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Epidemiological study of Leishmania parasite in Safita area - Tartous, Syria

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ABSTRACT

This study aims to define the features of the epidemiological picture of leishmaniasis in Tartous through Safita district in collaboration with the health center of Leishmania in Safita province during the period 2010-2014.We adopted the recorded data of leishmaniasis cases from the Health center and made statistical analysis to evaluate the relationship of leishmaniasis prevalence with different variables.

The results demonstrated increasing in both local and expatriate leishmaniasis cases and presence of carrier vector due to weakness of pest control and anti-insect factors. The emergence of visceral leishmaniasis cases indicates the presence of a new species of previously unknown Leishmania parasite in the region and may be explained by the presence of new species of visceral leishmaniasis vectors, or the impact of population migration during the crisis and lack of security or the entrance of foreigners who carry Leishmania or because of the proliferation of reservoirs especially stray dogs and wild animals.

KEY WORDS: Leishmaniasis, prevalence, Tartous city.

1. INTRODUCTION

Leishmaniasis is a disease caused by multiple species of parasitic genus Leishmania sp. It is a major health problem around the world. According to reports of the World Health Organization (WHO), the disease is endemic in 88 countries and causes annually more than 2 million cases of human infection, including 1.5 million cutaneous cases and 500,000 visceral infections. There are also more than 350 million people around the world exposed to the risk of the disease (Alvar, 2012).

Leishmania parasite exists in two forms: The non-flagellated form (Amastigote) which exists in humans and infected mammals. It is distinguished by the nucleus, cytoplasmic organelles and movement origin (kinetoplast) without a flagellum. The other form is the flagellated form (promastigote). This form resides in the intestines of vector insect and in special culture media. It is characterized by its fusiform with a single flagellum, in addition to other organelles like cytoplasm, nucleus and kinetoplast (Peter E Kima, 2007).

The disease has three clinical forms. The first one is cutaneous leishmaniasis which is caused by the many species of the genus Leishmania especially *L.major* and *L.tropica.* The second form is visceral leishmaniasis caused by a parasite species *L.infantum*, *L.donovani* and *L.chagasi*. The last form is mucocutaneous leishmaniasis which is caused *by L.braziliensis*.

Many studies confirmed the important role of sand fly in the transmission of Leishmania parasite. It has been regarded as a kind of 70 out of 700 species of sand flies responsible for the transmission of leishmaniasis all over the world. In Syria, particularly the Syrian coast, 10 species of sand flies belonging to the genus *phlebotomus* and two belonging to the genus *sergentomyia* were recorded (Nabil Haddad, 2015).

The following table shows the most prevalent types of Leishmaina vectors and their ratios in Tartous, including our study area (Safita) (Maroli, 2009; Dereure, 1991).

Table.1. Most prevalent types of Leishmaina vectors and their ratios in Tartous, including the study area (Safita)

Vector	Prevalence	Leishmana species	Resevoir
Phlebotomus papatasi	36.81%	L.major L.tropica	Human, some rodent species and dogs
Phlebotomus tobbi	10.12%	L.infantum L.donovani	The reservoir is of a single type that varies from one place to another
Phebotomus syracuse	40.41%	L.infantum	Dogs
Sergentomya dentate	7.36%	L.tarentolae	Reptiles

- Humans in India, dogs in north China, West Africa and Latin America, foxes in France, Spain and Iran, and rodents in Sudan and Senegal
- Rioux (1991), isolated *L.donovani* from the vector *P.tobbi* in Latakia in 1991.
- This vector doesn't transmit leishmaniasis to mammals, although it inhabits the provinces of Tartous and Latakia

The carrier is an important stage of the epidemiology of Leishmania parasite, as the sandy fly type determines the species of Leishmania that can be transmitted to humans, due to its physiological characteristics. Environmental

and nutritional behavior determines how the parasite transmits, and thus that impact is an important key in the policy of combating leishmaniasis.

2. MATERIAL AND METHODS

The study area: Safita district belongs to the province of Tartous and its center is Safita City. It has an area of 35.575 km^2 and a population of 92,753 according to statistics in 2013. It is 35 km far from Tartous city, and has a height of 380 m above sea level. Safita has a warm and mild climate and a precipitation rate of annual rainfall 1125 mm. This area is distinguished by a density of forest and woodland. The community is divided into rural nature (The bulk of the area) and to urban area represented by the city of Safita (The district center).

Figure.1. Safita geografic location

Study design:

- We adopted the recorded data of leishmaniasis cases from the center of Health Directorate of Tartous records about Safita district for the period between 2010 and 2014 (five years).
- The information recorded were classified in tables and graphs for comparison including age, sex, clinical type of infection, local / expatriate, lesion position and the number of recorded lesions.
- Analysis of the results using qai Square test.

3. RESULTS AND DISCUSSION

Relationship between number of cases and gender: We studied the statistical relationship between number of cases and gender, where the value of chi square was 0.00010. This indicates that there is no relationship between gender and infections (independence of variables) in all various degrees of confidence.

Table.2, shows the number and percentage of cutaneous infection by gender in Safita district and its countryside for the period (2010-2014).

Table.2. Number and percentage of cutaneous infection by gender in Safita district

The total number of cases	The number and percentage of cases among males	The number and percentage of cases among females
851 (100%)	482 (56.63%)	369 (43.36%)

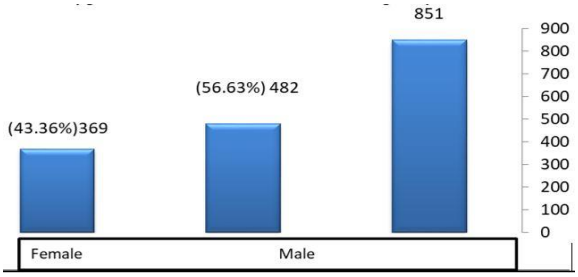

Figure.2. The number and percentage of cutaneous Ieishmaniasis lesions by gender in Safita district and its suburbs during the years 2010-2014

Relationship between number of cases and age: Table.3, figure.3, show the number and percentage of cutaneous leishmaniasis in Safita district by age during the period 2010-2014.

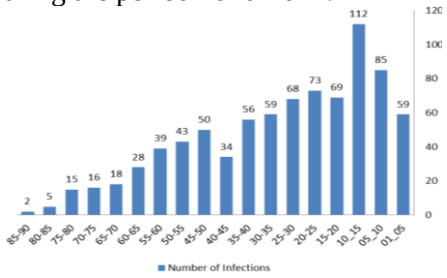

Figure.3. Number and percentage of cutaneous leishmaniasis in Safita district by age during the period 2010-2014

Table.3. Number and percentage of cutaneous leishmaniasis in Safita district by age during the period 2010-2014

Age groups (years)	Number of cases	Age groups (years)	Number of cases
01-05	59	45-50	50
05-10	85	50-55	43
10-15	112	55-60	39
15-20	69	60-65	28
20-25	73	65-70	18
25-30	68	70-75	16
30-35	59	75-80	15
35-40	56	80-85	5
40-45	34	85-90	2

Relationship between number of cases and the source: The number and percentage of cutaneous leishmaniasis depending on the source of infection (Expatriate and local) in Safita district during the years 2010- 2014 were shown in table.4 and figure.4.

Total number of cases	Number and percentage of expatriate	Number and percentage of local
851	135 (15.86%)	716 (84.14%)

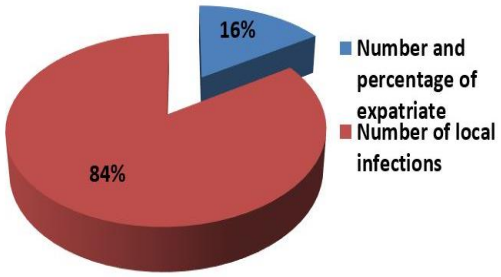

Figure.4. Relationship between number of cases and source

Statistical significance: The value of chi square is 7.78. This indicates a correlation between the source of infection (local /expatriate) and the incidence of leishmaniasis with confidence interval of 90%.

Relationship between the number of cases and demographic distribution: Table.5 and figure.5, shows the number and percentage of cutaneous leishmaniasis cases in rural and urban Safita district during 2010-2014. The value of square qui test is 7.9. This indicates a statistically significant relationship between demographic distribution (rural and urban) and leishmaniasis, i.e., correlation of variables with confidence level 95%.

Table.5. Number and percentage of rural and urban cases

Year	Total cases	Number and percentage of rural cases	Number and percentage of urban cases
2010	52	(%96.15) 50	(%3.85) 2
2011	100	(%96) 96	(%4) 4
2012	73	(%90.41) 66	(%9.59) 7
2013	328	(%94.51) 310	(%5.49) 18
2014	298	(%92.61) 276	(%7.39) 12

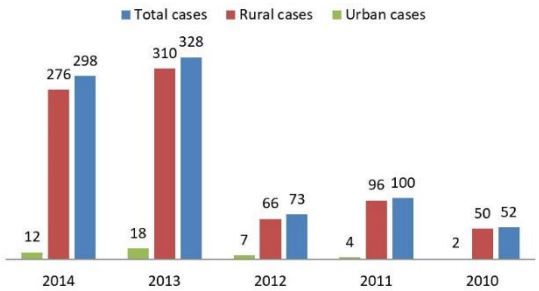

Figure.5. Rural and urban cases

Distribution of cutaneous leishmaniasis cases according to the lesions position: Distribution of cases according to lesion position is shown in table.6, and figure.6. We found that more than half cases are multiple lesions 52%, and the rest cases were single lesion with higher rate on the arm. The value of square qui test is: 4.91, which indicate that

there is no statistically significant relationship between number of lesions (one or more lesions) and leishmaniasis, i.e. independence of variables with a confidence level of 75%.

Table.6. Distribution of lesions according to position

Position	number of cases	percentage
the arm	115	18.82%
the leg	97	15.88%
chick	36	5.89%
ear	16	2.62%
shoulder	13	2.13%
back	3	0.49%
chest	2	0.33%
neck	4	0.65%
eye	5	0.82%
more than one position	320	52.37%
total	611	100%

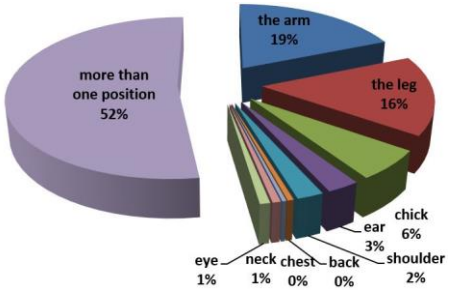

Figure.6. Distribution of cases according to body position

Visceral leishmaniasis cases: Visceral leishmaniasis (VL) is rare in Syria, but the number of cases has increased during the Syrian crisis. Here, as shown in table.7, two expatriate VL cases were recorded during 2011-2014, with a percentage of 0.234% of all recorded cases.

Table.7. Number of visceral leishmaniasis cases

Year	Number of cases	Local	Expatriate
2010	0	0	0
2011	0	0	0
2012	0	0	0
2013	0	0	0
2014	2	0	2

4. CONCLUSION

- According to our study, we found high rates of cutaneous leishmaniasis especially in 2013, due to the increased density and presence of carrier vector (female sand fly) caused by impaired pest and insect control and people displacement to more secure places. Our findings correspond with the sudden increase of Leishmania cases in Lebanon during 2013 which is attributed to the increasing numbers and wide distribution of Syrian refugees in Lebanon (Ali Alawieh, 2014).
- There were statistically significant correlation between the source of infection (local /expatriate) and the demographic distribution (rural and urban) with the incidence of leishmaniasis in Safita area. By contrast, there were no statistically significance between leishmaniasis and other variables (age, gender, site of lesion).
- The emergence of visceral leishmaniasis cases indicates the presence of previously unknown species of Leishmania parasite genus in the region, may be due to different factors; the presence of new species of vectors, the impact of population migration after the Syrian crisis, the presence of foreigners who carry Leishmania, and the proliferation of reservoir animal especially stray dogs and wild animals.

Recommendations:

- Activate or reactivate conducted epidemiological studies to develop an integrated epidemiological map across Syria.
- Apply the prevention procedures of leishmaniasis, particularly vector control programs, as well as organized campaigns to exterminate stray dogs that play role as reservoir to some Leishmania species.
- Open specialized sections in the centers of the Syrian health ministry to investigate the sand fly species and intensity in all provinces, which may help in vector control and elimination.

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