EPIDEMIOLOGICAL STUDY OF CUTANEOUS LEISHMANIASIS IN AL-MUTHANNA PROVINCE, IRAQ

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ABSTRACT: Leishmaniasis is an endemic disease. The prevalence of Cutaneous Leishmaniasis (CL) has been reported in different parts of Al-Muthanna province. Sufficient knowledge about the epidemiological aspects of CL disease is needed to launch an appropriate program for planning control and prevention strategies.

A descriptive study was applied on selected 208 patients at Al Hussain Hospital and four other health centers in the province. Data such as sex, age, occupation, disease season, scar location on patient’s body and place of residence were collected and analyzed by descriptive statistics.

The study showed that the allocation of six, age, and spatial, were 52% female patients, 41.82% of age group 4-15 years, and 77.40% living in rural areas, respectively. The highest incidence rate was observed in December and January (62 cases for each month). The majority of lesions were observed on face (46.37%). The highest of infection was observed on the patients with single lesion (56.19%).

The conclusion is that cutaneous leishmaniasis are more likely to influence rural areas in Al-muthanna. According to the epidemiological features of CL in province, this disease is still a public health problem and needs to be managed. Under a uniform mechanism for control and prevention. Thus, The actions such as staff training, screening in endemic areas, and put more efforts on rural areas can be useful.

Key words: Epidemiology, leishmaniasis, cutaneous, parasites, endemic diseases.

INTRODUCTION

Leishmaniasis is a one of parasitic disease caused by haemoflagellate protozoa called Leishmania. The disease is widespread and may cause serious health problems in communities throughout the Mediterranean regions and the Middle East, including Iraq (Hepburn, 2003). And it is one of the six important tropical diseases and its various aspects recommended as research studies by World Health Organization (Azni et al., 2011; Mohammadi et al., 2010). Leishmaniasis is distribution in both the old and the new world countries, mainly in tropical and subtropical regions of the world (Duthie et al., 2012). It is a vector-borne disease caused by different members of the Leishmaniasis parasite. Vector-borne parasitic diseases are epidemiologically complex with interleaved and heterogeneous parasitic interactions interacting with the host. Accurate epidemiological data are essential for the implementation of control measures, which are often difficult to obtain in neglected tropical diseases (WHO, 2012).

Leishmaniasis is a disease associated with poverty. Endemic areas are usually identified with leishmaniasis by reporting active or negative cases, while epidemic areas are usually identified by an early warning system. The distribution and epidemiology of parasites are subject to several factors. The disease affects the poorest, linked to conditions such as malnutrition, displacement, poor housing, illiteracy, gender discrimination, weak immune systems and lack of resources (Kroeger et al., 2002).

In all areas of Iraq, there were also cases of cutaneous leishmaniasis. The course of the disease is much more gentle than that of kala-azar. In 1992, there were 8779 cases of cutaneous leishmaniasis (45 cases for every 100 thousand citizens), 955 cases in 2000 and 652 cases in 2001. Cases of cutaneous leishmaniasis caused by L. tropica mostly occur in the suburbs of major cities (Baghdad, Mosul) among large conglomerations of people where the sanitary conditions are unsatisfactory. Incidences caused by L. major are much more common; they appear primarily in rural areas, especially in the
northern and southern provinces of the country (Korzeniewski, 2005; WHO, 2003).

Cases of cutaneous leishmaniasis in Iraq (1989-2011) were lower than in Syria and Saudi Arabia, but more than in Jordan. The risk factors for this disease are represented by malnutrition, poor sanitary, age, gender, geographical and seasonal distribution (Salam et al., 2014). The population movement, the deterioration of health services and disease vector control during previous wars and the economic sanctions imposed on Iraq in 1990 in all its sequence (such as poverty, malnutrition, etc.) contributed to the outbreak of leishmaniasis in the region (AL-Nadawi et al., 2000; Niazi and Al-Kubaisi, 1998).

In Iraq, *L. major* and *L. tropica* are the causes of cutaneous leishmaniasis (Gonzalez, 2003). As with other vector borne diseases, *Leishmania* fitness is intimately linked to the fate of the sand fly (Hurd, 2003). Sand flies are vectors of at least three kinds of diseases to human, the most important of which is leishmaniasis. Infection is transmitted to humans via biting of the infected female sand flies (Azizi and Rassi, 2010).

Cutaneous leishmaniasis is a disease with different clinical manifestations in Al-Muthanna. Therefore, the present study carried out to illustrate if there is changes in epidemiological characteristics of Cutaneous leishmaniasis. Also registered cases of Cutaneous leishmaniasis in province from July 2017 - March 2018 by demographic information and geographic distribution and to compare the results with those published for other endemic areas in some northern, central and southern parts of Iraq.

**METHODS**

**Study area and period of study**

The current study were started from distribution of the infection in the city from July 2017 - March 2018.

Al-Muthanna is an Iraqi province and the second largest province in the Republic of Iraq in terms of area 51,740 sq km (11.9% of Iraq) (Fig. 1), but the lowest in terms of population with a population in 2007 by about 614,997 (2% of total) thousand people and the Geographical Distribution : Rural: 56% Urban: 44% according to the estimates of the Central Organization for Statistics and Information Technology (COSIT), Government of Iraq.

**Collecting of Epidemiological data**

This cross-sectional descriptive-analytical study was carried out on 208 patients with cutaneous leishmaniasis. They were attended to Al-Hussien Teaching Hospital and Health centers in four areas of Al-muthanna province. All cases were clinically diagnosed by dermatologist in hospital and Health centers in province. The study was used the available surveillance database for the disease from the Department of Epidemiology and control of Transitional Diseases. Data of the current study were including samawa, Al-Rumiatha, Al-Warka and Al-Khidir and its affiliated areas in Al-Muthanna provinces.

This study analyzed the cases of cutaneous leishmaniasis disease in terms of place of residence, gender, age, occupation, disease season, number and location of scar on the patient’s body and type of rural or urban environment.

**Data analysis**

Statistical analysis was performed using Exel and Minitab 17 software. Paired t-test and ANOVA were used for exploring significant differences. Comparisons were performed using both Tukey and Fisher grouping in 90% and 95% confidence level.
RESULTS AND DISCUSSION

Distribution of infection by gender

Results showed that higher infection cases of Cutaneous leishmaniasis was in females which was 52% of the total cases, while in males it was 48% (Fig. 2).

A paired T-test between the two genders shows that there is no significant difference between male and female referred to the high p-value so cannot reject the null hypothesis, ThatAll means are equal (Table 1).

Also to assure these results, ANOVA were used for exploring significant differences. Results are shown in Fig. 3. Results assure that there is no significant difference between male and female. These results are similar to previous studies in Iraq and some other countries (Al-Mayali and Al-Hassani, 2016).

Geographical distribution of CL Table as shown in Table 2, the table reveals the higher percentage of infections was in Samawa (45.71%), Kidhir (20.19%) and Al-Rumaitha(17.78%), while the lower infections were recorded in Al-Warka (17.30%).

ANOVA were used for exploring significant differences (Fig. 4). Test shows that there is no significant difference between all four cities of Al-muthanna province referred top-value = 0.310 in Significance level (α = 0.05), so cannot reject the null hypothesis (All means are equal).

Our findings were supported with previous studies which reported that five provinces of Iraq are considered as foci of leishmaniasis as Mosul, Baghdad, Kerbala, Muthanna and Misan (Niazi, 1980). Regarding the difference between urban and rural area, data was reveals to the highest cases was recorded in rural areas, while the lowest in urban. Statistical analysis using with ANOVA were performed for exploring significant differencesin (α = 0.1). This shows a significant difference in 90% confidence level (Fig. 5).

This significant differences was in agreement with the results reported in Iraq. Al-Obaidi et al (2016) mentioned the CL is more common in rural than urban areas. Also, Rahi (2013) finding showed that CL was significantly associated with illiteracy and farmers as an occupation, which is usually more common in rural population (67.4%) (Rahi, 2013). Shirzadi (2010) also explained that the rural type is widely distributed in 15 provinces in Iran. Table 3 shows some statistical results for distribution of CL cases according to the environment.

The monthly distribution of cases of cutaneous leishmaniasis, can be seen in Table 4, which showed the statistical analysis of results.

The study showed that the lowest rate of infection in the month of August 2017, which are only two cases (0.96%) and then began to rise to reach the highest rate of infection in the months of December 2017 and January 2018 was about 29.80% (62 cases) and then decreased in February to 47 cases (22.59%) (Fig. 6).

These results were similar to those mentioned by Al–Ubaidi, that the monthly distribution of CL in winter was more than in summer months (Al-Obaidi et al, 2016). Also, this study was consistent in monthly distribution with many previous studies in Al-Hawija (Al-Samarai and Al-Obaidi, 2009), Karbala (Jafar et al, 2015), Diyala (Humadi et al, 2017), Al-Qadisiya (Al-Mayali and Al-Hassani, 2016) and Maysan (Kazim, 2012).

The seasonal distribution of cutaneous leishmaniasis in Iraq for the years 2010–2011 were identified during winter (January and February), with a peak seen in February (Al-Warid et al, 2017). Decreasing of CL cases in summer is due to absent of sand fly in summer. No sand flies could be collected in the middle of July and August (Alten et al, 2016; Amin et al, 2013).

CL lesions

Number of lesions of CL on the skin of infected patients. The Table and Fig. 7 reveals the higher percentage is one lesion (56.19%), then two lesions (17.45%) and three lesions (14.15%), while the lower number of lesions were recorded in eight lesions (0.47%). With regard to the number of ulcers, the rate of infection of one ulcer is the most and these results were consistent with the results of the Najim (1996), Sharquie and Najim (2004) in Iraq and Feiz-Haddad et al (2015), Sharifi et al (1998) in Iran. These results differ from the results confirmed by Al-Rasheed et al (2015) because insects
bite more than once in areas where insects are high.

Statistical analysis using ANOVA (Table 5) were performed for exploring significant differences in (\(\alpha = 0.05\)), means that do not share a letter are significantly different.

Also, Fig. 8 shows a significant difference in 95% confidence level, and at least one mean is different.

**Distribution of cutaneous leishmaniasis according to the site of lesion**

Different clinical lesions were observed as nodule, crusted lesions and sometimes ulcers. Skin lesions concentrated on face, arm, leg, neck and back of the patients (Table 6 and Fig. 9).

There were (40.5%) of the lesions on the face, as well as (21.4%) on face and hands while on the hands

<table>
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<th>Table 2: Distribution of CL cases in some of Almuthana regions.</th>
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<td>Samawa</td>
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**Table 3: Statistical analysis for site of lesion.**

| Area | Cases | Percentage | Mean, case/month | St. Dev. | Grouping (Tuky) |
| --- |
| Rural area | 161 | 77.40 | 20.13 | 20.06 | A |
| Urban area | 47 | 22.59 | 5.88 | 6.29 | B |

**Table 4: Statistical results of the monthly distribution of cases of leishmaniasis.**

| Variable | Mean | SE Mean | St. Dev. | Sum |
| --- |
| Total Cases | 26.00 | 9.29 | 26.28 | 208.00 |
| Minimum | 2.00 | Median | 11.00 | Maximum | 62.00 | Mode | 62 | Skewness | 0.70 |

**Table 5: Statistical analysis for number of lesions of CL on the skin of infected patients.**

| Lesion | N | Percentage | Mean, case/month | St. Dev. | Grouping (Tuky) |
| --- |
| One lesion | 118 | 56.19 | 14.75 | A |
| Two lesions | 37 | 17.45 | 4.63 | B |
| Three lesions | 30 | 14.15 | 3.75 | B |
| Four lesions | 11 | 5.18 | 1.375 | B |
| Five lesions | 11 | 5.18 | 1.375 | B |
| Six lesions | 2 | 0.94 | 0.250 | B |
| Seven lesions | 2 | 0.94 | 0.250 | B |
| Eight lesions | 1 | 0.47 | 0.125 | B |

**Table 6: Statistical analysis for site of lesion.**

| Sit of lesions | Cases | Percentage | Mean, case/month | St. Dev. | Grouping (Tuky) |
| --- |
| Face | 192 | 46.37 | 24.0 | 32.6 | A |
| Hand | 121 | 29.22 | 15.13 | 17.83 | AB |
| Leg | 91 | 21.98 | 11.38 | 12.75 | AB |
| Neck | 5 | 1.20 | 0.625 | 0.916 | B |
| Back | 3 | 0.72 | 0.375 | 0.744 | B |
| Ear | 2 | 0.84 | 0.250 | 0.463 | B |

only (19.1%) (Table 6 and Figs. 10, 11 and 12).

In Fig. 10, test shows a significant difference between the site of lesion in significance level (\(\alpha = 0.1\)).

The most of the lesions were found on the face (46.37%) then on arms and hands (29.22%). Hot weather play important factor in distribution of infection because
Fig. 4: Exploring significant differences using ANOVA for all four areas of Al-muthanna. The large box represents the 25th percentile, Median and 75th Percentile; the Whiskers Represent the 5th and 95th Percentiles; the Small Circle Represents the Mean.

Fig. 5: Exploring significant differences using ANOVA for (urban, Rural) of Al-muthana. The Large Box Represents the 25th Percentile, Median and 75th Percentile; the Whiskers represent the 5th and 95th Percentiles; the Small Circle represents the Mean.

Fig. 6: Monthly distribution of leishmaniasis.
some people prefer to sleep out their rooms, so they become in direct contact with insect. In addition, most of the people (especially the children) leave their faces, hands and legs without cover, exposed to the bites of sand flies (Kassiri et al., 2012). The results of this study so close with Sharifi et al. (1998), who showed that more cases of the lesions were on the face. In addition, the result agree with Rahi et al. (2013), who showed that the face was the most effected part (64.3%).

In comparison, the study by AL-Obaidi (2000) found that CL lesions occurred mainly on upper limbs and lower limbs, less frequently on the face and much less frequently on the trunk. The differences in distribution of lesions noted in the studies mentioned above may be explained by the living conditions and habits of the people concerned. For example, some people prefer to sleep outdoors, thus exposing their upper and lower limbs as well as their faces to sand fly bites at night when the insects become more active. In general, the presence and distribution of lesions depend on which parts of the body are exposed and on the susceptibility of the host.

Distribution of cutaneous leishmaniasis according to the age groups and occupation when studying the effect of age, we found that the most affected age group was individuals whose ages ranged between 5 and 14 years (Fig. 13).

The highest infection of CL was observed in the age group (5-14 yr.) as (41.82%). The current study was reported that the age range (5-14 years) was the highest incidence of CL (Table 7). This result was agreed with another study, which indicated that the age range over 15 years and younger (Al-Samarai and Al-Obaidi, 2009).
The disease was found to infect all the age groups. The current study was agreed with another study, it can hence be concluded that infection incidence rates in different areas vary depend upon the study place and age groups. It should also bear in mind, whiles the most individuals develop life-time immunity against the disease, the incidence rate gradually decreases in adults and elderly people. In the other words, in other parts of the country while the number of native people is low or the population is frequently altered, the disease can be assigned in all age groups (Sadeghi-Nejad, 2000).

Statistical analysis using ANOVA were performed for exploring significant differences in (ά = 0.5). This shows a significant difference in 95% confidence level (Fig. 14).

The highest rate of lesion according to the occupation was observed in child (44.71%) (Fig. 15). There was no significant relationship between the occupation and disease (P-Value = 0.032).
Fig. 11: A group of skin ulcers caused by the *leishmania* on the face and lower limbs.

Fig. 12: A group of skin ulcers caused by the *leishmania* on the upper limbs.
Fig. 13: Distribution of cutaneous leishmaniasis according to the age group.

Table 8 shows the distribution of CL according to the occupation. The table reveals the higher percentage with child (44.71%), student (20.19%) and employer (7.21%), while the lower infections were recorded in home keeper (6.37%).

ANOVA were used for exploring significant differences (Fig. 16). Test shows that there is no significant difference between all four occupation referred to p-value = 0.032 in significance level (α = 0.05), so cannot reject the null hypothesis (all means are equal).

These results have been agreed with many studies that have shown that infection is more prevalent among farmers in Iraq (Hurd, 2003), South western Iran (Feiz-Haddad et al, 2015) and Libya (Ahmed and Abou Faddan, 2013). The most severe cases in Muthanna province among children and young school students living in rural areas.
CONCLUSION
Cutaneous leishmaniasis is still represents a health care problem with medical and social impact in Al-Muthanna province, as one of the most important diseases transmitted by sandflies. According to the available results, it can be concluded that Al-Muthanna is a highly endemic area, Cutaneous leishmaniasis in Al-Muthanna province seemed to be an endemic rural type, with 208 infected patients between July 2016 and march 2018. Yet, the actual number may be higher than this. Therefore, the appropriate preventing measures regarding to the rural cutaneous leishmaniasis should be considered to decrease incidence of the disease in the region. Management of cutaneous leishmaniasis should be one of the priorities of centers for national disease control and prevention. Training programs should address environmental health activities including garbage collection, removing construction debris, as well as ways for preventing cutaneous leishmaniasis.

This study showed that the female sex and people under 14 years of age are mostly at risk, among children and young school students living in rural areas. Therefore, education for groups at risk is very important.

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Epidemiological study of cutaneous leishmaniasis in Al-Muthanna province, Iraq

1413


