



Contents lists available at ScienceDirect

Acta Tropica

journal homepage: [www.elsevier.com/locate/actatropica](http://www.elsevier.com/locate/actatropica)

## Interaction between canine and human visceral leishmaniases in a holoendemic focus of Central Tunisia

Z. Zoghalmi<sup>a,1</sup>, E. Chouihii<sup>a,1</sup>, W. Barhoumi<sup>a</sup>, K. Dachraoui<sup>a</sup>, Nabil Massoudi<sup>a</sup>, K. Ben Helel<sup>b</sup>, Z. Habboul<sup>b</sup>, M.H. Hadhri<sup>c</sup>, S. Limam<sup>d</sup>, M. Mhadhbi<sup>d</sup>, M. Gharbi<sup>d</sup>, tdfnmE. Zhioua<sup>a,\*</sup>

<sup>a</sup> Laboratory of Vector Ecology, Pasteur Institute of Tunis, 13 Place Pasteur BP 74, 1002 Tunis, Tunisia

<sup>b</sup> Paediatric Department, University Hospital of Kairouan, Tunisia

<sup>c</sup> Regional Department of Health, Governorate of Kairouan, Tunisia

<sup>d</sup> Veterinary School of Sidi Thabet, Sidi Thabet, Tunisia

### ARTICLE INFO

#### Article history:

Received 2 May 2014

Received in revised form 21 June 2014

Accepted 27 June 2014

Available online xxx

#### Keywords:

Canine visceral leishmaniasis

Human visceral leishmaniasis

Dogs

Humans

Sand fly vectors

Phlebotomine

### ABSTRACT

Canine visceral leishmaniasis (CVL) is endemic in the Mediterranean basin. In Tunisia, CVL is spatially associated with human visceral leishmaniasis (HVL) affecting mostly children younger than 5 years old. In this study, seroprevalence of *Leishmania infantum* infection in dogs was assessed in highly endemic districts of the governorate of Kairouan where more than 50% of HVL cases in Tunisia were reported. An entomological investigation was also carried out in two endemic districts (Bouhajla and Haffouz) to assess sand fly fauna and infection status of sand flies with *Leishmania*. A total of 191 serum samples were collected from healthy dogs and tested for anti-*L. infantum* antibodies by indirect immunofluorescence antibody test (IFAT). Overall seroprevalence for *L. infantum* was 26.7% being highest among dogs in the district of Bouhajla (52.7%) and the lowest in the district of Chbika (5.2%). In dogs, seroprevalence did not differ significantly based on gender or age, with dogs younger than 1 year showing a higher seroprevalence compared to older dogs. These findings suggest strong force of infection in naïve animals in holoendemic regions leading to emerging high incidence of HVL. Concomitant to the high CVL prevalence observed in the Bouhajla district, a significantly high cumulative HVL incidence also was observed in this district. *Phlebotomus perniciosus* and *Phlebotomus longicuspis* were the most abundant sand fly species in Bouhajla and Haffouz districts. The rate of *Leishmania*-DNA infection in sand flies was 9.4%. This finding points to spatial correlation between the occurrence of disease in humans, a high rate of infection in dogs and a high abundance of *P. perniciosus* and *P. longicuspis*. Thus, CVL is the main risk factor for transmission to humans and subsequently, it is an important parameter for controlling transmission to humans.

© 2014 Published by Elsevier B.V.

### 1. Introduction

The sand fly *Phlebotomus perniciosus* is the main vector of *Leishmania infantum*, etiologic agent of human visceral leishmaniasis (HVL) and canine visceral leishmaniasis (CVL) in Tunisia (Ben Ismail, 1993; Chargui et al., 2012). Dogs are the main reservoir host of *L. infantum* (Nicolle and Compte, 1908; Ben Ismail et al., 1987b; Aoun et al., 2003; Chargui et al., 2012). This neglected disease has been historically endemic in the northern part of Tunisia (Anderson, 1938; Vermeil, 1956; Chadli et al., 1968; Croset et al., 1978). From

1982 to 1991 more than 200 cases of HVL were reported from areas located in Central and Southern Tunisia (Ayadi et al., 1991; Besbes et al., 1994; Ben Salah et al., 2000), indicating an emergence of this disease in areas further south. Similarly, CVL was limited to the north of the Tunisian Ridge (Dedet et al., 1973; Bouratbine et al., 2005; Diwani et al., 2008) but since 1985 CVL became endemic in governorates situated in the center of the country (Keddous, 1988; Ben Said et al., 1992; Chargui et al., 2012). Of a total of 142 cases of HVL reported during 1993, 47 (33%) originated from the governorate of Kairouan situated in Central Tunisia (Bouratbine et al., 1998). Among all nationwide HVL cases reported in 2011 and 2012, 72.2% and 67.5%, respectively, originated from governorates located in Central Tunisia, mainly in the governorate of Kairouan (DSSB, 2011, 2012). Clearly, the main foci of HVL cases are now in the south of the Tunisian Ridge located in Central Tunisia (governorate of

\* Corresponding author. Tel.: +216 70 945 577; fax: +216 70 944 222.

E-mail address: [elyes.zhioua@gmail.com](mailto:elyes.zhioua@gmail.com) (E. Zhioua).

<sup>1</sup> equal contribution

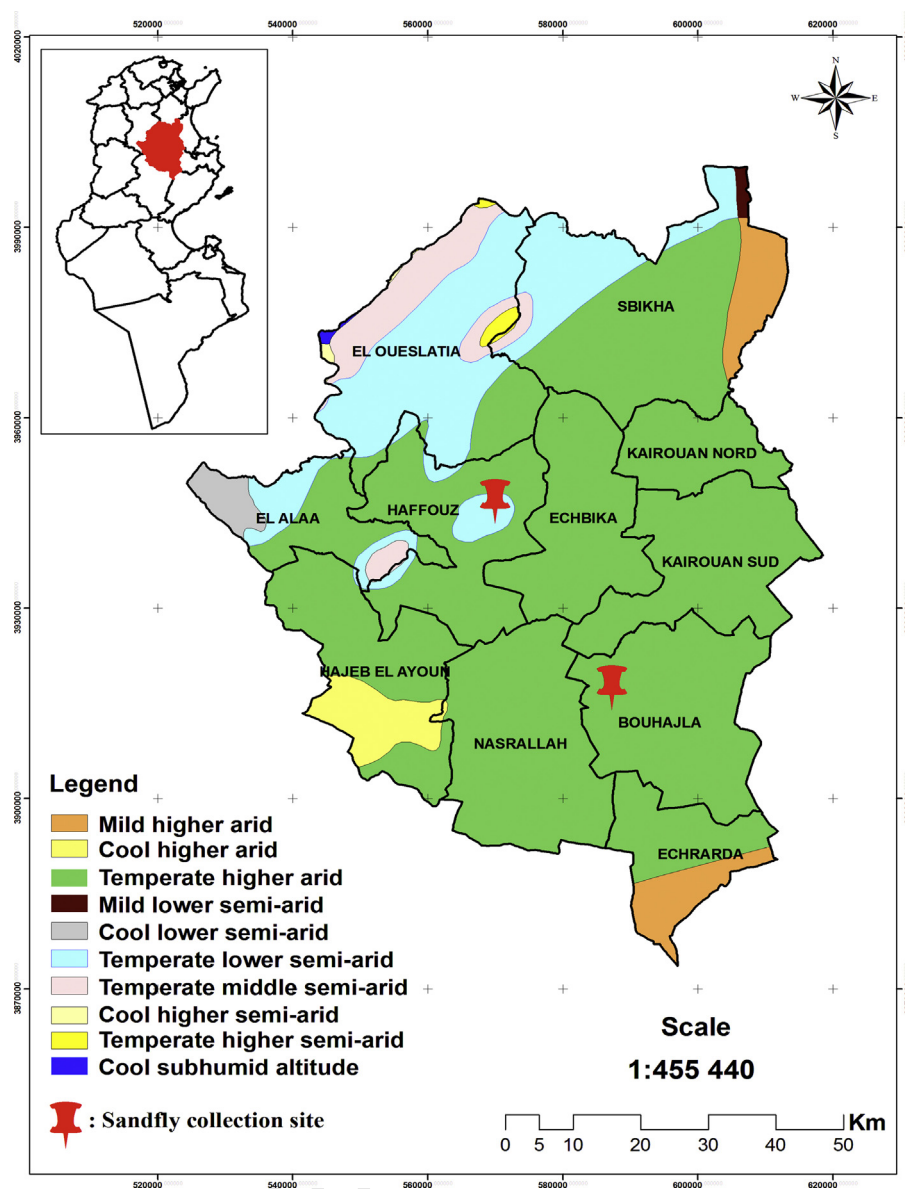


Fig. 1. Bioclimatic map of the governorate of Kairouan showing all districts and sand fly collection sites.

Kairouan). Environmental changes following the agricultural development mainly due to irrigation in Central Tunisia have occurred which may lead to an increase in the vector populations and subsequently to the emergence of new foci of HVL and CVL in these areas (Zhioua et al., 2007). While several epidemiological investigations have been published on HVL in the governorate of Kairouan, no comprehensive studies on CVL have been performed. The aim of the present study is to investigate the epidemiological link between CVL and HVL in a highly endemic foci of HVL located in Central Tunisia.

## 2. Material and methods

### 2.1. Study area and population

The governorate of Kairouan located in Central Tunisia with a total population of 542,209 inhabitants according to the census of 2013 is divided in 10 districts (considering the delegation of Kairouan north and south as one delegation, as shown in Fig. 1). All human cases of HVL diagnosed in the governorate of Kairouan

between 2004 and 2013 were included in the study. This study was performed following IRB approval from the ethic committee of Pasteur Institute of Tunis, Tunisia. Cases of HVL were diagnosed at the pediatric department of the University Hospital of Kairouan that serves the whole population of the governorate of Kairouan. Diagnosis of HVL is based mainly on the presence of a splenomegaly and IFAT IgG-anti-*L. infantum* titers greater than 1/100. Human cases of HVL by district from 2004 until 2013 were obtained from the pediatric department of the University Hospital of Kairouan.

### 2.2. Animal sampling

A cross-sectional study on dogs was undertaken in seven main endemic districts for HVL in the governorate of Kairouan during the fall of 2013 (Ben Salah et al., 2000). Three districts located in the southern part of the governorate (Nasrallah, El Hajeb, and Chrarda) bordering the governorate of Sidi Bouzid, an endemic area for zoonotic cutaneous leishmaniasis (Ben Ammar et al., 1984; Ben Salah et al., 2000; Chelbi et al., 2007) were not included in the assessment for canine serology. Door-to-door visits were made

Download English Version:

<https://daneshyari.com/en/article/6127287>

Download Persian Version:

<https://daneshyari.com/article/6127287>

[Daneshyari.com](https://daneshyari.com)