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# The seven-year longitudinal study on relapsing fever borreliosis in Western Iran

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## PEER REVIEW

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## ABSTRACT

**Objective:** To determine the epidemiologic and clinical features of tick borne relapsing fever in Kurdistan Province during 2000–2006.

**Methods:** In this cross-sectional clinic-based study, target group was all population of Kurdistan Province. In order to screen patients based on national protocol we diagnosed cases based on clinical symptoms together with the presence of *Borrelia* in blood smears that are stained with Wright–Geimsa. Positive cases after identifying were treated. Also we completed a questionnaire for all patients. The data were analysed by SPSS for getting descriptive indicators (relative and absolute frequency tables).

**Results:** The numbers of tick borne relapsing fever cases recorded during 2000 to 2006 were as follows: 14, 8, 17, 36, 22, 10 and 31, respectively. A total of 138 patients (50.8% males, 49.2% females) were studied. The most prevalent clinical manifestations were fever (100%), chills (92.7%) and headache (76.1%). Laboratory tests performed on patients showed the presence of *Borrelia persica* in blood smears. Most of the cases (42%) were in the age group 10–19 years old and 86.2% of them were under 30 years old. Nearly 92% of the patients were resident of the villages. About 37.7% and 25.4% of cases were students and housewives, respectively. Approximately 66% of cases were observed in summer. In 70% of cases, the buildings that they lived in were very old. Cattle or sheep were found in the homes of 89.1% of patients.

**Conclusions:** Due to the relatively high infection rate and economic consequences of this disease on the person and the community, we should take measures to prevent its prevalence by carrying out educational programs.

## 1. Introduction

Tick borne relapsing fever (TBRF) or endemic relapsing fever is an acute infectious zoonotic disease and sporadically distributed throughout rural areas of the globe[1,2]. TBRF is characterized by recurrent episodes of fever and a variety of nonspecific signs (such as vomiting, chills, abdominal pain, headache, myalgia and arthralgia), which are related to spirochetemia. It has an incubation period of 4 to 18 (or more) d. The infection is affirmed by

observing the spirochetes (*Borrelia* spp.) on blood smear under a microscope, during one of the periods of fever. TBRF often responds to antibiotic treatment[3–6].

This recurrent febrile illness is reported from Africa, South America, North America, Europe and Asia[2,7–9]. Soft ticks (Acari: Ixodida: Argasidae) perform a major role in transmission of TBRF[10]. *Borrelia* species are transferred to persons via the bite of infected *Ornithodoros* spp. ticks. *Borrelia* spp. alter their surface antigens, causing frequent stimulation of the body immune system by the latest antigen and a pyrexial response by the sick[3,11–13]. *Ornithodoros* spp. have nightly blood-feeding habits and pain-free bites. The *Borrelia* spp. can survive for many years in their long-lived vectors. Attainment of human TBRF is universally limited to the geographical range of the *Ornithodoros* tick vectors. The host reservoirs of *Borrelia*

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are rodents[3,12,13].

In Iran three species of Argasidae including, *Ornithodoros tholozani* (*O. tholozani*) (Figure 1), *Ornithodoros erraticus* (*O. erraticus*) and *Ornithodoros tartakovskyi* are able to transmit the TBRF to humans. Moreover, *Borrelia persica* (*B. persica*), *Borrelia microti*, *Borrelia latyschevi*, and *Borrelia baltazardi* (*B. baltazardi*) are the major causative agents of TBRF in Iran[14]. Among these four species of *Borrelia* in Iran, only *B. persica* and *B. baltazardi* are isolated from the blood smears of sick. *B. baltazardi* is isolated from the blood smear of just one sick with TBRF in Iran[15]. *B. persica* is transmitted by *O. tholozani*, *Borrelia microti* and *O. erraticus* which is found in rodent burrows[1]. Lyme borreliosis is recognized as the most common vector-borne human diseases in the northern moderate zone of the globe. Meanwhile, TBRF and Crimean Congo hemorrhagic fever are the most prevalent tick-borne illness in Iran[12,14]. In Iran, principal foci of TBRF are mountainous provinces of north-west and west, and also it is reported from various parts situated in south and center of the country (Figure 2) [1,2,13]. The objective of this research was to determine the epidemiologic and clinical features of TBRF in Kurdistan Province during 2000–2006.



Figure 1. Dorsal view of *O. tholozani*.

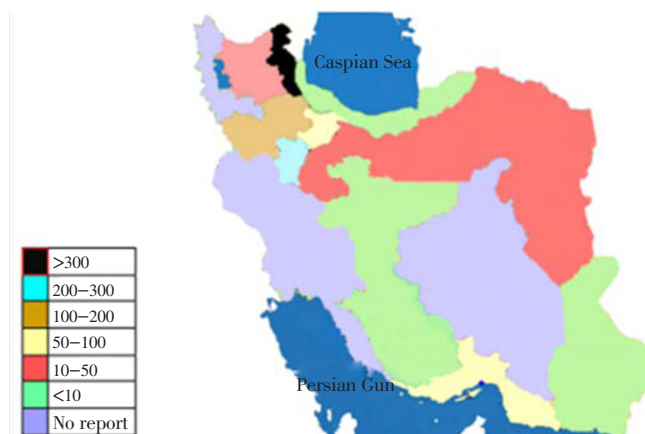


Figure 2. Distribution about the number of infected TBRF in Iran during 1997–2006[2].

## 2. Materials and methods

The province of Kurdistan is an entirely mountainous area

with 28817 km<sup>2</sup>. It is situated in the west of Iran (Figure 3) and border Iraq on the west, the provinces of Kermanshah to its south, Zanzan to the northeast, Hamedan to the east and West Azerbaijan to the north. The geographical coordinates of this province are from 34°44' to 36°30' of northern latitude and from 42°31' to 48°16' of eastern longitude. Winters are lengthy and can be so cold with heavy snowfalls.

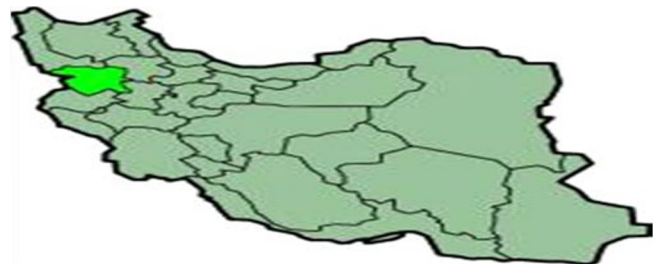


Figure 3. Kurdistan Province in Western Iran.

This study is a field and experimental investigation. This research was done as a cross-sectional and descriptive design. A questionnaire was planned in this study which contained data on clinical manifestations, construction matters, job, distance of livestock from human dwelling place, age, month, season, family size, place of residence, and other related data collected in interviews. Diagnosis was based on clinical symptoms in febrile illness plus the detection of spirochetes (*Borrelia* spp.) under Wright-Giemsa staining in thin and thick blood smears using dark-field microscopy (Figure 4).

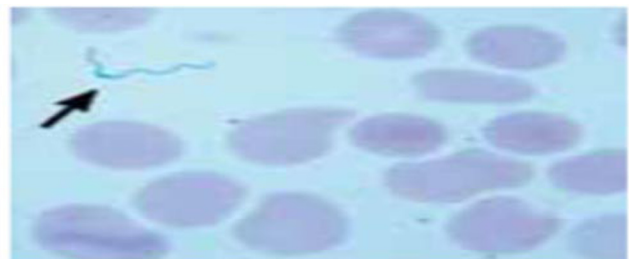


Figure 4. A *Borrelia* spp. spirochete in a smear of peripheral blood.

## 3. Results

In this epidemiological study, a total number of 138 cases have been found over seven years (2000–2006). The majority cases of TBRF was reported in the year 2003 ( $n=36$ ) (Figure 5). The patients included 50.7% women and 49.3% men. Patients were observed during eight months of the above mentioned years: 114 (82.6%) patients occurred from July through October; most patients were reported in July (37 cases, 26.8%) and August (28 cases, 20.3%) (Figure 6). The highest of patients were diagnosed during the summer and autumn months (Figure 7). The most common clinical symptoms were fever (100%), chills (92.7%), headache (76.1%), sweating (60.9%) and abdominal pain (58%). All cases had fever and other clinical symptoms in accordance with TBRF. Other findings

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