Epidemiology of Leishmaniasis Disease in Şanlıurfa Between the Years of 2010 and 2019

Şark Çıbanı Hastalığının Şanlıurfa'da 2010-2019 Yılları Arasındaki Epidemiyolojisi

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ABSTRACT

Aim: In the present study, by making use of Geographical Information Systems, it was aimed to examine the changes in the number of cutaneous leishmaniasis cases in Şanlıurfa between the years 2010 and 2019 by the regions and to define the risky areas.

Materials and Methods: The present study has a descriptive design. The universe of study consisted of patients, who applied to Leishmaniasis Diagnosis and Treatment Center (LDTC) and received the diagnosis of leishmaniasis and treatment in this facility between the years of 2010 and 2019. Patients' age, gender, place of residence, total number of lesions, lesion location, lesion width, lesion clinic, and type of treatment were used in the present study. The maps were prepared involving only 68 neighborhoods having 10 or more cases.

Results: Of 10,706 patients who applied to LDTC between the years of 2010 and 2019, 45.7% were male and 54.3% were female. It was determined that 80% of the cases detected between the years of 2010 and 2014 were residing in Şanlıurfa center. Considering the years between 2015 and 2019, 69% of the cases were living in Eyyübiye, one of the central districts. Given the heat maps, it was determined that the places, where the patients were living, vectorially shifted towards the southeast between the years of 2010 and 2015.

Conclusion: While the northwestern neighborhoods in Şanlıurfa were risky in the early 2010s, the risk shifted to southeastern neighborhoods in the following years. It is thought that, in the coming years, majority of the cases would be in these neighborhoods because of the number of immigrants and environmental factors.

Keywords: Cutaneous leishmania, epidemiology, mapping

ÖZ

Amaç: Bu çalışmada Coğrafi Bilgi Sistemleri'nden yararlanılarak Şanlıurfa'da 2010-2019 yılları arasında şark çıbanı olgu sayılarındaki değişimin bölgelere göre incelenmesi ve riskli alanların belirlenmesi amaçlanmıştır.

Gereç ve Yöntem: Bu çalışma tanımlayıcı bir tasarıma sahiptir. Çalışmanın evrenini 2010-2019 yılları arasında Şark Çıbanı Tanı ve Tedavi Merkezi'ne (ŞÇTTM) başvuran ve bu merkezde şark çıbanı tanı ve tedavisi alan hastalar oluşturmaktadır. Bu çalışmada hastaların yaş, cinsiyet, ikamet yeri, toplam lezyon sayısı, lezyon yeri, lezyon genişliği, lezyon kliniği ve tedavi türü bilgileri kullanılmıştır. Haritalar yalnızca 10 veya daha fazla olguya sahip 68 mahalleyi içerecek şekilde hazırlanmıştır.

Bulgular: 2010-2019 yılları arasında ŞÇTTM'ye başvuran 10.706 hastanın %45,7'si erkek, %54,3'ü kadındı. 2010-2014 yılları arasında tespit edilen olguların %80'inin Şanlıurfa merkezde ikamet ettiği belirlendi. 2015-2019 yılları arası dikkate alındığında olguların %69'unun merkez ilçelerden Eyyübiye'de yaşadığı tespit edildi. Isı haritalarına bakıldığında 2010-2015 yılları arasında hastaların yaşadıkları yerlerin vektörel olarak güneydoğuya doğru kaydığı tespit edildi.

Sonuç: Şanlıurfa'da 2010'lu yılların başında kuzeybatı mahalleleri riskli iken, ilerleyen yıllarda risk güneydoğu mahallelerine kaymıştır. Göçmen sayısı ve çevresel faktörler nedeniyle önümüzdeki yıllarda olguların çoğunluğunun bu mahallelerde olacağı düşünülmektedir.

Anahtar Kelimeler: Kutanöz leishmania, epidemiyoloji, haritalama

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INTRODUCTION

Leishmaniasis refers to a group of diseases caused by Leishmania-type protozoa. Three main forms of this disease are cutaneous leishmaniasis (CL), visceral leishmaniasis, and mucocutaneous leishmaniasis[1].

Localized CL is the most widely seen clinical manifestation. It begins in the form of a small nodule or papule 2-8 weeks after a sandfly bite. Although it generally tends to limit itself, a scar might develop[2]. Response of the host might cause different atypical forms (erythematous volcanic ulcer, lupoid, eczematous, erysipeloid, verrucose, dry, zosteriform, paronychial, sporotrichoid, cancriform, and circular) and there may sometimes be secondary infections. CL is also known as the "great masquerader" since it can mimic many dermatoses[3,4].

More than 1 billion individuals worldwide live in endemic regions in terms of leishmaniasis. More than 1 million new CL cases are seen annually[1]. In Turkey, approximately 2500 new CL cases are detected annually and the annual morbidity rate is 3/100,000. Most of the cases are found in Şanlıurfa, Adana, Osmaniye, and Hatay provinces[3,5].

Epidemiological maps play an important role in monitoring the disease and preparing protection and control plans addressing it. Nowadays, epidemiological maps can provide more useful information with the support of Geographical Information Systems (GIS). GISs are the systems qualitatively and quantitatively representing the distribution of a disease. They allow for the preparation of disease-related risk maps by making use of spatial and temporal models[6-8].

In the present study, by making use of GIS, it was aimed to examine the changes in the number of CL cases in Şanlıurfa between the years of 2010 and 2019 by the regions and to define the risky areas.

MATERIALS AND METHODS

The present study has a descriptive design. This is a retrospective study and a consent form was not required as the results were obtained from the patients' records. The universe of study consisted of patients, who applied to Leishmaniasis Diagnosis and Treatment Center (LDTC) and received leishmaniasis diagnosis and treatment in this facility between the years of 2010 and 2019. LDTC is the main center, where this disease is treated, in Şanlıurfa province. More than 90% of leishmaniasis patients are treated in this facility.

No sample selection was performed for the present study and all the registered patients were involved. In total, 10,706 patients were followed up for treatment by LDTC between the years of 2010 and 2019.

The data used in this study were obtained from the patients' electronic files kept in LDTC. Patients' age, gender, place of residence, total number of lesions, lesion location, lesion width, lesion clinic, and type of treatment were used for evaluation in the present study.

Lesion locations were categorized as the face, neck, trunk, upper extremity, lower extremity, and genital area. For those having multiple lesions, each lesion was considered separately.

Clinical situations of lesions were classified as nodule, papule, ulcerated, and recidive.

The treatment methods were grouped as intralesional (IL) and intramuscular (IM).

Şanlıurfa province has 13 districts. Since this province gained the status of metropolitan and city administration changed in 2012, the central districts were specified as Şanlıurfa Center for the LDTC records addressing the year 2014 and before. For the records of the year 2015 and after, the city center of Şanlıurfa started to be administered as three districts named Haliliye, Karaköprü, and Eyyübiye[9].

The data were used by grouping as 2010-2011, 2012-2013, 2014-2015, 2016-2017, and 2018-2019.

This study was performed in line with the principles of the Declaration of Helsinki. Ethical approval no. E-49866, date: 19.04.2023 was obtained from the Ethics Committee of the Faculty of Medicine of Harran University. Moreover, the approval for using the data of leishmaniasis patients was obtained from the Provincial Directorate of Health of Şanlıurfa.

Statistical Analysis

Data analysis was performed using descriptive statistics in Statistical Package for the Social Sciences version 20.0 package software. Mapping was performed using Microsoft Excel 2016 3D Maps. Coordinates of the neighborhoods were tagged on the map after obtaining from the Parcel Search Application of the General Directorate of Land Registry and Cadaster[10]. The change of color from blue to red in neighborhoods with given coordinates indicates an increase in the number of cases.

The descriptive statistics were calculated using all the patient data. However, the maps were prepared involving only 68 neighborhoods having 10 or more cases. The patients from locations other than Şanlıurfa were not involved in mapping. Using the criteria specified, 81% of the cases were used in the mapping process.

RESULTS

Of 10,706 patients who applied to LDTC between the years of 2010 and 2019, 45.7% were male and 54.3% were female. The mean age was found to be 20.55±18.17 years (Figure 1).

A single lesion was found in 58.1% of the patients, while 2 lesions were found in 21.2%. The patient having the highest number of lesions had 33 lesions.

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Of the lesions, 48.5% were found in the face, 1.9% in the neck, and 2.5% in the trunk. Moreover, 45.3% of lesions were found in the upper extremities and 17.6% in the lower extremities. Only 2 cases were found to have a lesion in the genital area.

Of the lesions, 45.2% were ulcerated, 44.8% were nodules, and 8.8% were papules. Of the patients, 98.0% received IL treatment, whereas 0.4% received IM treatment and 1.6% received none of these treatments.

The distribution of cases by the years is presented in Table 1. The highest number of cases was found in the year 2013 (15.3%), whereas the lowest number was observed in the year 2014 (7.6%) (Table 1).
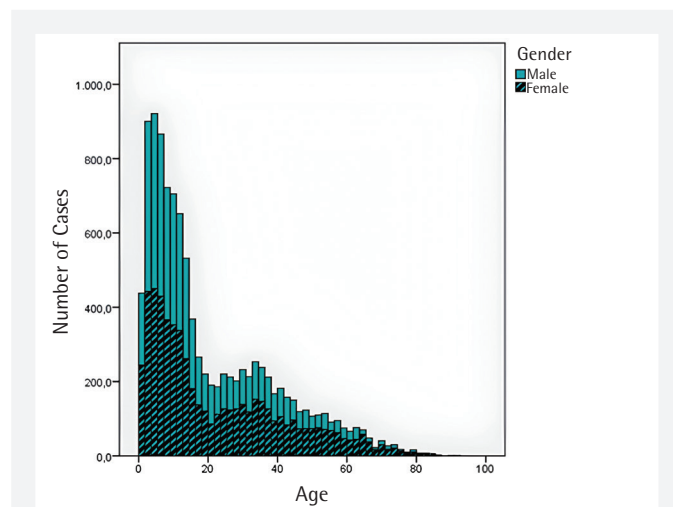
Figure 1. Distribution of the number of cases by age and gender

Ninety-nine percent of the patients were living in Şanlıurfa. It was determined that 80% of the cases detected between the years of 2010 and 2014 were residing in Şanlıurfa center. Besides the city center, the second highest (13.7%) percentage of patients were those living in Birecik district (Table 2).

It was determined that 80% of the cases found in the period 2010-2014 were in the city center, whereas the same percentage was 85.8% for the period 2015-2019. Increases were observed in both percentages and numbers of cases in Harran, Viranşehir, and Ceylanpınar districts in the period 2015-2019.

Considering the years between 2015 and 2019, 69% of the cases were living in Eyyübiye, one of the central districts, followed by the district Ceylanpınar with a percentage of 3.6% (Table 2).

For the period between 2010 and 2019, the three neighborhoods with the highest numbers of cases were Devteyşti (11.8%), Selçuklu (11.3%), and Osmanlı (10.8%) (Table 3).

Table 1. Distribution of cases by years		
Year	Number	Percentage
2010	1198	11.2
2011	826	7.7
2012	1019	9.5
2013	1634	15.3
2014	815	7.6
2015	1016	9.5
2016	947	8.8
2017	1.216	11.4
2018	1192	11.1
2019	843	7.9
Total	10706	100.0

Table 2. Distribution of cases by the districts between 2010 and 2019					
District	2010–2014		District	2015–2019	
	Number	Percentage		Number	Percentage
Şanlıurfa center	4350	80.0	Eyyübiye	3568	69.0
			Haliliye	570	11.0
			Karaköprü	302	5.8
Birecik	749	13.7	Birecik	104	2.0
Bozova	93	1.7	Bozova	58	1.1
Harran	91	1.7	Harran	147	2.8
Akçakale	59	1.1	Akçakale	58	1.1
Suruç	37	0.7	Suruç	16	0.3
Viranşehir	18	0.3	Viranşehir	133	2.6
Ceylanpınar	15	0.3	Ceylanpınar	185	3.6
Halfeti	12	0.2	Halfeti	13	0.2
Hilvan	6	0.1	Hilvan	6	0.1
Siverek	4	0.1	Siverek	7	0.1
Toplam	5434	100.0		5167	100.0

In the years of 2010 and 2011, the highest numbers of cases were detected in Saha (11.0%), Akşemsettin (8.4%), Direkli (8.1%), Buhara (7.6%), and Devteyşti (7.6%) neighborhoods. For the years of 2012 and 2013, the highest numbers of cases were seen in Devteyşti (27.5%), Osmanlı (8.6%), Akşemsettin (7.4%), and Direkli (7.2%) neighborhoods. In the period 2014-2015, the highest numbers were found in Osmanlı (16.4%), Devteyşti (8.1%), and Yenice (7.2%), whereas the highest numbers of

cases in the period 2016-2017 were seen in Selçuklu (24.2%), Osmanlı (13.8%), Yenice (9.9%), Direkli (6.4%), and Devteyşti (5.1%) neighborhoods. Finally, in the period 2018-2019, the highest numbers of cases were found in Selçuklu (28.6%), Osmanlı (11.4%), and Devteyşti (5.7%) neighborhoods. The change in the numbers found in neighborhoods is illustrated in the heat map shown in Figure 2.

Given the case distribution, it can be seen that there were two main foci consisting of Akşemsettin-Süleymaniye-Devteyşti neighborhoods and Selçuklu-Osmanlı neighborhoods and that there were many small foci around them. Examining the change by years, it was determined that these foci became sometimes significant and sometimes indistinct.

Given the heat maps, it was determined that the places, where the patients were living, vectorially shifted towards the southeast between 2010 and 2015, the number of cases became more prominent in Karaköprü district (arrow), Yenice neighborhoods became indistinct, and the vector "place of residence" shifted towards the northwest (in the same line) again since the year 2016.

The distribution of patients by the place of residence for the period 2010-2019 is presented in Figure 3 as stacked columns. Most of the cases were found in Devteyşti (11.8%), Selçuklu (11.3%), Osmanlı (10.8%), Direkli (5.8%), Yenice (4.8%), Akşemsettin (4.4%), Süleymaniye (3.1%), Hayati Harrani (3.0%), Buhara (2.7%), and Saha (2.6%) neighborhoods. It was determined that the number of cases decreased in Devteyşti, Direkli, and Süleymaniye neighborhoods after the year 2013 and increased in Selçuklu and Osmanlı neighborhoods after the years 2010-2011.

Table 3. Distribution of 10 neighborhoods with the highest numbers of cases between the years 2010 and 2019			
Neighborhood	District	Number	Percentage
Devteyşti	Haliliye	1259	11.8
Selçuklu	Eyyübiye	1211	11.3
Osmanlı	Eyyübiye	1151	10.8
Direkli	Eyyübiye	618	5.8
Yenice	Eyyübiye	519	4.8
Akşemsettin	Eyyübiye	477	4.4
Süleymaniye	Haliliye	328	3.1
Hayati Harrani	Eyyübiye	313	3.0
Buhara	Eyyübiye	290	2.7
Saha	Birecik	279	2.6
Other neighborhoods		4261	39.8
Total		10706	100.0
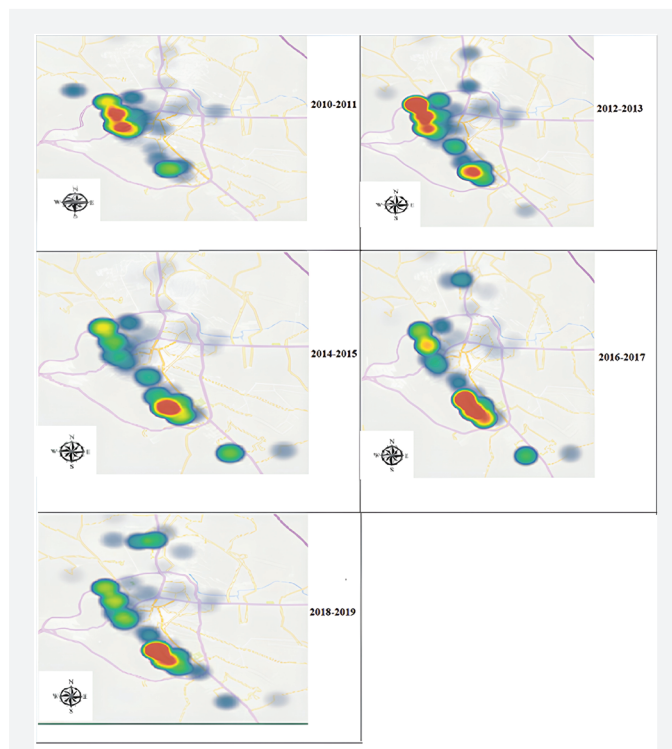
Figure 2. Heat map of the cases between the years of 2010 and 2019
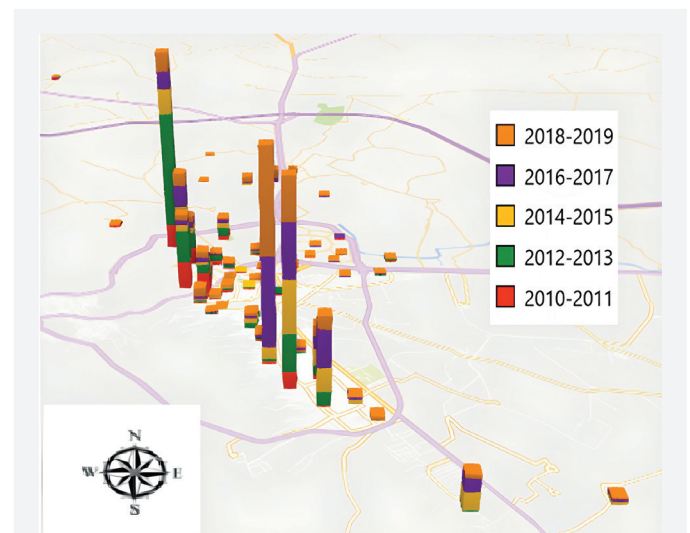
Figure 3. Stacked column presentation of cases for the period 2010-2019

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DISCUSSION

The majority of patients consisted of children, adolescents, and young adults. Since leishmaniasis is a disease that causes immunity, it can be stated that, in places where the disease is endemic, individuals have the disease at young ages and then do not become ill again. The finding that almost half of the patients had lesions on the face and upper extremity regions suggests that parasite-transmitting flies bite open surfaces on the body more frequently. Since the region is very hot in the summer season, as a cultural habit, locals sleep in open areas such as balconies and gardens and it increases the possibility of being bitten.

Şanlıurfa is the province, where leishmaniasis disease is seen the most in Turkey, and almost half of the cases seen annually in Turkey are seen in this province[11]. It was revealed that the number of cases was specifically high in neighborhoods where the infrastructure was insufficient, houses were constructed with insufficient materials, there were barns, individuals frequently contacted with animals, and the level of squatting was high.

In Şanlıurfa province, 48.1% of the population lives in central districts[12]. The cases were found more frequently in those central districts. It is known that Eyyübiye district, which was found to have the highest number of cases, has poor socioeconomic and educational status[13]. In a previous study, it was reported that almost 80% of the parents of children having leishmaniasis had an educational level of elementary school or lower[14]. Even though they are central districts, the individuals living in these districts exhibit rural-specific behaviors such as keeping small cattle and cattle in houses. On the other hand, the animal market in Eyyübiye district and the animal barns in houses and nearby regions facilitate the reproduction of sand flies causing the transmission of this disease[3,15]. In a study carried out in Brazil, it was observed that the majority of leishmaniasis patients were found to live in rural areas and have low educational levels[16]. Low educational level, low health literacy, realizing the disease, and effort to have treatment are important determinants in maintaining the treatment. A delayed diagnosis and treatment of this disease play an important role as a source in the infection chain in the transmission of this disease[17]. Moreover, there are also studies reporting that Syrian immigrants live in Eyyübiye and Haliliye districts' Devteyşti, Ahmet Yesevi, Süleymaniye, Bağlarbaşı, Şehitlik, Cengiz Topel, Şair Nabi, Yeşildirek, İpekyolu, Sancaktar, İmam Bakır, Yavuz Selim, Eyyüpnebi, Hayati Harrani, Eyüpkent, Akşemsettin, Yenice, Muradiye, Direkli, and Kurtuluş neighborhoods[18,19]. It is known that the migration of refugees might cause changes in the health patterns of receiving country. Hence, in a previous study carried out in Birecik in the period between 2014 and 2015, it was reported that 76.40% of leishmaniasis cases were Syrian, while another study carried out in Gaziantep reported that leishmaniasis cases significantly increased after the migration of immigrants[20,21]. Similarly, it was determined that 96.6% of leishmaniasis cases in Lebanon were Syrian[22].

In Şanlıurfa, the neighborhoods where Syrian immigrants live are the places where leishmaniasis has already been observed. However, it is thought that difficulties in living conditions of immigrants negatively contributed to this process. On the other hand, there are also studies suggesting that this vector might have shifted[23].

Many negative factors such as poor living conditions, crowded life, having no access to medical services, and communication difficulties affect immigrants more. From the aspect of controlling leishmania, offering an effective-accessible healthcare service is very important for immigrants. Active surveillance and selective active surveillance activities should be considered in places where there are intense border activities between the countries.

It was stated that the level of knowledge on the contagiousness and preventability of leishmaniasis was low among leishmaniasis patients. Most of them also have a low educational level[17]. Since leishmaniasis patients also carry the factor, they are a source of disease too. In case of any delay in the treatment, these individuals might possibly transmit the disease to those who live with them in the same house, or the individuals they have close contact. It is especially important to inform those who live in endemic regions about the disease and to specify how important early application is for the treatment. In particular, it is important to carry out active surveillance in neighborhoods where the number of cases is high, to detect the cases, and to initiate the treatment in order to eliminate the source of the disease[17].

The cases were aligned in the northwest-southeast line. In parallel with this alignment, it is emphasized that the main wind direction in Şanlıurfa is the northwest[24]. Thus, it is stated that sand flies might be whiffled by the wind[25] and their activities throughout the day are affected by the wind[26]. In a study carried out in Libya, it was reported that the number of leishmaniasis cases caused by flies decreased at locations where the windspeed was higher[27]. Although there is no such finding in the present study, it should be studied if there is a causal relationship. While the northwestern neighborhoods in Şanlıurfa such as Devteyşti, Akşemsettin, Direkli, and Süleymaniye were risky in the early 2010s, the risk shifted to southeastern neighborhoods such as Selçuklu, Osmanlı, Yenice, and Hayati Harrani in the following years. It is thought that, in the coming years, majority of the cases would be in these neighborhoods because of the number of immigrants and environmental factors. Healthcare managers should conduct surveillance works and provide training about the disease

in neighborhoods having high number of cases, as well as determining and eliminating the infrastructural problems in those neighborhoods and making it easier for immigrants to access healthcare services in neighborhoods where high number of immigrants live.

Study Limitations

The cases in this study were only those who applied to LDTC. Patients who did not apply to this center were not included in the study.

CONCLUSION

While the northwestern neighborhoods in Şanlıurfa were risky in the early 2010s, the risk shifted to southeastern neighborhoods in the following years. It is thought that, in the coming years, majority of the cases would be in these neighborhoods because of the number of immigrants and environmental factors.

Ethics

Ethics Committee Approval: Ethical approval no. E-49866, date: 19.04.2023 was obtained from the Ethics Committee of the Faculty of Medicine of Harran University.

Informed Consent: Retrospective study.

Peer-review: Externally peer-reviewed.

Authorship Contributions

Concept: B.B., İ.K., Design: B.B., İ.K., Data Collection or Processing: B.B., İ.K., F.B., Analysis or Interpretation: B.B., İ.K., F.B., Literature Search: B.B., İ.K., F.B., Writing: B.B., İ.K., F.B.

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