



Demographic and spatio-temporal distribution of cutaneous leishmaniasis in the *Souf* oasis (Eastern South of Algeria): Results of 13 years



Bachir Khezzani ^{a,b,c,*}, Salah Bouchemal ^{b,d,1}

^a Department of Natural Sciences, University of Oum El-Bouaghi, Algeria

^b Laboratory of Natural Resources and Development of Sensitive Environments, University of Oum El-Bouaghi, Algeria

^c Department of Biology, University of El-Oued, Algeria

^d Institute of Urban Management Techniques, University of Oum El-Bouaghi, Algeria

ARTICLE INFO

Article history:

Received 19 August 2016

Received in revised form 1 November 2016

Accepted 9 November 2016

Available online 11 November 2016

Keywords:

Cutaneous leishmaniasis

Vector

Reservoir

Distribution

Souf oasis

Algeria

ABSTRACT

Cutaneous leishmaniasis is one of many dangerous parasitic diseases. It remains a serious public health problem not only in *Souf* oasis, but also in Algeria and all developing countries.

The results of our thirteen-year study shows a recording of 4813 confirmed cases of cutaneous leishmaniasis and the details shows that this disease affects all municipalities and all age groups, from infants to elderly, but the most affected ones are teenagers aging (10–19) years with 1512 cases (31.41%) and infants less than 9 years old with 1237 cases (25.70%). In addition, males are more prone to this disease than females (65% and 35% respectively). Among the 18 municipalities in the *Souf*, the most affected were *El-Oued* with 1171 cases (24.33%) followed by *Guemar* with 997 cases (20.71%). Furthermore, more than 40.03% of all cases (1927 cases), were record just in one year in 2010.

A parallel, this study shows that the original factors of the studied area, such as climatological, agricultural and environmental factors, was the reason do not apparition this epidemic for a long time, but the changes in these conditions, resulting from various human activities create new environmental conditions, which help with the emergence and spread of leishmaniasis disease.

The effective fight against this disease should be based on the elimination of the vectors and reservoirs populations, by the overall improvement of sanitary conditions and hygiene, extensive research in epidemiology of leishmaniasis could also reduce the incidence of cutaneous leishmaniasis.

© 2016 Elsevier B.V. All rights reserved.

1. Introduction

Leishmaniasis a group of parasitic diseases (Harrat and Belkaid, 2003). It was discovered in *Biskra* (Southern East of Algeria) by Henri Hamel in 1860 (Mansouri et al., 2012; Rafati and Modabber, 2014). This disease caused by obligate intracellular flagellate protozoan parasites belonging to the genus *Leishmania* (Chaara et al., 2014; Izri et al., 2014; Soto et al., 2004). According to (Markle and Makhoul, 2004; Zakai, 2014), there are more than 20 *Leishmania* species that are transmitted to humans through the bite of an infected

female phlebotomine sand fly. The most common species in Algeria are *Leishmania* (*L. major*, *L. infantum* and *L. killicki*) (Tomás-Pérez et al., 2014). Cutaneous Leishmaniasis can also occur after accidental occupants (laboratory) exposures to *Leishmania* parasites.

The vector of this parasite is an insect belonging to genus *Phlebotomus* called sand fly (Crowe et al., 2014; Elhadj et al., 2015; Hayani et al., 2015). According to Bachi (2006), only the female is responsible for the transmission of the disease. More than 30 species of *Phlebotomus* can transmit leishmaniasis to humans, but species known in Algeria are (*P. papatasi*, *P. longicuspis*, *P. perfiliewi*, *P. perniciosus* and *P. sergenti*) (Mansouri et al., 2012).

According to (Mokni et al., 2014), reservoirs contain from 20 to 30 species of mammals among which are rodents, carnivores and man which is an accidental host. The species known in Algeria are *Meriones shawi*, *Psammomys obesus*, *Canis aureus* and dogs (Bessad et al., 2012; Bourée, 2014). the causative agent, the disease manifests as visceral, cutaneous, or mucocutaneous forms (Paz et al., 2011; Ul Bari, 2006). In the most severe form of the disease,

* Corresponding author at: Faculty of Natural Sciences, Department of Biology, El-Oued University, PO Box 789 El-Oued, Algeria.

E-mail addresses: bachir-khezzani@univ-eloued.dz (B. Khezzani), s.bouchemal@yahoo.fr (S. Bouchemal).

¹ Institute of Urban Management Techniques, University of Oum El Bouaghi, PO Box 358 Oum El Bouaghi, Algeria.

visceral leishmaniasis, the parasite migrates to internal organs such as the liver and spleen and can be fatal if left untreated (Bachi, 2006; Desjeux, 2004; Paz et al., 2011). Because the parasite attacks the blood and tissues (Crowe et al., 2014; Tomás-Pérez et al., 2014), the disease is characterized by chronic skin lesions, leaving permanent scars with deformation of the infected area (Demir and Karakuş, 2015; Tlamçani and Er-Rami, 2014).

Leishmaniasis remains a major world health problem in the 21st century (Desjeux, 2004; Hamzavi and Khademi, 2015; Izri and Belazzoug, 2007), because this disease is found in over 98 countries worldwide (Belal et al., 2012) and 90% of cases occur in Afghanistan, Algeria, Brazil, Pakistan, Peru, Saudi Arabia and Syria (Garnier and Croft, 2002; Reithinger et al., 2007; Saab et al., 2015; Zakai, 2014). And it threatens about 350 million people who are exposed to leishmaniasis and two million new cases occur every year (Almeida et al., 2015). According to (Alvar et al., 2012; Benallal et al., 2013), the worldwide annual incidence of leishmaniasis is believed to be 0.7 to 1.2 million new cases of cutaneous leishmaniasis and 0.2 to 0.4 million new cases of visceral leishmaniasis.

In Algeria, leishmaniasis remains a major public health problem (Fendri et al., 2012; Izri and Belazzoug, 2007). The statistical data from the National Institute of Public Health recorded 4450 confirmed cases in 2000. Later, this number increased to 25511 cases in 2005 and then 16585 cases in 2011. Similar to several countries, Algeria classified cutaneous and visceral leishmaniasis in the list of compulsory-declared diseases (Harrat et al., 1995), because they represent 35% of these diseases and occupy the first rank among parasites diseases (Achour Barchiche and Madiou, 2009).

Through this study, we will try to highlight the spatial, temporal and demographic distribution of cutaneous leishmaniasis, as we will also discuss all the natural and human factors that control and affect the distribution in our studied area.

2. Materials and methods

2.1. Study area

The Souf oasis is situated in the Eastern South of Algeria, exactly in the central part of El-Oued province. This oasis extends over an area of 11738.4 km², represents nearly 26% of the total territory and administratively divided in 18 municipalities (Khezzani and Bouchemal, 2016) (Fig. 1). The total population of this oasis was about 566245 people in 2015, with a value of population density amounted to be 48.23 people per sq. km. This number is equivalent to about 72% of the total population of El-Oued province. Its altitude above the sea level is between 50 m in the north and 100 m in the south.

The climate of the study area is hyper-arid, characterized by a very hot and dry summer, and a mild winter (Khechana and Derradji, 2012). The rainfall is low, sporadic and oscillatory, with an annual average that does not exceed 70 mm and rarely exceed 100 mm in some years. While the evaporation is characterized by high values exceed 2200 mm (Khezzani et al., 2016). Temperatures can drop to near-freezing point in winter and can reach 45 °C during summer, with 26 °C as an annual rate. The relative humidity is relating to temperature, rainfall and winds; the monthly average values are usually about 30% during the summer (July and August) and may reach up to 65% during the winter (December and January). Winds are usually mild, but in the spring and autumn, they become violent. All these indicators are witnesses to the aridity and the cruelty of the climate in this region.

Life in this oasis is based on irrigated agriculture from the fossil groundwater. In addition, people depend on cattle and sheep breeding and some activities related to commerce. In the standard state, the depth of groundwater does not exceed a few meters from

the surface and sometimes it appears on the surface in the form of swamps.

2.2. Cutaneous leishmaniasis cases and data analysis

The statistical data series of this study was provided from the Direction of Health and Population (DHP) of El-Oued province, during the period from 2003 to 2015. To identify the factors that influence on disease distribution, we have taken into account several variables presented by the temporal distribution (Annual and Monthly), the spatial distribution (Origin of the patient) and demographic distribution (Age and Gender). For distribution according to gender, we had to classify patients in 8 different age groups.

The different statistical tests are realized by Microsoft Excel 2010 and SPSS v 20 (IBM SPSS, Chicago, USA) with degree of confidence estimated at 95%. The graphs of this paper were prepared using Microsoft Excel 2010.

3. Results and discussion

3.1. History of cutaneous leishmaniasis in the Souf oasis

After searching in the history of this epidemic in our study region, we found that the history of cutaneous leishmaniasis back to the end of the 18th century. The first who tackled this subject was Legrain in 1896 (Legrain, 1896). In his writings, he noted that the Souf oasis was completely free from this epidemic. According to Piana (1939) absence of marshes, mosquitoes and fleas are the main reasons behind the lack of emergence of this epidemic.

The first cases of this epidemic was discovered and cited by Bacqué (1921), then by Bidault (1923), in El-Oued and Kouinine. Also, Luiggi (1929) in his search noted that he treated two cases concerning the incidence of cutaneous leishmaniasis in Hassi Khalifa, the first case relates to girl that has 12-year-old, while the second case relates to her brother's that has 10 years. Another publication in 1930 for Luiggi (1930) that confirms the emergence of new three cases relates to cutaneous leishmaniasis; the first was in Reguiba (girl with 12 years), the second in Drimini (girl with 7 years) and the third in Amiche (boy with 15 years). In 1939 Piana (1939), noticed that the incidents related to cutaneous leishmaniasis have become widespread. After 1939, we did not find any study relating to this subject

3.2. Possible reasons for the prevalence of cutaneous leishmaniasis in the souf oasis

Many researchers in this field of cutaneous leishmaniasis confirm on the importance of the environmental and climatic changes impact on the progression of the disease and his appearance in new focus (Boudrissa et al., 2012; Cross and Hyams, 1996). The principal reasons for the spread of this disease in our study area are generally due to the appearance of suitable and supportive environments for reproduction and growth both of vector (Sand flies) and reservoir (Rodents). These factors are represented by, firstly, big number of degraded "Ghouts" submerged with water and scattered among population communities. So, this status provides of humidity and food throughout the year. Secondly, the development that noted in the agriculture sector, which completely adopted on organic fertilizers of sheep droppings, birds and cows, which are used to improve the properties of the sandy soil. This organic matter imported from peripheral provinces such as M'sila, Batna, Biskra and Tebessa, which are old focuses of cutaneous leishmaniasis. Also, the importation of this organic matter by trucks was always accompanied by the transfer of the rodents that had invaded the region in recent years. These rodents also can be transferred with dry palm

Download English Version:

<https://daneshyari.com/en/article/5670892>

Download Persian Version:

<https://daneshyari.com/article/5670892>

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