Geographical distribution of ixodidae (hard ticks) in all provinces of Iraq

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Abstract

A Large project was held to detect the hard ticks in Iraq in 2019; 3421 ticks’ samples were collected from 18 provinces of Iraq, representing all Iraqi areas. The results showed that ticks belonging to the Ixodidae family, the prevalence and density of ticks per host revealed that the genus Hyalomma was the dominant genus in the present survey. Genus Hyalomma spp. The highest rate in Duhok was 88.6%, while the lowest rate was 46.94% in Nineveh. Eight species belonging to Hyalomma are Hyalomma anatolicum, Hyalomma turanicum, Hyalomma scapense, Hyalomma dromedarii, Hyalomma excavatum, while Rhipicephalus spp. was the second most common species namely Rhipicephalus annulatus, Rhipicephalus sanguineous, Rhipicephalus turanicus, the highest rate found in Al-Anbar 48.9% while the lowest in Duhok was 11.4%. The genus Dermacentor spp. found in Basra only at a rate of 1.72%.

Introduction

Ticks are generally regarded as the Ectoparasite that causes significant economic losses to livestock production worldwide; they cause anemia, damage hides, and paralysis (1). however, hard ticks play a considerable role in spreading various infectious diseases of human and animal importance (2-4). Ticks are distributed in many countries except the frozen areas (5), and they infest broad groups of mammals (6). Also, ticks have huge ability adaptations for host and environmental tolerance (7,8). There have been attempts at immunization, like the one made by using the salivary gland of Hyalomma to immunize sheep (9). Ticks of Iraq were well documented (10-14), reported on the seasonal incidence and distribution of ticks infesting domestic animals; basic information was added to four unreported ticks on the list of 21 species (15,16). Another study reported some spp of ticks on domestic and wild animals in Iraq, and ticks in the desert of Iraq (17). A survey was performed to identify the species of ticks at their geographical distribution in fifteen provinces of Iraq (18). Other study the distribution of ticks and infection among sheep and cattle in the southern part of Baghdad (19). In contrast, in Sulaimani, an epidemiological study of hard ticks showed that Hyalomma anatolicum anatolicum, H. marginatum, Rhipicephalus turanicus, and R. sanguineus are more prevalent in sheep (20,21). There are about 700 species of Ixodidae ticks described worldwide (22). In comparison, there were 33 species and subspecies of hard ticks in Iraq (18,23). More recently, studies provided perfect data on tick infestations among native animals in different areas of Iraq (24,25). Recent studies in Al-Najaf province showed three abundant species private: Boophilus annulatus, Rhipicephalus sanguineus, and Hyalomma dromedarii (26-28).

This survey is a huge campaign held in Iraq since 1967, which covers 18 provinces, to identify hard ticks with particular emphasis on the claim of some researchers that new species of Bovine.

Materials and methods

Animal and tick sample

The samples collected from domestic animal (cattle, sheep, goat, buffalo, dog, and chickens) was carefully
examined to detect hard ticks and then removed and placed in methyl alcohol 70% for preservation.

**Study areas**

The samples carried out from 18 provinces included: Nineveh 48, Saladin 155, Babylon 115, Wasit 149, Diyala 86, Sulaymaniyah 787, Basra 233, Najaf 105, Muthanna 236, Al-Anbar 182, Al-Qadisiya 86, Kirkuk 73, Baghdad 230, Kirkuk 73, Maysan 193, Nineveh, Erbil 60, and Duhok 39.

**Microscopic examination of hard tick**

A dissecting microscope is used to examine tick samples after cleaning them to identify the species of the ticks with the aid of diagnostic keys and taxonomy depending on references (15-29).

**Ethical approve**

The Scientific Ethical Committee of the College of Veterinary Medicine, University of Diyala, Iraq, approved this study. Approval no: VM 104 December 2018 H, R, M, E, S and T.

Table 1: Distribution of Ixodidae ticks among Iraq provinces

<table>
<thead>
<tr>
<th>Province</th>
<th><em>Hyalomma</em> spp.%</th>
<th><em>Rhipicephalus</em> spp.%</th>
<th><em>Dermacentor</em></th>
<th><em>P</em> value</th>
</tr>
</thead>
<tbody>
<tr>
<td>Nineveh</td>
<td>46.94</td>
<td>51.0</td>
<td>0</td>
<td>0.031</td>
</tr>
<tr>
<td>Saladin</td>
<td>51.61</td>
<td>48.38</td>
<td>0</td>
<td>0.028</td>
</tr>
<tr>
<td>Babylon</td>
<td>51.3</td>
<td>48.7</td>
<td>0</td>
<td>0.035</td>
</tr>
<tr>
<td>Wasit</td>
<td>58.38</td>
<td>41.6</td>
<td>0</td>
<td>0.026</td>
</tr>
<tr>
<td>Diyala</td>
<td>60.47</td>
<td>39.53</td>
<td>0</td>
<td>0.038</td>
</tr>
<tr>
<td>Sulaymaniyah</td>
<td>67.73</td>
<td>32.27</td>
<td>0</td>
<td>0.035</td>
</tr>
<tr>
<td>Basra</td>
<td>78.11</td>
<td>20.17</td>
<td>1.72</td>
<td>0.022</td>
</tr>
<tr>
<td>Najaf</td>
<td>73.33</td>
<td>26.7</td>
<td>0</td>
<td>0.026</td>
</tr>
<tr>
<td>Muthanna</td>
<td>62.29</td>
<td>37.7</td>
<td>0</td>
<td>0.029</td>
</tr>
<tr>
<td>Al Anbar</td>
<td>51.1</td>
<td>48.9</td>
<td>0</td>
<td>0.034</td>
</tr>
<tr>
<td>Al-Qadisiyyah</td>
<td>74.42</td>
<td>25.58</td>
<td>0</td>
<td>0.027</td>
</tr>
<tr>
<td>Kirkuk</td>
<td>69.86</td>
<td>30.1</td>
<td>0</td>
<td>0.039</td>
</tr>
<tr>
<td>Baghdad</td>
<td>83.47</td>
<td>16.52</td>
<td>0</td>
<td>0.011</td>
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<tr>
<td>Karbala</td>
<td>70.42</td>
<td>29.6</td>
<td>0</td>
<td>0.032</td>
</tr>
<tr>
<td>Maysan</td>
<td>83.9</td>
<td>16.1</td>
<td>0</td>
<td>0.014</td>
</tr>
<tr>
<td>DhiQar</td>
<td>75.85</td>
<td>24.2</td>
<td>0</td>
<td>0.027</td>
</tr>
<tr>
<td>Erbil</td>
<td>78.3</td>
<td>21.66</td>
<td>0</td>
<td>0.026</td>
</tr>
<tr>
<td>Duhok</td>
<td>88.6</td>
<td>11.4</td>
<td>0</td>
<td>0.015</td>
</tr>
</tbody>
</table>

Genus *Hyalomma* spp. (Figure 1A) recorded the highest rate in Duhok 88.6% while the lowest rate, 46.94%, in Nineveh, *Rhipicephalus* spp. (Figure 1B), was the second most common species, the highest rate found in Al Anbar 48.9% while the lowest in Duhok was 11.4%. The genus Dermacentor (Figure 1C) was found in Basra only at a rate of 1.72% (Table 1).

The results of the present survey will be summarized in table 2. Eight species belonging to two Genera *Hyalomma* and *Rhipicephalus*, namely, *H. anatolicum* (Figure 1A), *H. turanicum* (Figure 2A), *H. scupense* (Figure 2B), *H. dromedaryi*, *H. excavatum* (Figure 2C), *R. annulatus* (Figure 3A), *R. sanguineus* (Figure 3B).

**Statistical analysis**

The data were analyzed using IBM-SPSS Version 19 (Inc., Chicago, USA), which included the Chi-square 2x2 table and the Kappa value. The data was deemed statistically significant when the *P* value was 0.05 and 0.01.

**Results**

This survey aims to search for A claim that ticks *Amblyomma gemma* Were reported previously in a massive project to apply integrated pest management (IPA) to hard ticks in Iraq during 2015 in 12 provinces; a total number of 3421 ticks’ samples were collected from 18 provinces of Iraq including Kurdistan region during the year 2019. The results identified ticks belonging to the family Ixodidae, and the prevalence and density of ticks per host recorded that the genus *Hyalomma* was more dominant in the present survey (Table 1).
Discussion

This study showed that the infestation of ticks in livestock in Iraq is still a problem even after using different insecticides from the sixteenth of the 20th century. The importation of live livestock to Iraq from other countries, especially the illegal ones, increases the rate of introducing Ectoparasites that may not be detected during the examination. The present work differs from the most recent work on ticks in Iraq, like a study of Shubber et al. (30) which covered 12 provinces, while our research includes 15 provinces plus three provinces of the Kurdistan region. Still, the genus *Hyalomma* was the most dominant species among ticks-infested livestock in Iraq, which agrees with most studies and surveys implemented before (31-35), while the second most abundant ticks’ species in Iraq was genus *Rhipicephalus* with its three species were *R. turanicus* 67%, *R. annulatus* 17.1%, *R. sanguineus* 15.9%, various factors affect the increasing of *Rhipicephalus* spp intensity, these factors may be improvement in raising conditions, age of the animals, breed, immunity, acaricides usage and the seasonal changes e.g. sharp decrease in annual rainfall during recent seasons recorded in Iraq (36,38).

Basra recorded a single infection rate of 1.72% in only one province with *Dermacentor* hard tick. These results differ from earlier work which could be due to alteration of the relative humidity (9,37,40), which is considered to be a limiting factor of the geographical distribution of various ticks’ species, and this may be due to environmental changes
affecting the prevalence of tick’s infestation like temperature, rainfall, and relative humidity which play essential roles in propagation and multiplication of ticks (19,42).

Conclusion

The results showed the highest Ixodidae hard tick infestation rate, which is still widely spread in Iraq. Genus Hyalooma was dominant in the present survey. While Rhipicephalus spp. was the second most common species and, for the first time, the genus Dermacentor spp. Recorded in Basra province, the results appeared in this survey.

Acknowledgments

We are grateful to the Veterinary Directorate Ministry of Agriculture for their assistance and support in the parasitology laboratory unit of Baghdad’s central veterinary laboratories. Thanks to all of Kurdistan’s veterinary hospitals for their service of sample collection during the study.

Conflict of interest

All authors declare that there is no conflict of interest.

References


التوزيع الجغرافي للقراد الصلب في جميع المحافظات العراقية

حليم حمزه الزبيدي1، رعد حمودي حسون1، منتصر عمر العاني2، إيناس جواد فايد2، صلاح فاضل عباس2 و ثامر حبيب الخفاجي3

أُجريت دراسة كبيرة وموسعة للكشف عن القراد الصلب في العراق خلال عام 2019 حيث جمعت 3421 عينة قراد من 18 محافظة عراقية والتي تمثل جميع مناطق العراق. أظهرت النتائج أن أجناس القراد التابعة لعائلة اللبوديات أكثر انتشارا وأوضحت الدراسة أن جنس القراد زجاجي العين هو السائد على الأجناس الأخرى في الدراسة الحالية حيث سجل جنس القراد زجاجي العين أعلى نسبة في دهوك 88.6% بينما كان الأدنى في النينوى 46.94٪. بينت الدراسة خمسة أنواع تابعة للقراد زجاجي العين و هي القراد زجاجي العين الأناضولية، القراد زجاجي العين القمحية، القراد زجاجي العين المكتشفة، القراد زجاجي العين الجملي، القراد زجاجي العين المحفورة. بينما كان ثاني أكثر الأنواع شيوعاً جنس القراد مروحية الرأس وسجلت له ثلاث أنواع وهي القراد مروحية الرأس الملحية والقراد مروحية الرأس الدموية والقراد مروحية الرأس القمحية وكانت أعلى نسبة وجدت في الأنبار 48.9% بينما الأدنى في دهوك كانت 5.13٪. كما بينت الدراسة وجود جنس ناخس الجلد في البصرة فقط ونسبة 1.72٪.

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