



A retrospective study of tick fauna of Iraq – checklist

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Abstract

Ticks are an important vector for several viral, bacterial, and protozoan pathogens that infect a wide range of domestic and wild animals as well as humans. There is limited information about tick species and tick-borne diseases in Iraq. To facilitate future studies of this important group of ectoparasites and to identify gaps in our understanding of the biology of ticks and the diseases that they transmit in the region, we have conducted this review study. The present study included literature on ticks which was published in Iraq, during the period from 1955 to 2023. It was found that 33 tick species infesting livestock, birds and wild animals belonging to 10 genera were confirmed to be recorded. These genera are *Argas*, *Ornithodoros*, *Otobius*, *Amblyoma*, *Boophilus*, *Dermacentor*, *Haemaphysalis*, *Hyaloma*, *Rhipicephalus* and *Ixodes*.

Keywords: Iraq, Tick fauna, Argasidae, Ixodidae

Introduction

Ticks and their importance

Ticks are blood-feeding obligatory ectoparasites of terrestrial vertebrates and amphibians, causing blood loss and damage to the skin of infested hosts (Sparagano *et al.*, 2012). They are important vectors of a wide range of pathogenic microorganisms (Viruses, Bacteria, Protozoa) affecting livestock, human and other vertebrate (Fatemian *et al.*, 2018). There are more than 900 species of ticks known worldwide, and 10% of these species are responsible for the transmission of pathogens among domestic animals and humans (Jongejan and Uilenberg, 2004). Some tick-



borne diseases not only threaten animal life but also make human health at risk (Fatemian *et al.*, 2018). In addition to transmitting various diseases through biological or mechanical transport, ticks also have a negative impact on human and animals health through serious annoyance, dermatitis, fatigue and malnutrition which can be induced by nutrition-based behaviours (Jafarbekloo *et al.*, 2014; Sofizadeh *et al.*, 2014 and Mansfield *et al.*, 2017). Tick saliva contains toxic substances that may cause paralysis in animals and humans, this is another tick-borne problem that is added to the diseases transmitted by ticks (Sonshine, 1991; de la Fuente *et al.*, 2017 and Whitfield *et al.*, 2017). Therefore, ticks remain one of the most significant threats to global public health (Dantas-Torres *et al.*, 2012).

The importance of livestock in Iraq

Iraq is an agricultural country in the first place, and man was and still depends heavily on livestock products that make up the second half of agricultural production. Which provides him with his nutritional needs as its other luxury needs, as well as the use of its waste as fertilizer for the soil. Iraq has many kinds of livestock and according to the latest census carried out by the Directorate of Animal Wealth in 2010, the number of cows was 2.552 million, Buffaloes 285.5 thousand, sheep 7.722 million, goats 1.474 million and Camels 58.300 thousand. They are abundant in the areas rich in their fertile pastures. However, livestock in Iraq face several challenges or problems including ticks and tick-borne diseases (TBDs).

Tick-borne diseases (TBDs) and their importance

Ticks and tick-borne diseases are cosmopolitan distribution, but increasingly important and their greatest impact is in tropical and sub-tropical countries (Schischke, 2015). Tick not only acts as a vector for the pathogen, but the infection itself causes several problems in the lack of milk production, and weight loss and makes the animals vulnerable to bacterial and fungal infections (Hasson, 2016). Ticks are vectors of causative agents of a number of diseases in livestock, such as theileriosis, babesiosis, Crimean- Congo hemorrhagic fever etc., and cause huge economic losses and zoonotic risk for the human populations (Sparagano, 2021). Livestock in Iraq are exposed to the most dangerous tick-borne pathogens of the genera *Anaplasma*, *Babesia* and *Theileria*. However, the full impact of TBDs, in general, has not been accurately quantified, but it is believed that they cause massive losses through mortality, morbidity and productive losses.

Tick control



Ticks are one of the important vectors of different pathogens and have a great impact on human and veterinary health (Sparagano *et al.*, 2021) and cause huge economic losses, so their control is unavoidable. However, the use of chemical acaricides in ticks control leaves residues and remnants of toxic chemicals in the environment that constitute a source of riskiness to humans and animals, in addition to the fact that ticks developed resistance against these acaricides, which reduced their efficiency in eliminating them. For these reasons, there has been an increase in interest in natural resources, including plants, as effective treatments. More than 2000 species of medicinal herbs have been used around the world to control arthropods (Miresmailli and Isman, 2011). There is also promising research in obtaining an antigen or cocktail of several antigens derived from ticks that induce immunity to tick infestation (Sparagano *et al.*, 2022). In Iraq, studies on the effect of plant extracts on ticks, were limited, as there are some studies that dealt with this topic, Hasson and Al-Zubaidi (2015) found that 15% of clover leaf extract was efficient to killed 80% of *Argas spp.* in 24 hours than other concentration. Hatem (2020) pointed out that the ethanolic extract of corns *Quercus* had an acaricidal effect on *R. sanguines* and the females were more sensitive than males. Hatem and AL-Asadi (2020) showed that the toxic effect of eucalyptus oil gradually reduced the age of the tick *H. anatolicum*, and the eggs were the most affected.

History of tick's research in Iraq

It is somewhat unclear when that the first research on the tick fauna was conducted in Iraq, but it likely began with the collection of Dr.P.A. Buxon during the years of the 1st world war deposited in the Natural British Museum. Thereafter Hubbard (1955), Leiper (1957), Hoogstraal and Kasier (1958), Robson and Robb (1967) and Robson *et al.* (1969) collected a list of ticks from livestock. The work of Hoogstraal and Kasier (1958) is considered one of the most extensive works done on Iraqi ticks giving keys, geographical distribution, and host–parasite relationships. However, recently, there has been increased interest in the ticks of Iraq and a review of these studies is rather well documented in Shubber *et al.* (2014). After that, several studies were conducted, including the study of AL-Mayah and Abdul-Karim (2020); Makawi and Hadi (2023) and Hatem and Abdul-Karim (2023). These have been reinforced using molecular techniques, where AL-Fatlawi *et al.* (2018); Ali *et al.* (2021); Flayh (2021); Ismael and Omer (2021) and Yassin *et al.* (2022) which have simplified the detecting, identifying and characterizing ticks and tick-borne diseases. However, most of these studies are general surveys concentrated mainly on domestic hosts with few exceptions that dealt with wild



animals such as the studies done by Hasson and Al-Zubaidi (2011) and Mohammad (1996;2015). To facilitate future studies of this important group of ectoparasites and to identify gaps in our understanding of tick biology and the diseases that they transmit in the region, we have conducted this review study.

Materials and methods

A checklist of tick species recorded previously from terrestrial vertebrates in Iraq was presented by reviewing the literature carried out during the period between 1955 and 2023. This review also included a detailed list of tick-hosts arranged in alphabetical order. In addition, a brief account of ecology and some suggestions for future studies and control of ticks were also included. To avoid confusion in the nomenclature, tick species names were adopted as they were mentioned in the original articles.

Results

Based on a survey of previous studies, concerning the ticks in Iraq during the last 68 years, 33 tick species have been reported. These represent 10 genera and two families Table (1) and Figure (1).



Table 1. Tick species recorded in Iraq and their animal hosts

Family	Genus	Species	Hosts
Argasidae	<i>Argas</i>	<i>A. persicus</i>	Chicken
	<i>Ornithodoros</i>	<i>O. erraticus</i>	Cow
		<i>O. lahorensis</i>	Cow
		<i>O. savignyi</i>	Sheep
	<i>Otobius</i>	<i>O. megnini</i>	Buffalo
Ixodidae	<i>Amblyoma</i>	<i>A. punctata</i>	Sheep, Cow
	<i>Boophilus</i>	<i>B. annulatus</i>	Sheep, Cow
		<i>B. kohlsi</i>	Cow
	<i>Dermacentor</i>	<i>D. marginatus</i>	Cow, Sheep
	<i>Haemaphysalis</i>	<i>H. adleri</i>	Fox, Wild jungle cat
		<i>H. erinaceid</i>	Cow
		<i>H. detritum</i>	Cow
	<i>Hyalomma</i>	<i>H. parva</i>	Cow, Sheep
		<i>H. sulcate</i>	Buffalo
		<i>H. anatolicum</i>	Sheep, Cow, Buffalo, Goats, Camels, Horses, Donkey
		<i>H. asiaticum</i>	Cow, Buffalo, Black bird
		<i>H. detritum</i>	Cow
		<i>H. dromedary</i>	Cow, Buffalo, Camels
		<i>H. excavatum</i>	Sheep, Cow, Goats, Buffalo, Camels
		<i>H. impeltatum</i>	Sheep, Cow, Camels, Buffalo
		<i>H. marginatum</i>	Sheep, Cow, Goats, Buffalo
		<i>H. rufipes</i>	Sheep, Cow, Buffalo
		<i>H. schulzi</i>	Camels
		<i>H. scupense</i>	Sheep, Cow, Buffalo, Goats, Camels, Horses
		<i>H. truncatum</i>	Sheep, Cow, Buffalo, Goats, Camels
		<i>H. turanicum</i>	Sheep, Cow
<i>Hyalomma sp.</i>	Sheep, Cow, Buffalo		
<i>Ixodes</i>	<i>I. tatei</i>	Wild boar, Black rat, Crested lark, Rock partridge	
<i>Rhipicephalus</i>	<i>R. bursa</i>	Cow	
	<i>R. leporis</i>	Hare, fox, Jackal, Hedgehog	
	<i>R. sanguineus</i>	Sheep, Cow, Buffalo, Goats, Horses, Dog, Fox	
	<i>R. turanicus</i>	Sheep, Cow, Buffalo, Goats, Domestic cat, Hare, Fox, Jackal, Hedgehog, Ratel, Common outer, Wild bare	
	<i>Rhipicephalus sp.</i>	Sheep, Cow, Buffalo, Wild jungle cat	

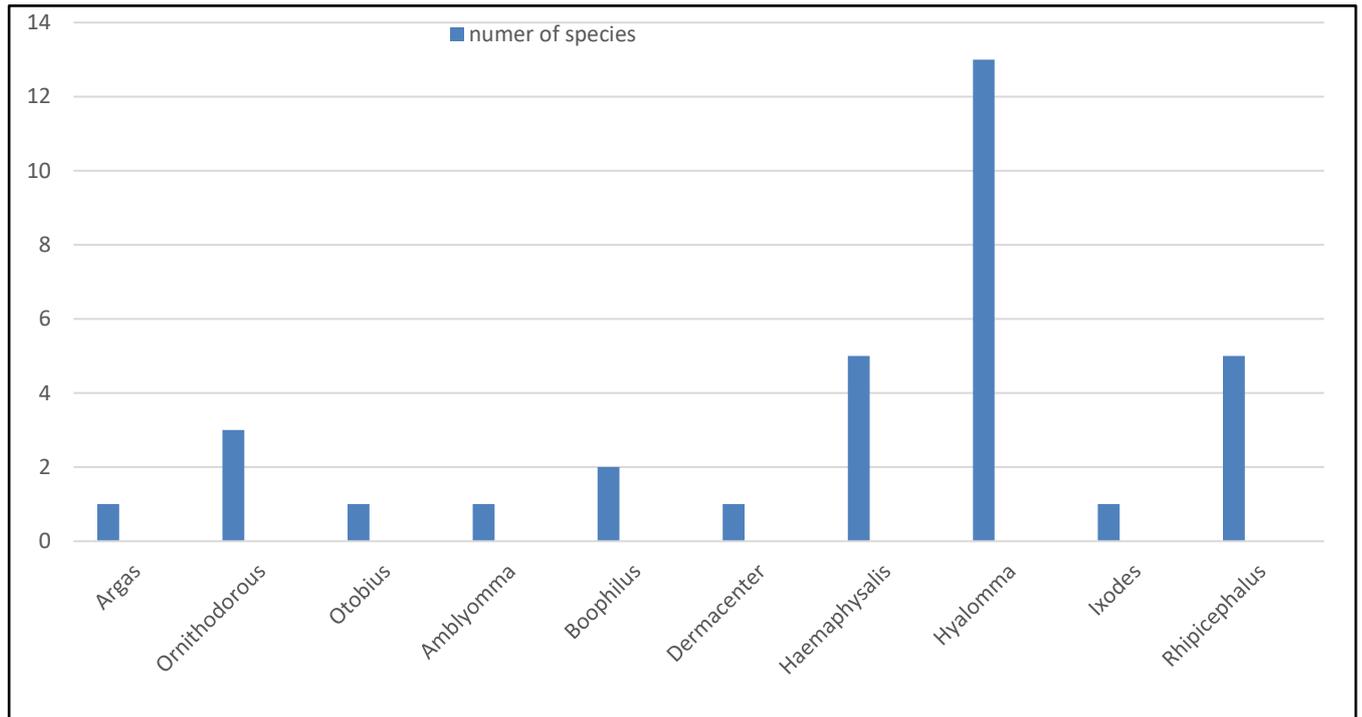


Figure 1. Genera of ticks and numbers of their species recorded in Iraqi animals

Discussion

Iraq is located within the southern part of the northern temperate zone, and this location has a significant impact on its climate, which is similar to the climate of the tropical region in terms of heat as it is characterized as sub-tropical. This geographical location and the climatic condition of Iraq made it suitable for the growth and spread of tick species. Therefore, ticks and tick-borne diseases are among the most challenges facing the livestock industry in Iraq. By reviewing previous research and studies conducted in Iraq, we find that the tick fauna is abundant and diverse, as it recorded 33 species belonging to 10 genera from various domestic and wild animals. Previously, Hoogstraal and Kaiser (1958) listed 21 species comprising the following genera, *Argas*, *Ornithodoros*, *Haemaphysalis*, *Hyaloma*, *Ixodes* and *Rhipicephalus*. Derwesh (1965) submitted an official report mentioning five genera of ticks comprising eight species namely *A. punctata*, *B. annulata*, *D. marginatus*, *H. detritum*, *H. dromedari*, *H. excavatum*, *R. bursa*, *R. sanguineus*. Abul-Hab (1980) presented a list of medical and veterinary importance arthropods including 28 species of ixodid ticks. Shamsuddin and Mohammad (1988) identified 12 tick species, namely *B.annulatus*, *B. kohlsi*, *R. bursa*, *R. leporis*, *R. turanicus*, *H. detritum*, *H. erinacei*, *H.sulcata*, *H. anatolicum*, *H. marginatum turanicum*, *H. scupense* and *O. erraticus*.when we compare the present check-list with the previous lists of



tick species in Iraq, we find that it is rich in species that have been recorded. This may be due to several reasons, including the increase in researchers in this field or the abundance and diversity of ticks as a result of the environmental changes that occurred in the region, or to the increase in trade in domestic animals, which lead to the introduction of species that did not exist previously. Tuama et al. (2007) recorded the two species *H. rufipes* and *H. truncatum* with dominant in Thi-Qar Governorate in southern Iraq. Both species were not previously reported in Iraq. Makawi and Hadi (2023) considered buffalo as a new host for *H. truncatum*, *H. impeltatum*, and *H. rufipes* in Iraq, but through this review, we found that *H. truncatum* had been previously isolated from buffalo by AL-Mayah and Hatem (2018). The literature review revealed that *Hyalomma*, *Rhipicepalus* and *Haemaphysalis* are the main genera of Ixodid infesting livestock in Iraq. While the Argasid ticks were the genus *Orinodoros*.

From reviewing the literatures given in this text, the authors would like to conclude that the field of ticks in Iraq is still new and incomplete. Since most of the previous studies in this field were concerned mainly with classification and ecology, further detailed studies are needed on life cycle, physiology, immunology, tick-borne diseases and on treatment as well as on control. Due to the increase in the incidence of zoonotic diseases at the present time, control and prevention of ticks has become an inevitable goal. Finally, the authors suggest first tick control programs based on the integration of public health efforts, veterinary medicine, and good husbandry management as well as environmental approaches. Second, funding research projects on ticks by stakeholders and establishing joint control programs to combat the movement of ticks across borders by controlling the livestock and animal trade.

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