

RETROSPECTIVE STUDY OF CUTANEOUS LEISHMANIASIS IN TIARET (NORTHWEST OF ALGERIA)

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Abstract. Leishmaniasis is a vector-borne, zoonotic and re-emerging disease that is transmitted via female sandflies and caused by intracellular flagellated protozoa of the genus *Leishmania*. This disease is mainly classified as a major parasitosis in tropical and subtropical regions. Among all clinical types of leishmaniasis, the cutaneous form (CL) is by far the more widely distributed. A ten-years retrospective study was conducted by extracting information from the Directorate of Public Health of the province of Tiaret, from 2010 to 2020. Data were extracted from the leishmaniasis cases registration book and summarized using Microsoft office Excel (2019). The study highlighted the distribution of CL cases by year, season, gender, age categories and origin. Over the period studied, a minimum of 23 and a maximum of 112 cases per year were recorded (from 2010 to 2020). The results of the present retrospective study from 2016 to 2020 showed that the maximum number of cases was observed in autumn and winter. The age group under 10 recorded the highest number of cases (134 cases), followed by those over 50 and 11 to 20 with 64 and 63 cases, respectively. However, the male sex was the most affected with a rate of 60%. This study allows us to conclude that cutaneous leishmaniasis is widespread in the Tiaret region with an annual distribution and the seasons autumn and winter are the most favorable to their appearance, the age group less than or equal to 10 years and the male sex is the most affected. Other descriptive and epidemiological studies are needed to evaluate the exact incidence of this disease and improve future public health strategies aimed to control cutaneous leishmaniasis.

Keywords: Cutaneous leishmaniasis, retrospective study, Tiaret, Algeria

INTRODUCTION

Leishmaniasis is a vector-borne parasitic disease caused by flagellated protozoa of the genus *Leishmania* (Aoun et Bouratbine, 2014). Leishmaniasis is classified as a zoonotic disease. It is transmitted by the bite of blood-sucking sandflies of the genus *Phlebotomus*. While wild or semi-domesticated animals are considered reservoirs of the disease (Mokni, 2019). Despite its status as a neglected disease on a global scale (Baghdad et al, 2020). Nevertheless, in tropical and subtropical regions, this disease is mainly classified as a major parasitosis (Kamau, 2000). Among all clinical types of leishmaniasis, the cutaneous form (CL) is by far the more widely distributed with approximately 0.7 to 1.2 million cases occur each year (Alvar et al., 2012). However, this form constitutes a real public health problem in underdeveloped countries (Baghdad et al, 2020). According to Benikhlef et al. (2021), Algeria ranks second after Afghanistan

for the incidence of cutaneous leishmaniasis (CL). However, these same authors class leishmaniasis as a re-emerging disease. Variable clinical lesions characterize CL. Usually, it manifests as lesions ranging from small skin nodules to extensive destruction of mucosal tissue (Reithinger et al., 2007).

In Algeria, three distinct noso-epidemiological CL entities coexist: the so-called sporadic form of the North (CLN), the zoonotic form (CLZ), and the chronic form (CLC)(Bachi et al., 2019; Messahel et al., 2021). Among these, two forms of cutaneous leishmaniasis are endemic: CLZ with *leishmania major* and CLN with *leishmania infantum* of which the dog is the principal reservoir of this species (Benikhlef, 2004). The Tiaret region is characterized by the presence of several bioclimatic stages, which predispose to the two forms of cutaneous leishmaniasis (Benali et al., 2021).

Several studies have been carried out in different Algerian regions. The present retrospective study was conducted by extracting information from the Directorate of Public Health of the province of Tiaret to evaluate the distribution of CL cases by year, season, gender, age categories and origin.

MATERIALS AND METHODS

Study Area

Our retrospective study was carried out in the region of Tiaret (figure. 1). This province is located in the northwest of Algeria (latitude 35°22'15" North, longitude 1°19'01" East). Its area of 2005005 km² and a population of 888220. It is divided into 14 daïras and 42 municipalities (ANDI, 2015; Achir and Hellal, 2016).

Tiaret area is characterized by several bioclimatic stages (sub-humid, semi-arid and arid) and by two climatic periods: a harsh and cold winter and a hot and dry summer due to its structure which is characterized by a mountainous zone in the north, central highlands and southern steppe areas (Benali et al., 2021). Its average annual temperature is 17.72°C and its recorded rainfall is 300 to 400 mm per year, with a seasonal fluctuation ranging from 157 mm in winter to 31 mm in summer (Reference) (Achir and Hellal, 2016).

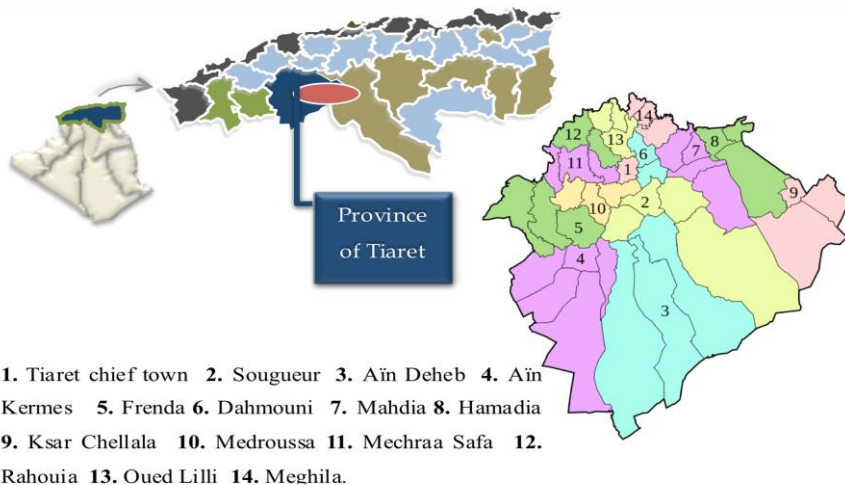


Figure 1. Geographic location of Tiaret area

Epidemiological data

A retrospective study was conducted by extracting information from the Directorate of Public Health of the province of Tiaret, from 2010 to 2020. Data were extracted from the leishmaniasis cases registration book and summarized using Microsoft office Excel (2019).

The annual distribution concerned a period of 10 years (2010 to 2020). On the other hand, the study of the results by month, sex, age and origin only concerned the years from 2016 to 2020.

RESULTS AND DISCUSSIONS

Annual distribution of CL cases from 2010 to 2020. The annual distribution of CL cases in Tiaret over the period from 2010 to 2020 shows that the total number of CL cases collected was 693 cases (Figure 02). The maximum rate of infection was observed during the year 2019 with 112 cases. While 2014 recorded the lowest rate with 23 cases.

Similarly, the year 2016 had a high number of cases with 109 cases compared to other years (2010, 2015, 2017 and 2020). Nevertheless, the lowest LC incidence rates were recorded during the years 2011, 2012, 2013, and 2018 with numbers of 42, 33, 32, and 43 cases, respectively.

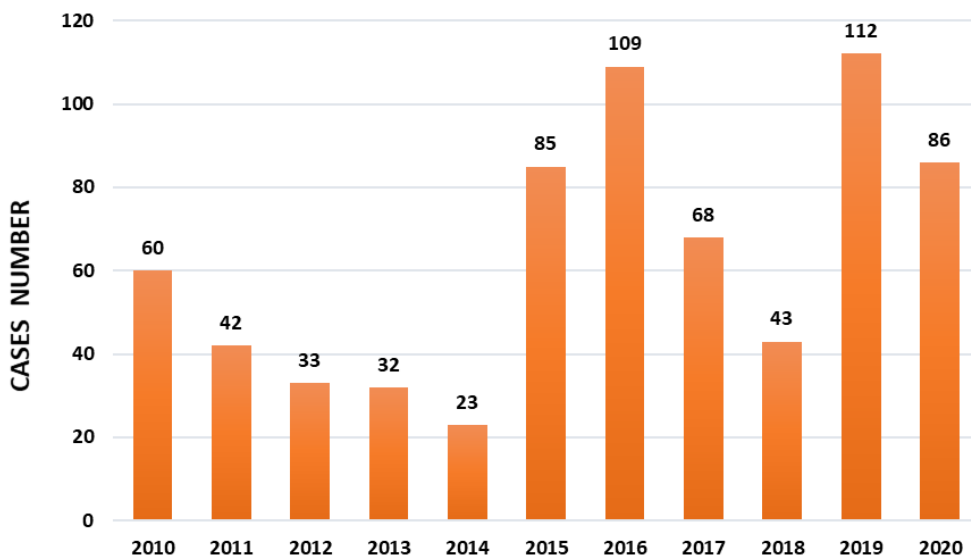


Figure 2: Annual distribution of CL cases from 2010 to 2020

The number of cases noted in the present study was lower than that mentioned in the retrospective study conducted between 2010 and 2020 in the province of Batna (northeastern Algeria) by Messahel et al. (2021) who observed a maximum rate of 1924 CL cases in 2010 and a minimum rate of 230 cases in 2019.

This difference in the number of cases can be attributed to various natural or human factors. Generally, global warming, the altitude of the region and human activities (deforestation, agriculture, urbanization, construction of dams and irrigation) have been incriminated to have a direct impact on the flora and fauna and consequently it influence

the density and abundance of sandflies and also the number and the diversity of the reservoir. Moreover, poor housing conditions, inadequate sanitation, malnutrition, poverty and migration of populations are considered to be the main risk factors (Bennai et al., 2018; Hamiroune et al., 2019; Messahel et al., 2021).

Monthly distribution of CL cases from 2016 to 2020. The study of the monthly distribution of CL cases in Tialet only covers a period of 5 years from 2016 to 2020. Figure 03 shows the monthly incidence of CL from 2016 to 2020 where there is a fluctuation in CL cases with peaks in two seasons (autumn and winter). However, spring and summer seasons had low rates. It can also be noted that the incidence of CL reached maximum values in November and December for the year 2019. While the months of January and February was marked by the highest values for the years 2020 and 2016.

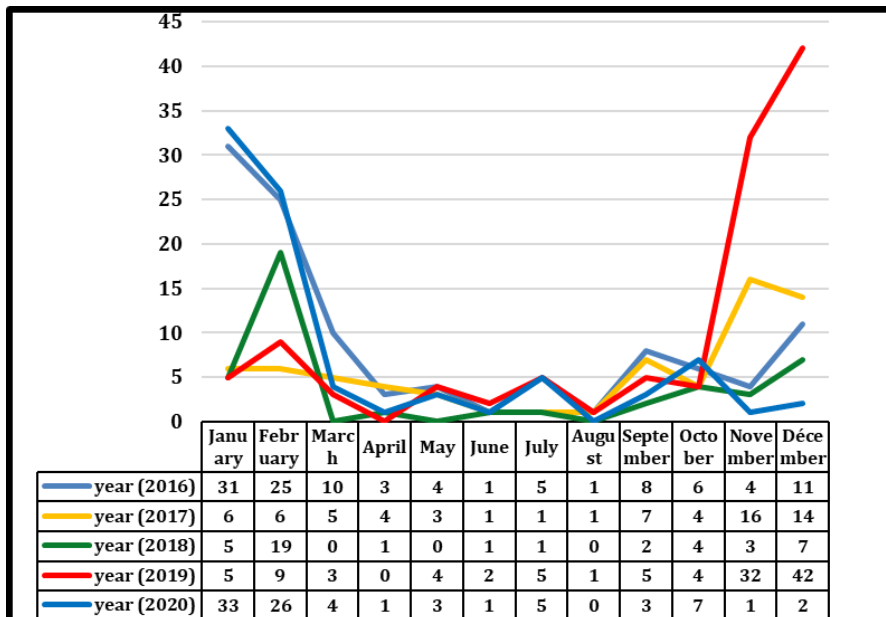


Figure 3. Monthly distribution of CL cases from 2016 to 2020

This result can be explained by the presence of vectors and reservoirs, which are mainly linked to climatic conditions.

The same observations were made during the study conducted by Zait and Hamrioui in 2009, which, explained that the seasonal effect of CL cases was linked to the seasonal dynamics of the vectors and the incubation period of the disease. While other authors have suggested an absence of a preferred season for the disease. But they recorded discrete disease peaks during March, April and July (Barchiche and Madiou, 2009). However, Masmoudi et al. (2005) show that the signs of the disease (skin lesions) appear one to two months or more after the infective bite of the female sandflies, which makes the winter peak poorly representative of the risk period.

Distribution of CL cases from 2016 to 2020 according to age. The 409 cases of LC recorded between 2016 and 2020 were divided into six different age categories: less than or equal to 10 years old, 11 to 20 years old, 21 to 30 years old, 31 to 40 years old, 41 to 50 years old and people over 50 years old (Figure 4).

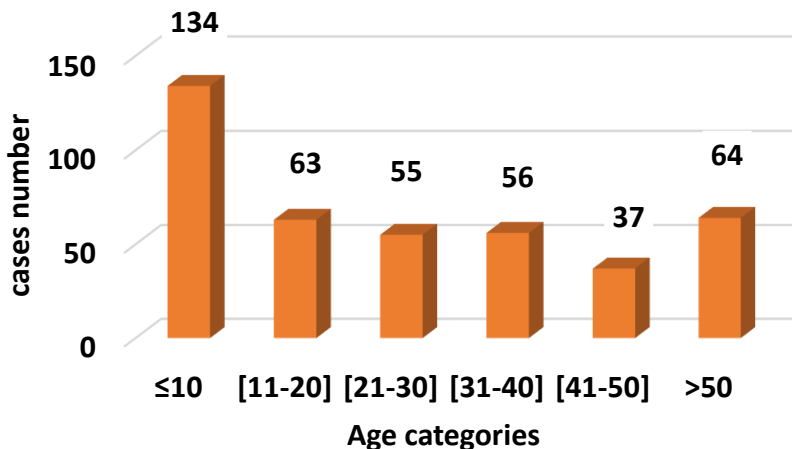


Figure 4. Distribution of CL cases from 2016 to 2020 according to age.

This study shows that the most affected age group is that of those less than 10 years (134 cases), followed by the age group over 50 years (64 cases), then the age group of 11-20 years (63 cases). However, the age group of 41-50 years was the least affected with 37 cases.

A similar result concerning the most affected age group was reported by Zait & Hamrioui (2009). Likewise, Barchiche & Madiou (2009) noted a high sensitivity in children aged 1 to 9 years. Similarly, Izri et al (1992) and Messahel et al (2021) showed that the age group most affected was that of children under 5 years old.

LC lesions mainly affect preschool children (WHO, 2010). This can be explained by a less developed immune system in this age group, unlike adults who have developed immunity to the disease following previous exposure to the parasite at a specific period of their life (Zait and Hamrioui, 2009; Messahel et al. 2021).

Distribution of CL cases from 2016 to 2020 according to gender

According to our results, it can be seen that by sex, males are more affected by this disease with 60% against 40% recorded for females (Figure 05).

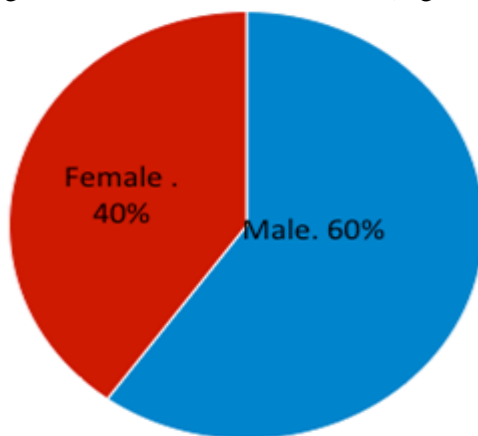


Figure 5. Distribution of CL cases from 2016 to 2020 by gender.

Previous studies report a slight predominance of males over females (Barchiche and Madiou, 2009; Fendri et al., 2011; Izri et al., 2021). Several authors have cited similar results. Hamiroune et al. (2019) noted a rate of 57.83% in males compared to 42.17% in females. Also Messahel et al. (2021) recorded a rate of 58.6% in men and 41.4% in women. The high rate in males is explained by the fact that the latter in Algeria and especially in the steppe regions are more exposed to the disease since they have to take care of the cattle or work in the fields where the risk of bites by sandflies is high. Moreover, according to the traditions of the region, the males wear short and less covering clothes than the females, especially in summer, which makes the males more vulnerable to infections. Additionally, we can also add that males may spend more time in the evening outdoors, where they are more likely to be exposed to sandflies compared to females (Messahel et al. 2021).

However, Zait and Hamrioui (2009) found no difference between the two genders. Nevertheless, results reversed to those obtained in this study were found by El Assri et al. (2016) with a predominance of infection in females with a rate of 55.12% against 44.88% for males in the Gharb-Morocco region. Likewise, Traoré et al. (2011) in Burkina Faso and Masmoudi et al. (2005) in Tunisia noted similar results. This can be explained by the fact that women are much more involved in disease-promoting activities, or by the fact that men, due to their profession or negligence, rarely consult a doctor or only in case of complications. Which, is in favor of male under-reporting (El Assri et al., 2016).

Distribution of CL cases from 2016 to 2020 according to their origin

The patients with cutaneous leishmaniasis from 2016 to 2020 were divided according to their origin or depending on the Daïra from which they came.

Most of the daïras have recorded cases. But three of them had a very high number, namely Aïn Kermes (192 cases), Aïn Deheb (133 cases) and Frenda (37 cases). However, Tiaret chief town, Sougueur and Ksar Chellala had a lower number of cases compared to the others, ranging from 2 to 15 cases. In addition, no case of CL was reported in the daïras of MechraaSfa, Rahouia, OuedLili and Meghila. The results of Distribution of CL cases according to their origin are summarized in table 1.

Table 01: Distribution of CL cases from 2016 to 2020 by origin (Daïra).

Daïra	CL cases from 2016-2020 (Number)
Tiaret chief town	12
Sougueur	15
Ain Deheb	133
Ain Kermes	192
Frenda	37
Dahmouni	7
Mahdia	2
Hamadia	6

Ksar Chellala	12
Medroussa	2
Mechraa Sfa	0
Rahouia	0
Oued Lili	0
Meghila	0

The most affected localities are located in various regions: semi-arid and arid, sub-humid as well as steppe regions where parasites and the vector responsible for cutaneous leishmaniasis dominate (Benikhlef et al, 2004; Bachi, 2006; Hamiroune and Khelaf, 2019; Benikhlef et al., 2021; Izri et al., 2021).

CONCLUSIONS

CL is prevalent in the Tiaret region and understanding it globally is fundamental to adopt measures that can minimize its incidence. Based on data collected, we can conclude that the cases of cutaneous leishmaniasis are spread over all the years. Cases have shown peaks in two seasons, namely autumn and winter. The age group of less than or equal to 10 years took the first place with 134 cases. The men have been more affected by this disease with 60% against 40% recorded among women.

These analyses are helpful to improve future public health strategies aimed at controlling CL. Moreover, we recommend descriptive and epidemiological studies to determine the exact incidence and prevalence of CL cases and identify associated risk factors for this zoonosis in the Tiaret region.

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