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STUDY OF CATTLE IXODID TICKS IN KHOOZESTAN PROVINCE, SOUTH-WEST OF IRAN

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ABSTRACT: Ticks are considered to be the main vectors for transmission of various diseases to animals and human. The present faunistic study aimed to determine species belonging to Ixodidae ticks, infesting cattle of Khoozestan province, south-west of Iran. Totally 1000 ticks were collected randomly from cattle from 9 locations in five geographical regions between January to September 2011, and were identified to the species level using valid identification keys. Eight tick species in fourdifferent genera were identified as *Hyalomma anatolicum* (39%), *Rhipicephalus sanguineus* (25.4%), *Hyalomma excavatum* (14.3%), *Hyalomma asiaticum* (6.8%), *Haemaphysalis sulcata* (3.7%), *Hyalomma scupense* (3.4%), *Hyalomma* spp. (3.4%), *Rhipicephalus* (*Boophilus*) *anuulatus* (2%) and *Hyalomma dromedarii* (2%). As some of the collected ticks are potential vectors for transmission of pathogens to animals and humans; more studies with focus onveterinary and public health importance of these species are recommended.

KEY WORDS: ixodid tick, cattle, Khoozestan, Iran

INTRODUCTION

Ticks are blood sucking arthropods belonging to phylum Arthropoda and class arachnids. To date, approximately 900 tick species have been described, divided among the Ixodidae, Argasidae, and Nuttalliellidae, of which about 10% of Ixodidae and Agasidae families are of clinical significance (Jongejan and Uilenberg 2004). Once they attach to a host for ablood meal, they can cause skin irritation and anemia. Ticks transmit pathogens that affect animal and human populations therefore tick-borne diseases (TBDs) have a great impact on both human and animal health (Petney et al. 2011). Although ectoparasites are not critical limiting factors, their presence can affect productivity of cattle, which in turn has economic consequences production by reducing animal weight gain and milk yield (J. de la Fuente et al. 2007). There are at least 50 species of ectoparasites including 22 species of ticks infesting cattle worldwide (Byford et al. 1992). Some of tick-borne pathogens include *Borrelia*, *Anaplasma*, *Coxiella*, *Francisella*, *Rickettsia*, *Theileria*, *Ehrlichia* and *Babesia* species, as well as viruses such as the tick-borne encephalitis virus, and Crimean-Congo hemorrhagic fever (CCHF) (Walker et al. 2003).

Therefore it is important to know the abundance of the tick species involved in disease transmission as well as their geographical distribution for controlling ticks and TBDs. There are several reports on host preference, infectivity, geographical distribution, insecticide resistance, molecular detection of different organisms, biodiversity, seasonal activity, classification, fauna, ecology and biology of hard and soft ticks by researchers from Iran.

The ixodid tick species are the most abundant ticks infesting ruminants in Iran. There are several reports from cattle of different parts of Iran; Telmadarraiy et al. (2004, West Azerbaijan province), Razmi et al. (2007, Mazandaran province), Nabian et al. (2007, North of Iran), Nabian and Rahbari (2008, Zagros mountainous area), Salim Abadi et al. (2010, Yazd), Shemshad et al. (2011, Qazvin) and Shemshad et al. (2012, Boeen Zahra and Takistan counties). However, the results were rarely quantified and compared geographically and seasonally. To the best of our knowledge there are no reports from the Khoozestan region. Hence, the objective of this faunistic study was to determine the species and distribution of ticks infesting cattle in this province to fill this epidemiologic information gap in Iran.

MATERIALS AND METHODS

Study area

Khoozestan province with center coordinates of 31° 19′ N and 48° 41′ E is located in south-west

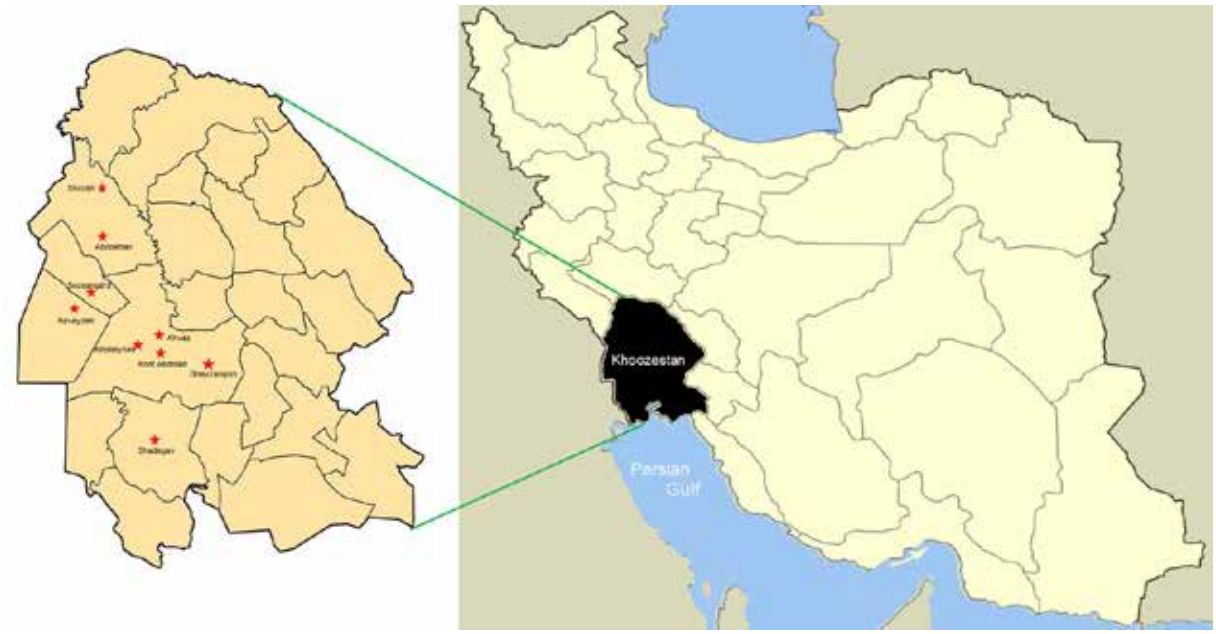

Figure. Map of Iran showing Khoozestan province. The samples were taken from 9 sub-regions which are marked by stars.

of Iran and includes 64.057 km^2. The overall climate of this province is generally hot and humid almost all year round. In the present study, cattle from five geographical zones with the most population of cattle were investigated by simple random sampling. As Figure shows the zones were Shoosh and Abdolkhan (from north), Gheyzaniyeh (from east), Soosangerd and Hoveyzeh (from west), Shadegan (from south) and Khobeynehand Koot Abdollah (from center).

Tick collection

During 9 months, from January to September 2010, one thousand ticks were collected from infested cattle in the early mornings and the evenings. Tick sampling was performed by examining the whole body including, but not limited to ears, abdomen, at the base of the mane, inside the tuft of the tail, inter-digital spaces, feet, pre-anal regions, milk gland area, and back of the animal. Collected ticks were placed in separate, dry, and labeled vials with some vegetation as a resting place, and placed in a cool box to keep them alive until being transported to the laboratory for examination. Also, ticks collected from the veterinary clinic of Shahid Chamran University of Ahwaz were enrolled. Livestock of these regions are grazed in pastures. For controlling ectoparasites, insecticides are used irregularly in the farms.

Tick identification

Adult ticks were counted and identified to species level using general identification keys of Hoogstraal (1956), Arthur (1960) and Walker et al. (2003) under a stereomicroscope (Zeiss, Germany).

RESULTS

Out of 1,000 collected ticks 8 species of ixodid ticks from 4 genera of *Hyalomma*, *Rhipicephalus*, *Haemaphysalis* and *Boophilus* were identified. *Hyalomma anatolicum* was found as the most abundant tick (39%), whereas *Rhipicephalus sanguineus* (25.4%) and *Hyalomma excavatum* (14.3%) were also prevalent in this south-west region of Iran. Other observed ticks were *Hyalomma asiaticum* (6.8%), *Haemaphysalis sulcata* (3.7%), *Hyalomma scupense* (3.4%), *Hyalomma* spp. (3.4%), *Rhipicephalus* (*Boophilus*) *anuulatus* (2%) and *Hyalomma dromedarii* (2%).

DISCUSSION

Mazlum (1971) previously reported all of the species identified in this study. Astudy in West Azerbaijan province exhibited species of hard ticks including *Rh. bursa*, *H. aegyptium*, *H. marginatum*, *H. schulzei* (Telmadarraiy et al. 2004) which we could not find from cattle in our study area, possibly due to local macro- and microclimate conditions. In current study, frequency of the genus *Hyalomma* was higher than the others, since *H. anatolicum* had the highest prevalence. *H. anatolicum* is vector of causative organism of tropical theileriosis, and transmits a variety of other pathogenic organisms such as *Theileria lestoquardi*, *T. equi*, *Babesiacabali*, *Trypanosoma theileri* and Crimean-Congo hemorrhagic fever (CCHF) virus

(Walker et al. 2003) which are endemic in Iran. Our finding along with the results of the study by Yakhchali et al. (2011) in Hendijan — a city in south of Iran — who found *H. anatolicum* as the predominant infesting tick. Also in mountainous areas of west and the desert boundary area of Iran *Hyalomma* ticks were reported to be the most abundant species (Nabian and Rahbari 2008; Salim Abadi et al. 2010). However, in north and north-west regions, *Rhipicephalus* spp. and in a national park in north-east *Dermacentor* spp. were the prominent dragged ticks (Telmadarraiy et al. 2004; Razavi and Seifi 2006; Razmi et al. 2007; Yakhchali et al. 2011; Razmi and Ramoon 2012). These discrepancies may be due to the origin of the collected ticks and climatic factors.

The second most prevalent tick species in our study was *Rhipicephalus sanguinus*. Nabian et al. (2007) and Shemshad et al. (2011) also reported high abundance of this species in North of Iran and Qazvin province. This species can infest a wide range of domestic ruminants, and is widespread in both mountainous as well as in plain areas (Shemshad et al., 2011). The distribution and abundance of *R. sanguineus* and *R. bursa* are important keys in epidemiology of various diseases such as babesiosis in Iran. Another member of the *Rhipicephalus* genus; *R. anuulatus* (formerly *Boophilus annulatus*) despite low prevalence in our study may play an important role in epidemiology of babesiosis and anaplasmosis in cattle herds in south of Iran. However, studies in north of Iran have shown *R. annulatus* to be the prominent tick infesting cattle (Razavi at Seifi 2006; Razmi et al. 2007; Yakhchali et al. 2011). Although *R. turanicus*has been collected in some parts of the country from sheep and goats, to the best of our knowledge there is no report of cattle infestation with this tick.

Haemaphysalis sulcata was identified with prevalence of 3.7%. Adults are usually found on larger animals, such as wild and domestic sheep, goats, cattle, horses, and camel (Hoogstraal and Valdez 1980). Species of genus *Haemaphysalis* cause tick paralysis and are vectors of the agents that cause animals and humans Q fever, tularemia, brucellosis and CCHF, and of *Theileria orientalis*, *T. sergenti, T. ovis*, *Babesia major*, *B motasi*, *B canis*, *Anaplasma mesaeterum*. Rahbari et al. (2007) studied *Haemaphysalis* ticks infestation in domestic ruminants in Iran. They identified 6 species of *Haem. punctata*, *Haem. choldokovskyi*, *Haem. sulcata*, *Haem. parva*, and *Haem. concinna* with respect to prevalence. However, in their report it is not clear which species was found in what ratio of examined cattle. *Haem. sulcata* is widely distributed and has been reported to be prevalent in humid and sub-humid zones (Grebenyuk 1966; Bouattour et al. 1999). As the climate of Khoozestan province is uniquely sub-humid because of the neighboring Persian Gulf and also different superficial water resources such as rivers and canals, we could find *Haem. sulcata* while other researchers from Iran could not find this species in other parts of country.

In conclusion, ticks which we found in southwest of Iran may play an important role in several tick-borne diseases of humans and animals, therefore tick eradication programs should be considered to reduce their population in order to prevent epidemics. Although epidemiological studies provide necessary information for health policy makers however, more molecular studies seem necessary for better understanding of TBDs transmissions in Iran.

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