomma dromedarii* Kotch,1844, *Hyalomma* sp., *Rhipicephalis turanicus* Pomerantzev,1941, *Rhipicephalus sanguineus* Latreille,1806, *Rhipicephalus annulatus* Say, 1821, *Rhipicephalus* sp., and *Haemaphysalis alderi* Feldman & Muhsam,1951. While, one species only belong to the soft ticks: *Otobius megnini* Duges, 1884. The most prevalent species in the study was *H. anatolicum* with 20.5%, while, *O. megnini* was the lowest with 2.6%. The most numbers of ticks was recorded in May with 15.2%, while the lowest was in January with 2.6%. Highest prevalence of ticks was in asiatic jackal and brown bear with 100%, while, small asian mongoose 33.3%. Brown bear was infested with one species of ticks only, while five species of ticks were collected from the hedgehog. *H. anatolicum* recorded from five species of wild mammals, while *Ha. alderi* collected from asiatic jackal only.

Keywords: Ticks, wild mammals, south of Iraq

1. Introduction
Ticks belong to the phylum Arthropoda, class Arachnida, order Acarina, about 850 species of ticks have been described worldwide [1]. Ticks are divided into two families; Ixodidae which includes the hard body ticks, and Argasidae which composes of the soft ticks [2]. Ticks are the most important ectoparasites of livestock and wild animals and cause great economic losses in several ways [3]. Ticks are obligate haematophagus ectoparasites of humans and animals, and their parasitization of livestock results in reduced milk production, reduced weight, and transmission of pathogens, some ticks causing paralysis or toxicosis and physical damage to animals [4]. However, the major losses attributable to ticks are due to their ability to transmit protozoan, rickettsial and viral diseases of livestock [5]. Tick associated dermatophilos is the major health and management issues of livestock in many developing countries [6]. It is well established that ticks and tick-transmitted infections have coevolved with various wild animal hosts which often live in a state of equilibrium with ticks [7].
Wild animals are counted a reservoir for ticks and tick-borne pathogens of livestock and humans [2]. These diseases are transmitted by ticks to livestock when the infected wild hosts come into contact with livestock, for example when livestock move into endemic regions [1]. On the other hand, movement of infested livestock into disease free areas may introduce new tick species into wildlife and effectively create new niches for particular tick species and diseases [3]. Unlike livestock, under certain circumstances it is nearly impossible to eradicate diseases from wildlife reservoirs [4]. Therefore, the interaction between livestock and wildlife is a major determinant of the efficacy of control programs for tick infestations and tick-borne diseases [5]. In humans, tick infestations typically involve few specimens and the greatest risk for people bitten by a tick lies in infection due to a tick-borne pathogen [6].
Despite the health and ecological importance of ticks as vectors for several major diseases for animals and human, studies on the taxonomy and ecology of ticks in Iraq are scanty. This study was conducted to isolate and diagnose ticks species that infested some wild mammals in South of Iraq, and detect the prevalence of ticks and monthly distribution.

2. Materials and Methods

2.1 Study area and Samples collection

This study has been conducted in three provinces in South of Iraq, Basrah,Thi-Qar and Maissan. A large number of farm lands, zoo, marshes and deserts were visited. A total of 150 wild mammals belonging to 10 species were examined (Table1), during January to December 2017. Samples of ticks were collected from head, ears, eyelids, axilla, perinea, udder, teats and scrotum, by using a fine forceps. The samples were fixed on thick paper and kept in small box.

2.2 Samples identification

Ticks identification study was made using dissecting microscopes; samples were photographed by digital camera NIKON D90. Species of ticks were identified based on some morphological characteristics. The specimens of ticks were identified to the species using taxonomic keys [8-13], based on many features, including: size, color, mouth parts, scutum and festoons. For more conformation, the results of the classification were compared with the specimens in The Iraqi Museum for Natural History in Baghdad University.

2.3 Ecological study

Temperature and relative humidity rates were adopted by Iraqi meteorological organization and seismology in Basrah Airport.The prevalence rates of ticks were calculated of each month during the study period.

2.4 Ecological study

The rates of months were compared. The results were statistically analyzed by applying chi-square test.

3. Results

3.1 Ticks species

In this study, 11 species of ticks were identified, 10 from the hard ticks (Family: Ixodidae) namely: *Hyalomma anatolicum* Kotch,1844, *Hyalomma excavatum* Koch,1844, *Hyalomma asiaticum* Schulze & Schlottke,1929, *Hyalomma dromedarii* Kotch,1844, *Rhipicephalis turanicus* Pomerantzev,1941, *Rhipicephalus sanguineus* Latreille,1806, *Rhipicephalus annulatus* Say, 1821, *Haemaphysalis alderi* Feldman & Muhsam,1951. One species only of the soft ticks: *Otobius megnini* Duges, 1884, this species is recording for the first time in Iraq.

3.2 Prevalence's of tick's infestation

A total of 73 wild mammals were observed, 53 were infested with ticks, and the total prevalence of infestation was 72.6%. Table1 and Figure1 showed that ticks belong to genus *Hyalomma* are the most dominant species, followed by *Rhipicephalis*, then *Haemaphysalis* and *Otobius*. The statistical analyses were explained significant differences ($P \leq 0.05$) with the rates of ticks' genus. Table 3 revealed the most prevalent species in the study was *H. anatolicum* with 20.5%, followed by *R. turanicus* 15.25%, while, *Otobius megnini* was the lowest with 2.6%, with many significant differences among the species.

3.3 Specificity of ticks

The species of ticks were varied in the host specificity. Table 1 showed that *H. anatolicum* was recorded from five species of wild mammals (hedgehog, persian rat, black rat, asiatic jackel and wild cat), while *Ha. alderi* collected from asiatic jackal only. Some species of mammals did not show a specificity to be infested with ticks; brown bear was infested with one species only, while five species was collected from the hedgehog. Table 2 revealed the highest prevalence of ticks was in asiatic jackal and brown bear with 100%, while the lowest was recorded in small asian mongoose with 33.3%.

3.4 Seasonal occurrence of ticks

Many variations of monthly distribution of ticks were determined during the study period between January and December 2017. According to Figure2, ticks were the most occurrences species in the moderate seasons (spring and autumn) period of the year, followed by summer months, while winter months recorded the low rates. The highest prevalence of tick's occurrence was recorded in May with 15.2%, while the lowest was in January with 2.6%. The statistical analysis was showed significant differences ($P \leq 0.05$) among the rates of ticks' occurrence for the months of period study.

Table1: Species diversity of ticks from some wild mammals in south of Iraq.

Mammals scientific name	Mammals local name	Ticks species
Hemiechinus aurtus	hedgehog	*H. anatolicum, H. asiaticum, R. turanicus, R. sanguineus, H.* sp.
Lepus capensis	wild hare	*H. excavatum, H. dromedarii, R. sanguineus, Otobius megnini*
Rattus norvegicus	persian rat	*H. anatolicum, R. turanicus, R. annulatus, Otobius megnini*
Rattus rattus	black rat	*H. anatolicum, H. asiaticum, R. turanicus, R. sanguineus*
Herestes javanicus	small asian mongoose	*R. turanicus, H.* sp.
Canis aureus	asiatic jackal	*H. anatolicum, H. asiaticum, Ha. alderi*
Sus scrofa	wild boar	*H. excavatum, R. turanicus*
Felis silvestris	wild cat	*H. anatolicum, R.* sp.
Felis chaus	wild jungle cat	*R. annulatus, R.* sp.
Ursus arctos	brown bear	*R. sanguineus*

Table 2: Infestation rates of some wild mammals with ticks in south of Iraq.

Mammals species	No. of examed	No. of infested	% infestation
Hemiechinus aurtus	15	13	86.6
Lepus capensis	15	12	80
Rattus norvegicus	13	10	76.9
Rattus rattus	10	5	50
Herestes javanicus	6	2	33.3
Canis aureus	4	4	100
Sus scrofa	3	2	66.6
Felis silvestris	3	2	66.6
Felis chaus	3	2	66.6
Ursus arctos	1	1	100
total	73	53	72.6

Table 3: Relative diversity of ticks species from some wild mammals in south of Iraq.

Ticks species	No. of samples	% prevalence
H. anatolicum	62	20.5
R. turanicus	46	15.2
R. sanguineus	39	12.9
H. excavatum	32	10.5
H. asiaticum	29	9.6
R. annulatus	28	9.2
Hyalomma sp.	23	7.6
H. dromedarii	13	4.3
Ha. alderi	12	3.9
Rhipicephalis sp.	10	3.3
Otobius megnini	8	2.6
total	302	100

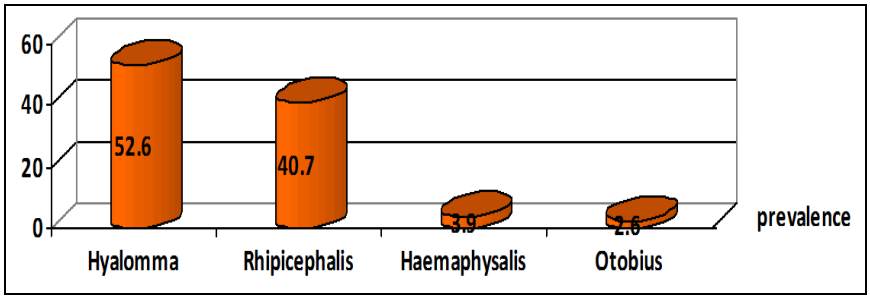

Fig 1: Prevalence of ticks genera from some wild mammals in south of Iraq.

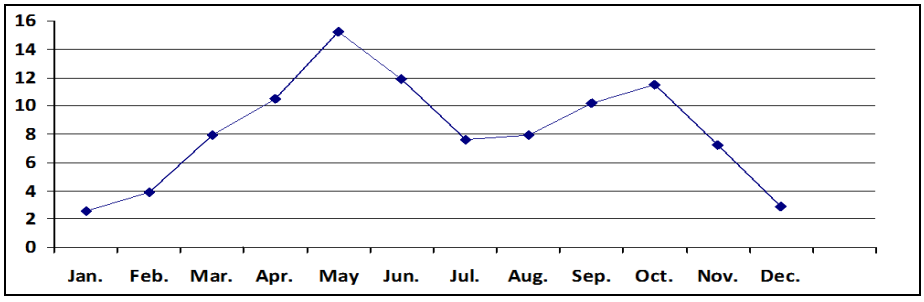

Fig 2: Relative occurrence of ticks from some wild mammals in south of Iraq during January to December 2017.

4. Discussion

Despite the importance of ticks as vectors for several major diseases of animals and humans, studies on the taxonomy and ecology of ticks in Iraq are scanty. The present study differs from the other studies in Iraq, it is included a survey of hard and soft ticks, while the previous reports have specialized in hard ticks only, and most studies are about domestic animals in exception, [14-15] studied the hard ticks of wild animals from some provinces in the middle of Iraq, and reported 13 species of hard ticks belonging to three genera. In the current study, eight species of Ixodid ticks were isolated. Ticks belong to genus *Hyalomma* are the dominant in the present study, both in the number of species and individual ticks collected, Tavakoli *et al*. (2012) [16] referred to acclimation of *Hyalomma* sp. to the environment of the area and adaptation for hot or cold. Hasson (2012) [17] reported this genus distributed among wild animals in Iraq. For the soft ticks Argasids, there was one species only recorded in this study, namely *Otobius megnini*. This is a first record for this species in Iraq. The differences between the results of the present study and previous studies might be due to variation in the geographical locations, climatic conditions, methodology, selection of sampling animals and breeding of animal studied. The distribution of ticks on the hosts influenced by various factors, such as the morphology of the tick (length of the hypostome), morphology of the host (length of the fur coat) [18]. Vatsya *et al*. (2007) [19] referred to host immune responses, self-grooming, inter-specific interactions, heat dissipating behavior and length of the feeding phase.

In respect of seasonal abundance, the results showed a significant difference in the numbers of ticks' collection among the months. The abundance and distribution of ticks depend upon many factors such as the climate (temperature, humidity, sunlight, wind speed and dust [20], also habitat characteristics and presence of hosts [19]. The nature of the host (susceptibility, breed, age and sex) and management practices including the use of acaricides [21]. The seasonal dynamics of tick's species are the consequence of appropriate environmental conditions, temperature, moisture, light intensity and rainfall [22]. The occurrence of ticks with limited movements can greatly be affected by the chances of encounter with a potential host and their population densities [23]. The variation in tick's distribution in different seasons of the year is derived from a variety of factors such as climatic conditions, lifestyle of host animals, and habitat characterization [24-25]. Temperature is the principal extrinsic factor of ectoparasites occurrence, because it regulates the metabolic rate and influences both the efficiency of blood-meal utilization, length of oviposition periods and developmental rates [26]. The relative humidity is the controlling factor of water balance mechanisms of ticks [27]. Low humidity represents a great stress on the water balance of ticks and seems to adversely affect the efficiency of converting the blood meal into egg biomass [28].

5. Conclusion

The present study has shown that wild animals infested with several species of ticks, they can be transmitted to farm animals.The results obtain from the present study shows that ticks have seasonal distribution and varied with preferable host selection. The observations of this study may contribute to increase the understanding of epidemiology of ticks in Iraq. This may help in adopting tick control strategies. Therefore, further studies on tick abundance are also suggested in other areas of Iraq to clear the faded knowledge of tick distribution in wild animals and livestock. Focus should also be given on tick distribution pattern on different attachment sites on host body, tick prevalence in relation to body score and breed of host.

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7. References

1. Wall R. Shearer D. Veterinary Entomology. Chapman and Hall Publisher, UK, 2001, 271.
2. Lancaster JL, Meisch MV. Arthropods in livestock and Poultry production (Ellis Harwood series in Acarology). Chichester, England, John Wiley and Sns. Ltd, 1986, 271.
3. De Castro JJ. Sustainable tick and tick borne disease control in livestock improvement in developing countries. Vet. Parasitol. 1997; 71:77-97.
4. Soulsby EL. Helminths, Arthropods and Protozoa of Domesticated Animals, 7th ed. Bailliere Tindall and Cassel Ltd., London, 2006, 809.
5. Walker AR, Bouattour A, Camicas JL, Estrada-Peña A, Horak IG, Latif AA *et al*. Ticks of domestic animals in Africa: a Guide to Identification of Species. The University of Edinburgh, 2003, 221.
6. Jongejan F, Uilenberg G. The global importance of ticks. Parasitology. 2004; 129:S3-S14.
7. Barker S, Murrell A. Phylogeny, evolution and historical zoogeography of ticks: a review of recent progress. Experimental and Applied Acarology. 2007; 28:55-68.
8. Barker S, Murrell A. Systematics and evolution of ticks with a list of valid genus and species names. Parasitology. 2004; 129:S15-S36.
9. Keirans JE, Litwak TR. Pictorial Key to the Adults of Hard Ticks, Family Ixodidae (Ixodida: Ixodoidea), East of the Mississippi River. Journal of Medical Entomology. 1989; 26(5):435-448.
10. Oliver JH. Biology and systematics of ticks (Acari: Ixodida).Annual Review of Ecology and Systematics. 1989; 20:397-430.
11. Walker AR, Bouattour JL, Camicas A, Estrada Pena IG, Horak AA, Latif RG *et al*. Ticks of Domestic Animals in Africa: A Guide to Identifi cation of Species. Bioscience Reports, 2003, 221.
12. Farid HA. Morphological keys for the separation of the *Rhipicephalus sanguineus* group of ticks (Acarina: Ixodidae) in Egypt. Journal of the Egyptian Society of Parasitology. 1996; 26(2):453-460.
13. Trapido H, Varma MGR, Rajagopalan PK, Singh KRP, Rebello MJ. A guide to the identification of all stages of the *Haemaphysalis* ticks of South India. Bulletin of Entomological Research. 1964; 55(2):249-270.
14. Mohammad K. Distibution of Ixodid ticks among domestic and wild animals in central Iraq. Bull. Iraq nat. Hist. Mus. 2025; 13(2):23-30
15. Shubber W, Al-Hassani N, Mohammad M. Ixodid ticks diversity in the middle and south of Iraq. International Journal of Recent Scientifics Research. 2014; 5(9):1518-1523.
16. Tavakoli M, Hosseini-Chegeni A, Mehdifar D. Occurrence of morphologic variability in tick *Hyalomma anatolicum anatolicum* (Acari: Ixodidae). Iran. J Vet. Med. 2012; 6(3):177-186.
17. Hasson RH, Tick distribution and infestation among sheep and cattle in Baghdad's south suburb. Kufa J. For Vet. Med. Sci. 2012; 3(1):77-90.
18. Pfaffle M, Littwin N, Muders SV, Petney TN. The ecology of tick-borne diseases. International Journal of Parasitology. 2013; 43:1059-1077.
19. Vatsya S, Yadav RR, Kumar R, Garg S. Seasonal activity of *Boophilus microplus* on large ruminants at an organized livestock farm. J Vet. Parasitol. 2007; 21(2):125-128.
20. Patel G, Shanker D, Jaiswal AK, Sudan D, Verma SK. Prevalence and seasonal variation in ixodid ticks on cattle of Mathura district, Uttar Pradesh. J Parasit. Dis., DOI Buffalo Bulletin. 2012; 34(1).
21. Gray JS. The development and seasonal activity of the tick *Ixodes ricinus*: A vector of Lyme borreliosis. Med. Vet. Entomol. 1991; 79:323-333.
22. Das SS. Prevalence of ixodid ticks infestation on farm animals in Pantnagar, tarai of Uttar Pradesh. J Parasit. Appl. Anim. Biol. 1994; 3:71-73.
23. Kwak YS, Kim TY, Nam SH, Lee Y, Kim HP, Mduma S, *et al*. Ixodid Tick Infestation in Cattle and Wild Animals in Maswa and Iringa, Tanzania. Korean J Parasitol. 2014; 52(5):565-568.
24. Dantas-Torres F. Biology and ecology of the brown dog tick, *Rhipicephalus sanguineus*. Parasites and Vectors. 2010; 3:26-35.
25. Gonzalez I, Labruna M, Chagas CR, Salgado P, Monticelli C, Morais LH *et al*. Ticks infesting captive and free-roaming wild animal species at the São Paulo Zoo, São Paulo, Brazil. Braz. J Vet. Parasitol., Jaboticabal. 2017; 26(4):496-499.
26. Chabra MB, Ruprah and S.K. Gupta.1983. Ixodid ticks on bovines in Haryana: A preliminary report.Cherion. 1983; 12:298-303.
27. Labruna M, De Paula C, Lima T, Sana D. Ticks (Acari: Ixodidae) on Wild Animals from the Porto-Primavera Hydroelectric Power Station Area, Brazil. Mem. Inst. Oswaldo Cruz, Rio de Janeiro. 2002; 97(8):1133-1136.