

Cutaneous Leishmaniasis in Zliten, a New Focus in North West of Libya

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Authors' contributions

This work was carried out in collaboration between all authors. Author TMA designed the study, performed the statistical analysis, wrote the protocol and wrote the first draft and the last draft of the manuscript. Author HAD managed the analyses of the study and literature searches and helped in the writing of the last draft of manuscript. Authors NSA, AAM, AA and AAS managed the collection of data and the analyses of the study. All authors read and approved the final manuscript.

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ABSTRACT

Aims: This study was done to evaluate the epidemiological aspects of cutaneous leishmaniasis (CL) in the patients who were presented to dermatology clinic of main referral hospital in Zliten, and to discover its distribution in relation to age, sex, season, and residency.

Study Design: In this case series study. The data of Studied patients were recorded and analysed to discover the incidence of CL, as well as the distribution of CL according to age, sex, residency, season, and affected body sites.

Place and Duration of Study: All patients with CL, who were referred or presented to dermatology outpatient clinic of Zliten Teaching Hospital, were enrolled. The majority of patients came from Zliten and its Suburban and the minority from neighboring cities. The study was conducted over

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more than a six-year period from November 2010 till December 2016.

Methodology: All referred or presented patients with suspected CL, were examined clinically, and slit skin smear and / or Skin biopsy for microscopic confirmation were performed whenever the diagnosis was suspicious. The information about age, gender, address of patient, date of presentation, and site of lesions on the body were collected and analysed with use of statistical Microsoft SPSS 20.

Results: Out of all referred patients, 420 patients were found to have CL. Males were 311(represented 74%) and females were 109 (represented 26%) with male to female ratio 3:1. The ages of patients ranged from 2 years to 80 years, and most of the infections occurred in the age group 20-29 years, which were 118 patient (28.1%). Annual incidence was increased markedly in 2016, and the disease was mainly observed in the winter.

Conclusion: Our study showed marked increase of reported cases of CL in 2016 especially in East area of Zliten compared to previous years. Therefore, further studies are required to recognize the vector, parasite species and the animal reservoir, which would enable national and local health authorities to put effective control programs.

Keywords: Zoonotic cutaneous leishmaniasis; epidemiology; Zliten; Libya.

1. INTRODUCTION

CL is a parasitic vector-borne disease caused by *leishmania*, which is flagellated protozoa transmitted by bite of infected female sandfly. There are variety of *leishmania species*, and each one of them has specific reservoir host [1]. CL is the most frequently occurring type of Leishmaniasis worldwide [2-6]. The clinical presentation of CL vary depending on infecting *leishmania species* and its lesions persist for months before healing take place with atrophic scars, which could cause severe social and psychological impact due to scarring and disfigurement [7].

CL usually manifests with one or multiple lesions on exposed parts of skin. There are similarities between lesions caused by different *leishmanial species*, however; the immunological response is variable from one infected person to another, but all lesions share sequential appearance of papules, plaques, nodules, ulceration, crusting and healing with scarring. The incubation period for rural or zoonotic CL (ZCL), which caused by *Leishmania major* (*L. major*), is less than 4 months and the spontaneous healing thereafter needs 2-8 months [8,9].

CL in general could be classified into anthroponotic or zoonotic according whether the natural reservoir of the parasite is human or animal. ZCL is caused by *L. major* and *L. infantum* in rural areas, and anthroponotic CL (ACL) is caused by *L. tropica* in urban areas [10].

In North Africa, *L. major* and *L. tropica* were the most frequent causative agents for CL, while *L. infantum* was the least frequent cause [3-6].

According to weekly epidemiological record of World Health Organization (WHO, 2016), there were 12 countries considered to be high burden countries for CL, and the number of recorded cases in these countries were tripled over few years from more than 50000 in 1998 to more than 150000 in 2005. The high burden countries were Afghanistan, Pakistan, Iran, Saudi Arabia, Syria, Turkey, Morocco, Algeria, Tunisia, Brazil, Colombia, and Peru, with highest total number of CL cases (55204 infected patients) were in Syria according to data reported 2014, and in the same year in Tunisia were 3368 cases, but underreporting were debated [2].

CL ranked among the tropical diseases least known and most neglected in Middle East and North Africa. Morocco and Tunisia were ranked as countries with highest prevalence of zoonotic cutaneous leishmaniasis (*L. major*), and Morocco was one of the countries with highest prevalence for ACL (*L. tropica*) [11]. Cases were reported in North West (NW) of Libya over dozens of years [5,12-15]. Spread of CL into northern central part of Libya were recently documented [16,17]. The risk factors of this infectious disease were suspected to increase because of armed and political conflicts since 2011 as well as interruption of the leishmania national control program aimed to prevent the spread of CL to non-endemic areas. Moreover, Zliten as a coastal region has a higher risk of CL with expected increase of newly infected people each year according to reported recent studies of CL in Libya [17,18]. The objective of our study was to determine the epidemiological pattern of CL, over several years, in Zliten city, which is wide rural geographical area in NW of Libya.

2. METHODS AND SUBJECTS

2.1 Area of Study

Zliten is a northern city in Libya and located on Mediterranean sea, about 160 Kilometer eastern of Tripoli and had according to civil registration in 2015 more than 263000 inhabitant [19] (Fig. 1). The majority of patients came from Zliten and its Suburban and the minority from neighboring cities.



Fig. 1. Geographical location of Zliten on Mediterranean sea

2.2 Data collection

All patients presented to dermatology outpatient clinic of Zliten Teaching Hospital (ZTH) during the period from 1st November 2010 to 31st December 2016, and diagnosed with CL were included in the study. The dermatology outpatient clinic of ZTH is the only referral clinic for

diagnosis and treatment of all suspected cases of CL in Zliten city. The only clinic in the region supplied with Pentostam (Sodium Stibogluconate) for treatment of CL. This clinic receives referral from primary and secondary health centers as well as from private clinics in Zliten.

In present study, a special form was filled for all patient, containing information about age, gender, address of patient, date of presentation, site of lesions on the body, number of them and type of applied treatment. Zliten were divided into 3 regions, central area, eastern area and western area, according to the geographical distribution of residency of patients. The diagnoses were based on clinical findings, in addition, laboratory tests, such as slit smear and / or skin biopsy were done when necessary and the diagnosis were suspicious.

2.3 Statistical Analysis

The obtained data were statistically analysed using statistical Microsoft SPSS system, version 20. Frequency distribution, percentage, descriptive statistics, chi-square was performed whenever needed.

3. RESULTS

3.1 Study Population

The total number of cases, which were identified to have CL, was 420 patients, majority of them were males (Fig. 2).

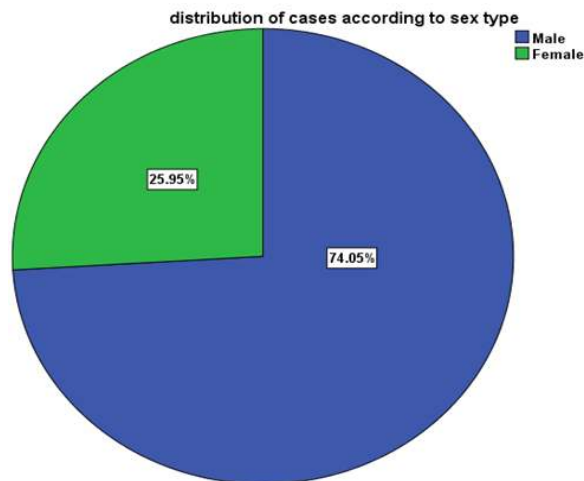


Fig. 2. Gender distribution of patients with CL

3.2 Age

The mean age of patients was 30.6 years. The youngest were 5 patients, aged 2 years old. The oldest patient was male and aged 80 years old. The most affected age group were from 20 years up to 29 years, and more than 60% were patients aged between 10 up to 40 years old. As well as, its clearly to be seen that after 39 years old the number of cases decreased steadily (Fig. 3).

3.3 Seasonal Variations

Most patients were presented to Dermatology OPD of ZTH in December (Over many years),

and followed by patients, who were presented in November. In June over studied years, no any new cases of CL were presented. In July, the least presented cases were registered (Fig. 4).

3.4 Incidence

The number of new cases of CL was markedly increased in 2016 to reach 264 new cases with incidence rate of 0.1% or (1: 1000), which is relatively high compared to only 48 new patients in 2015 with incidence rate 0.01% (1:10000), while, in the previous years, before 2015, the number of registered new cases was always less than 33 cases in each year (Fig. 5).

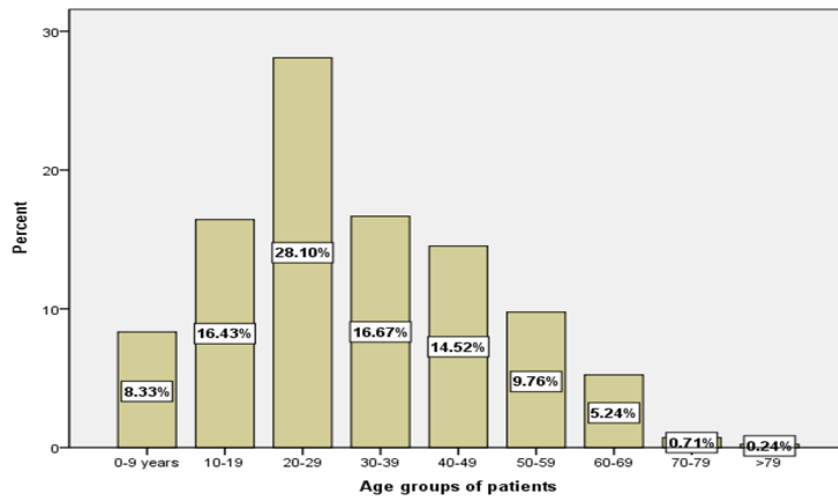


Fig. 3. Age distribution of patients with CL

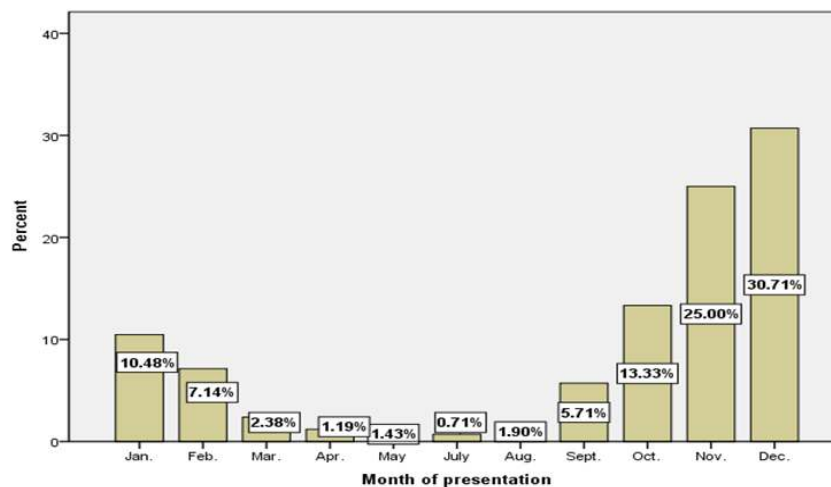


Fig. 4. Seasonal variation of patients with CL

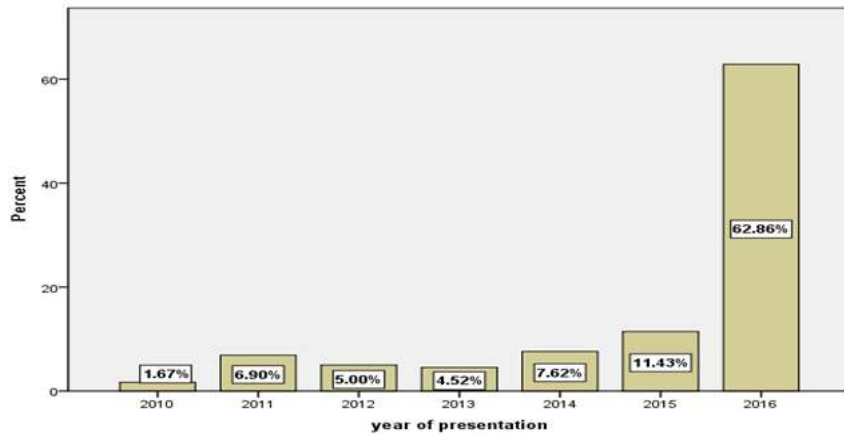


Fig. 5. The distribution of new cases (in percentage) with CL in several consequent years

3.5 Distribution of Cases According Their Place of Residency

Viewing the geographical distribution according to residency, the largest number of patients, 172 (represented 41% of total), came from eastern area of Zliten. While 146 patients (35%) came from western area of Zliten (Fig. 6).

The most of the patient with CL in 2016 came from eastern area of Zliten. On the other hand, in all previous years from 2010 until end of 2015 the majority of patients were residents of western area of Zliten (Fig. 7).

3.6 Distribution of Patients According to Affected Body Sites

Patients with sole facial lesions (with no other sites to be affected) were 16 patient (3.8%), while, the majority of patient were, either affected

with lesions on one of extremities and were 194 patients (46.2%), or patients affected with lesions at different body sites (including, face, trunk and extremities) were 198 (47.1%). Metastatic lymphatic spread were reported in 10 patients (2.4%) (Fig. 8).

4. DISCUSSION

CL is a common and major public health problem worldwide, affects 1.5–2 million people annually. In Libya, CL is endemic in NW of Libya since 1910; then many cases have been reported from different localities. Most published studies from Libya revealed that ZCL, is the oldest most significant leishmaniasis form in this country. It is caused by *L. major*, *zymodeme MON-25* and transmitted mainly by *Phlebotomus (P.) papatasi*. *Psammomys obesus* and *Meriones libycus* were found to be the main reservoirs for *L. major* in Libya [17,20,21].

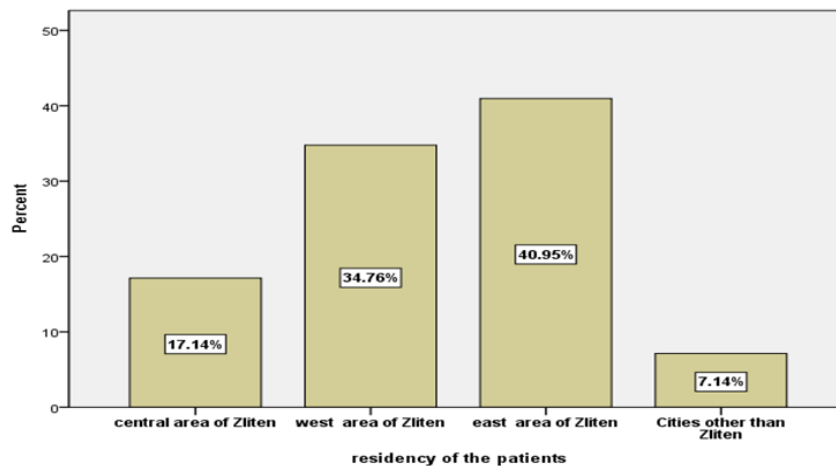


Fig. 6. Distribution of CL cases according residency

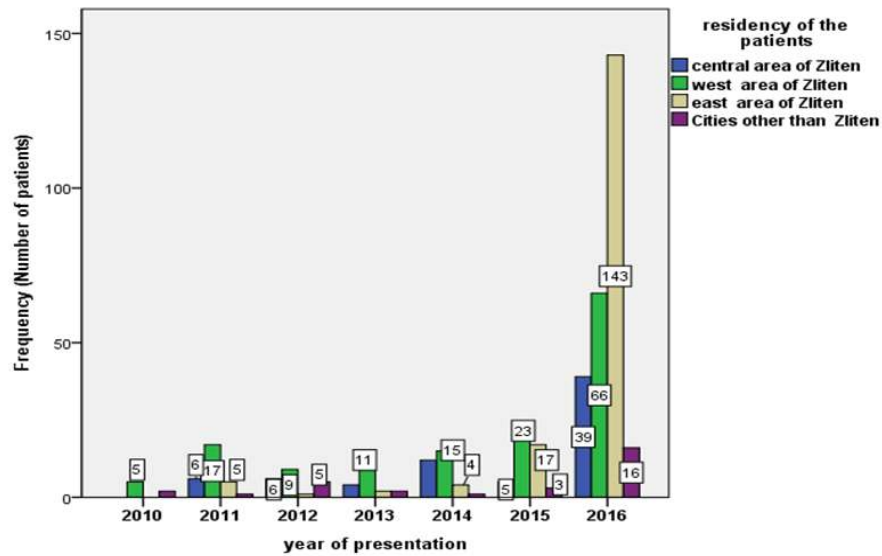


Fig. 7. Distribution of CL cases according to their residency and the year of presentation
* p value= 0.03

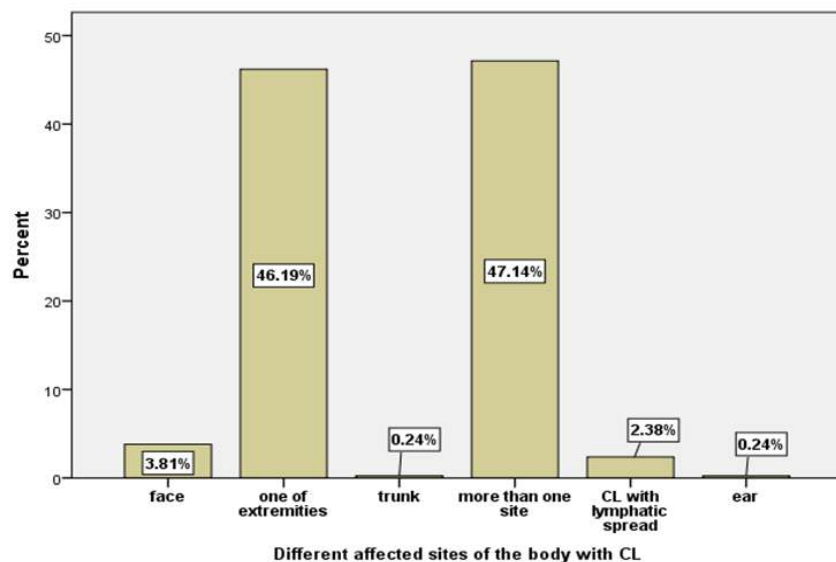


Fig. 8. Distribution of CL cases according to different affected body sites

Recently, molecular identification studies reported that cases due to *L. tropica* and *L. infantum* were prevalent in certain localities of NW of Libya, such as Nalut, Misrata, Jabal El Gharbi, and Tarhouna [17,18,22,23].

In our study, males were more at risk to develop CL, this finding is in agreement with other reported studies from Libya [5,16,22,23]. This might be because of men, mainly young adults stay outdoors at nights in endemic areas

because of leisure or work activities, this make them more exposed to be bitten by infected sandfly vectors, furthermore, men sleep outdoors in hot weather in summer time, which make them more exposed than women.

CL were more to affect younger age groups, this was similar to results of studies conducted in NW of Libya, which found that, the average age of patients to be at 30 years [15,18,20].

Climate changes, represented in maximum and minimum temperature, have great effect on survival, maturity, and fertility of sandflies, and their ability to transmit CL. In North Africa, the minimum temperature was assumed to show marked increase as well as reduction of rainfall. These climate changes have the potential to increase both, the incidence of CL and affected geographical area [18].

Seasonal distribution of ZCL was documented in our study as the majority of patients sought medical advice in November and December over successive years. This seasonal increase of presented cases was similar to increasing pattern of recording of CL at 1998 in AL-Rabta, endemic focus for CL in NW of Libya, as well as similar to seasonal distribution of CL using the data of patients from different localities in NW of Libya during the period of time from 1995 to 2008 and recently in two successive years, 2011 and 2012 [17,18,24].

L. major infection was detected in Tunisian rodents, and *Merions shawi* was confirmed the most important reservoir to transmit CL in Tunisia, because its ability to move from place to another and living near human settlements [25].

In NW of Libya, plenty of halophyte plants, *zizyphus lotus L. (Rhamnaceae)* and *Haloacnemum strobilaceum* were found in Taurgha, which is located 70 Kilometer east of Zliten, these plants are ideal for living of *Psammodomys obesus* and *Meriones libycus* [26].

A survey of vector was conducted 1993 in Al-Haraba, and 1997 in Ejhawat in NW of Libya, found out that, *Phlebotomus papatasi*, the vector of *L. major*, was active and widely spread in the above named areas between August and October, the activity in this period of year seemed to be similar to the activity of the vector in Zliten, which is up to date still unknown, and need to be recognized [27,28].

Study was carried out 2010 in Taurgha, which is costal city, located east of Misrata, showed that *Phlebotomus papatasi* and *Phlebotomus longicuspis* were the main species of sandfly vectors captured in this endemic area. This result was similar to finding of previous studies in NW of Libya [26-30].

This increase and spreading of the disease in Zliten could be explained by climatic and environmental changes affecting the geographic

distribution of vector and reservoir, and also by lack of the control measures following violent conflicts. Furthermore, other factors such as socio-economic status, lifestyle, people behaviour during the disease transmission months in summer, presence of new agriculture projects, construction work, and garbage collection may also have a role in spread of CL [31,32,33].

With considering that, incubation period for *L. major* lies between 2 weeks and less than 4 months, and clear seasonality of disease appearance in our studied area, therefore, it is reasonable to think that CL in Zliten is a zoonotic type of CL and caused mainly by *L. major* [8,9].

The recognition of *Leishmania* infecting agent will be helpful in choosing the best treatment options and affect the effectiveness of chosen therapy, which make the application of molecular diagnostic methods mandatory [8].

5. CONCLUSION

CL in Zliten, as a part of endemic area in NW of Libya, had characteristic features of ZCL, and recently had increasing rate of infected people, and more wide geographical areas to become endemic areas for CL.

Further studies are required for identification of vector, reservoir and infecting *Leishmania species*, that the continued research disease monitoring would allow the effective control of this infectious skin disease.

CONSENT

It is not applicable.

ETHICAL APPROVAL

The study design and protocols were reviewed and approved by Ethical Committee of Zliten teaching hospital.

COMPETING INTERESTS

Authors have declared that no competing interests exist.

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