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Evaluation of cutaneous leishmaniasis cases in Mersin, Türkiye: Impact of migration and the COVID-19 pandemic

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Abstract

Introduction: Cutaneous leishmaniasis (CL) is a significant public health concern in Türkiye, especially in the Southeastern Anatolia and Mediterranean regions. This study evaluated the epidemiological characteristics of CL cases diagnosed at Mersin University Hospital, including the impact of migration and the COVID-19 pandemic.

Methodology: The diagnosis of CL was confirmed by microscopic examination of lesion smears. In this study, data from 144 patients diagnosed with CL between January 2011 and December 2022 were evaluated retrospectively. Demographic characteristics of the patients, temporal distribution (by month and year), and lesion features (location, number, and duration) were included.

Results: CL was confirmed in 32.9% of patients (144/438). Of the 144 patients, 82 (56.9%) were Turkish citizens and 62 (43.1%) were Syrian refugees. The mean age was 20.7 ± 19.8 (1-78) years. CL was detected more frequently in females (52.1%, 75/144) and in the 0–20-year age group (64.6%, 93/144). The head-neck region was the most affected (53.9%), and the mean lesion duration was 6.8 ± 11.6 months. Most cases were detected in February and March. The number of cases increased with Syrian refugee migration but decreased during the COVID-19 pandemic.

Conclusions: Although the frequency of CL in the region has decreased in recent years, it remains a significant public health concern.

Key words: Cutaneous leishmaniasis; epidemiology; migration; COVID-19; Türkiye.

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Introduction

Leishmaniasis is a vector-borne disease caused by protozoan parasites of the genus *Leishmania*. It is transmitted to mammalian hosts by infected female sandflies. The disease presents in three clinical forms: cutaneous (CL), mucocutaneous (MCL), and visceral (VL) [1]. Among these, CL is the most prevalent and remains a major global public health concern. According to the World Health Organization (WHO), CL is endemic in more than 90 countries, with an estimated 0.7 to 1.2 million new cases annually [2,3]. In Türkiye, CL is endemic in the Southeastern Anatolia and Mediterranean regions [4,5]. The country borders Iran, Iraq, and Syria, each of which has a high CL burden [2]. The prevalence of CL is influenced by multiple factors, including global warming, reduced vector control, migration, travel to endemic areas, and conflicts [6]. The Syrian civil war has led to increased CL incidence in Syria and neighboring countries, including Türkiye, Jordan, and Lebanon, due to the migration of Syrian refugees [7-10]. Between 2012 and 2017, approximately 3.5 million Syrian refugees migrated to Türkiye, resulting in 8640 CL cases identified and treated [10].

In the Old world, *Leishmania tropica* and *L. donovani* are transmitted through an anthroponotic cycle, whereas other species have zoonotic reservoirs [11]. In Türkiye, *L. tropica* is the most common cause of CL, followed by *L. infantum* in the Mediterranean region. Recently, CL cases caused by *L. major* and *L. donovani* have also been reported due to increased migration [4,12,13]. Although CL can affect all age groups, it is more prevalent among children and young adults in endemic areas. Clinically, it typically presents as nodular, ulcerative lesions that often heal spontaneously, leaving scar tissue [14-16]. Diagnosis usually begins with clinical suspicion, which is then confirmed by microscopic examination, culture, or polymerase chain reaction (PCR) [1,16].

The emergence of SARS-CoV-2 in December 2019, which was declared a pandemic on March 11, 2020, has impacted the epidemiology of various infectious diseases [17,18]. While the incidence of some close-contact infections declined because of

interventions such as social distancing and quarantine, the increased burden on healthcare personnel, laboratories, and services has indirectly and adversely affected other diseases requiring diagnosis, treatment, and follow-up, such as tuberculosis [18-21]. The COVID-19 pandemic has likewise influenced the epidemiology of CL, a vector-borne infection [22-24]. CL is endemic in Mersin, a city in the Mediterranean region of Türkiye. This study aims to examine the epidemiological characteristics of CL cases at Mersin University Hospital from 2011 to 2022, with emphasis on the impact of migration and the COVID-19 pandemic.

Methodology

Study Population

This study involved the epidemiological investigation of CL cases detected at Mersin University Hospital. The records of 144 patients who were clinically and microbiologically confirmed to have CL between January 2011 and December 2022 were retrospectively evaluated. For each confirmed case, demographic data (age, gender, nationality), lesion duration (in months), lesion location (head–neck, trunk, upper extremity, lower extremity), number of lesions, geographical information, and month of diagnosis were documented. CL case distribution was analyzed by the month of diagnosis, year, and age group.

Table 1. Demographic and lesion characteristics of CL cases.

Characteristics	Number of CL cases n = 144 (%)	95% CI
Nationality		
Turkish	82 (56.9)	48.6 - 66.0
Syrian	**62 (43.1)**	34.0 - 51.4
Gender		
Male	69 (47.9)	39.6 – 56.3
Female	75 (52.1)	43.8 – 60.4
Mean age, years	**20.7 ± 19.8 (1-78)**	**17.4 – 24.0**
Age group, years		
0-20	93 (64.6)	56.9 – 72.9
21-40	24 (16.6)	10.4 – 22.2
41-60	20 (13.9)	8.3 – 20.1
≥ 61	7 (4.9)	1.4 – 9.0
Number of lesions		
One lesion	91 (63.2)	55.6 – 70.8
Two lesions	35 (24.3)	17.4 – 31.3
Three lesions	10 (6.9)	2.8 – 11.1
More than three lesions	8 (5.6)	2.1 – 9.7
Localization of lesions	**Total 230 lesions**	
Head-neck	124 (53.9)	47.8 – 60.4
Trunk	8 (3.5)	1.3 – 6.5
Upper extremities	75 (32.6)	26.5 – 39.1
Lower extremities	23 (10)	6.5 – 13.9
Duration of lesions (Month)		
Median [25-75%]	4.0 [2.0-6.0]	3.0 – 5.0
Mean (Min-max)	6.8 ± 11.6 (1-84)	4.5 – 9.29

Microbiological Diagnosis

Suspected CL was confirmed by microscopic examination. Smear samples were obtained from the active borders of patients' lesions in the dermatology outpatient clinic. After fixation with methanol in the microbiology laboratory, the samples were stained with Giemsa and examined under a light microscope using a 100× objective lens. *Leishmania* spp. were detected inside or outside macrophages, confirming the diagnosis by observing amastigote forms.

Ethical Statement

Ethics committee approval for this study was obtained from the Mersin University Clinical Research Ethics Committee (Date: 21/02/2024, Decision no: 2024/185).

Statistical Analysis

Data were analyzed using the SPSS IBM 20.0 software (IBM, USA). Descriptive statistics were presented as percentages/frequencies, means, medians, and quartiles. The Kolmogorov-Smirnov test was used to assess normal distribution. Categorical variables were compared using the chi-square and Fisher's exact tests, while numerical variables were compared between groups using the Mann-Whitney U test. Results with a $p < 0.05$ were considered statistically significant.

Results

Patient population and CL positivity

During the study period, lesion samples were collected from 438 patients who visited the dermatology outpatient clinic. The median (IQR) age was 20 [7-45] years, with 225 males (51.4%) and 213 females (48.6%). Pediatric patients (aged < 18 years) constituted 47.3% (207) of the total population. Of these 438 patients, 105 (24%) were Syrian and 333 (76%) were Turkish citizens. *Leishmania* amastigotes were detected in 144 (32.9%) patients. CL positivity was significantly higher in Syrian patients (59.0%, 62/105) than in Turkish patients (24.6%, 82/333) ($p < 0.0005$). The positivity rates were 32.4% (69/213) in males and 33.3% (75/225) in females, with no significant difference by gender ($p = 0.834$). When positivity was analyzed by age group, the highest rate was observed in the 0–20 years (42.3%, 93/220), followed by decreases in older groups: 21-40 years (27.3%, 24/88), 41-61 years (22.0%, 20/91), and ≥ 61 years (17.9%, 7/39) ($p < 0.0005$).

Evaluation of CL Cases and CL Lesions

Out of the 144 CL-positive patients, 82 (56.9%) were Turkish and 62 (43.1%) were Syrian citizens. Among these patients, 47.9% (69) were male and 52.1% (75) were female, with a mean age of 20.7 ± 19.8 years (range: 1-78 years). While 43% (62) of the CL cases involved patients aged 0–10 years, more than half (64.6%, n = 93) were in the 0–20-year age group (Table 1). No statistically significant difference was found in the mean age between Turkish and Syrian patients (23.0 ± 21.4 vs. 17.7 ± 16.9 years; $p = 0.121$).

The mean number of CL lesions was 1.6 ± 1.1 (range: 1–8), and 63.2% of patients presented with a single lesion. There was no significant difference in lesion count between Turkish and Syrian patients (1.4 ± 0.8 vs. 1.8 ± 1.3; $p = 0.548$). Most CL lesions were located in the head–neck region (53.9%), followed by the upper extremities (32.6%), lower extremities (10.0%), and trunk (3.5%). Specifically, the cheek (24%), arm (20%), and hand (12.6%) were the most common lesion sites (Table 2).

When lesion sites were evaluated by demographic characteristics, neck lesions were more common in male patients ($p = 0.05$). Facial lesions were significantly higher in children (81.6%, n = 71) than in adults (35.1%, n = 20) ($p < 0.0005$). Conversely, upper extremity lesions were more common in adults (68.4%, n = 39) than in children (23.0%, n = 20) ($p < 0.0005$). According to nationality, the frequency of hand lesions was significantly higher in Syrian patients than in Turkish patients (27.4%, 17/62 vs. 13.4%, 11/82; $p = 0.036$).

The mean lesion duration was 6.8 ± 11.6 months (range: 1-84). Although Turkish patients had a longer mean duration than Syrian patients (7.9 ± 14.1 vs. 4.8 ± 3.1 months), the difference was not statistically significant ($p = 0.742$). Two Turkish patients had chronic lesions lasting 84 and 72 months.

Table 2. Localization of lesions in CL patients according to body sites.

Localization	Number of lesions, n (%)	95% CI
Head/Neck (n = 124, 53.9%)		
Chin	8 (3.5)	1.3 – 6.1
Lips	8 (3.5)	1.3 – 6.1
Forehead	8 (3.5)	1.3 – 6.1
Nose	15 (6.5)	3.5 – 10.0
Eye region	14 (6.1)	3.0 – 9.1
Cheek	57 (24.8)	19.1 – 30.9
Ears	10 (4.3)	1.7 – 7.4
Neck	4 (1.7)	0.4 – 3.5
Trunk (n = 8, 3.5%)		
Shoulder	3 (1.3)	0.0 – 3.0
Chest	3 (1.3)	0.0 – 3.0
Back	2 (0.9)	0.0 – 2.2
Upper extremities (n = 75, 32.6%)		
Arms	46 (20)	14.8 – 25.6
Hands	29 (12.6)	8.7 – 17.4
Lower extremities (n = 23, 10%)		
Legs	18 (7.8)	4.3 – 11.3
Feet	5 (2.2)	0.4 – 4.3
Total	**230 (100)**	

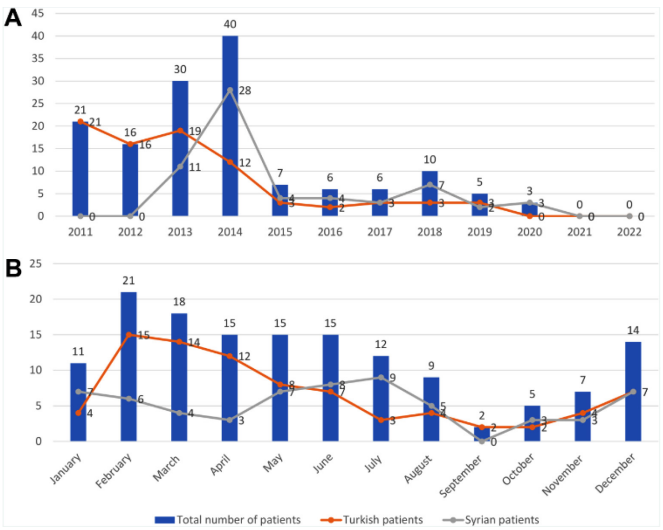
Distribution of CL cases by year and month

The highest number of CL cases was detected in 2013 and 2014, while the lowest number was observed in 2020, with no cases detected in 2021 or 2022. During the study period, the first admission of a Syrian patient occurred in 2013, reaching its peak in 2014. Specifically, the highest number of cases was 30 in 2013 (19 Turkish, 11 Syrian) and 40 in 2014 (12 Turkish, 28 Syrian). Both Turkish and Syrian cases declined in 2015 (n = 7; 3 Turkish, 4 Syrian) and remained at similar levels in subsequent years (Figure 1A).

To evaluate the impact of the COVID-19 pandemic on CL cases, the study period was divided into two-year segments. During the pre-pandemic period (March 11, 2018 - March 10, 2020), 15 CL positive cases were identified among 72 parasitology *Leishmania* test requests. In the pandemic period (March 11, 2020 - March 10, 2022), only one CL positive case was detected, and test requests decreased to 25. Consequently, *Leishmania* test requests declined by 65% (47 fewer) and CL cases by 93% (14 fewer) during the pandemic. In 2020, two cases were identified before the lockdown and one afterward, while no cases were detected in 2021 or 2022 (Figure 1A).

By month, CL cases peaked in February and March and were the lowest in September. Among Turkish patients, peaks were also observed in February and

Figure 1A. Distribution of CL cases by years; **B.** Distribution of CL cases by months.



March. No distinct monthly clustering was apparent among Syrian patients, although the highest counts were detected in June and July (Figure 1B).

Geographical Distribution of Cases

The geographical distribution of cases by place of residence was as follows: 62 patients from Syria, 39 from Mersin, 37 from surrounding districts of Mersin (23 from Tarsus, 6 from Silifke, 4 from Erdemli, 3 from Mut, and 1 from Gülnar), and 6 from other provinces (1 from Adana, 4 from Şanlıurfa, and 1 from Şırnak).

Discussion

According to WHO data, 205,986 new CL cases were reported worldwide in 2022, 85% of which were from eight high-burden countries, including Afghanistan, Algeria, Brazil, Colombia, Iran, Iraq, Peru, and the Syrian Arab Republic [2]. Türkiye is among the endemic countries for CL, with most cases occurring in Southeastern Anatolia and the Mediterranean regions [4,5]. Between 1990 and 2010, the Turkish Ministry of Health documented 46,003 CL cases, 96% of which were concentrated in Şanlıurfa, Adana, Hatay, Osmaniye, Diyarbakır, Kahramanmaraş, and Mersin provinces. While Türkiye's annual CL case numbers hovered around 1,500–2,000 before 2013, it surged to 5,362 (3,094 imported) in 2013 and 4,350 (2,801 imported) in 2014, concurrent with the migration of approximately 3.5 million Syrian refugees. Although the number of cases declined in subsequent years, it has remained around 2,500 annually [4,25,26].

This study was conducted at a university hospital in Mersin province, located in the Mediterranean region of Türkiye. Overall, the CL smear positivity rate was 32.9%; however, it was significantly higher among Syrian patients (59.0%) than among Turkish patients (26.6%) ($p < 0.0005$). Similarly, other studies have reported that an increasing proportion of Syrian patients correlates with higher overall CL positivity rates [27-29]. In this series of 144 CL cases, 56.9% were Turkish and 43.1% were Syrian. The first Syrian case was detected in 2013, followed by a surge in total case numbers with the influx of Syrian patients in 2013 and 2014. However, the number of cases decreased in subsequent years with diagnosis and treatment efforts. In Syria, reported CL cases peaked at 71,996 in 2013 during the civil war [30]. Various studies have shown that Syrian CL positivity rates range from 16.1% to 93.8% in refugee-hosting cities, particularly in border provinces such as Gaziantep and Şanlıurfa [27-29,31-33]. Although species identification was not performed in the current study, migration is known to alter the distribution of causative *Leishmania* species. In Türkiye, *L. tropica* is predominant, whereas both *L. tropica* and *L. major* are endemic in Syria [7]. Post-migration investigations have also reported *L. major* and *L. donovani*— species not endemic in Türkiye— among refugees and residents [12,13].

During the COVID-19 pandemic, only one CL case was detected after March 2020, and none were identified in 2021 or 2022. Parasitology test requests for CL decreased by 65%, while confirmed cases declined by 93% compared to pre-pandemic levels. Similar decreases in CL incidence have been reported elsewhere [22,23]. In contrast, Mazaherifar *et al.* [24] documented a zoonotic CL outbreak in Jahrom, Iran, attributed to disrupted rodent reservoir control during the pandemic. In endemic areas, reducing outdoor activities and protecting the skin with clothing can help lower vector exposure [6]. Pandemic measures such as quarantine, school closures, travel restrictions, and the use of personal protective equipment may have contributed to the decline in CL incidence. Nonetheless, factors such as the redirection of healthcare resources toward pandemic control, reduced health center visits for non-COVID conditions, and interruptions in vector-control programs suggest that the observed decline may not fully reflect the actual disease burden.

Although CL affects all age groups, it is more prevalent among children and young individuals in endemic areas [14,15]. Studies indicate that most cases cluster in individuals aged 0-20 years, with a higher risk in children under 10 [14,33-35]. In this study, 64.6% of cases involved individuals aged 0-20, and 43% were children under 10. This pattern may be attributed to their first exposure to *Leishmania* (lack of prior immunity), limited hygiene practices, and increased time spent outdoors, all of which increase the likelihood of vector contact. No significant difference in positivity rates was found between genders, although some studies have reported higher CL rates in either men or women [12,33,34]. Soares *et al.* [36] noted that CL risk in both sexes is influenced by the duration of vector exposure, with men being more susceptible hormonally and immunologically under shorter exposure conditions.

In the Çukurova region, *Phlebotomus* species remain active from May through October, and transmission predominantly occurs during this period [37]. Lesions typically develop within a few months, depending on the parasite load and the host's immune status. Although the incidence varies seasonally, most patients present to health centers in autumn and winter, following an incubation period of 2-8 months

[4,14,31,33]. In this study, 50% of locally acquired cases were diagnosed between February and April, consistent with the findings reported by Cömert-Aksu *et al.* [35] in Mersin. In contrast, Syrian cases did not exhibit a clear seasonal pattern, likely due to variable migration timelines, although a peak was observed in June and July.

CL primarily occurs on exposed areas, such as the face and upper extremities, and typically presents as a single lesion in most patients [15,28]. In a study conducted in Türkiye, 80.7% of 1030 cases exhibited a single lesion, with 58% located in the head–neck region, 32.4% in the upper extremities, 9.7% in the lower extremities, and 0.9% in the trunk [38]. Consistent with these findings, a single lesion was identified in 61.8% of patients in this study, predominantly affecting the head–neck region (53.9%) and upper extremities (32.6%). Specifically, the cheek (24%), arm (20%), and hand (12.6%) were the most common sites, areas typically left uncovered by clothing. In a Turkish study, the mean duration of CL lesions was reported as 10.8 months [38], whereas another investigation found that lesion durations were longer in Turkish patients compared to Syrian patients [34]. In this study, the mean lesion duration was 6.8 ± 11.6 months. Although the difference was not statistically significant, Turkish patients (7.9 ± 14.1 months) exhibited longer lesion durations than Syrian patients (4.8 ± 3.1 months), and two chronic cases were identified. One key factor influencing lesion duration is the *Leishmania* species. In Türkiye, lesions caused by *L. tropica* and *L. infantum* can persist for up to two years, and chronic CL develops in 5–10% of cases [16]. In contrast, *L. major* - commonly identified in Syria - typically results in lesions lasting 2–6 months [7,16]. Although the species was not confirmed in this study, variations in lesion duration are likely related to the causative species. Another contributing factor is that patients living in remote villages often delay seeking medical care until otherwise painless CL lesions become bothersome or chronic.

In this study, among 82 Turkish cases, 6 originated from other endemic provinces, 39 were from Mersin, and 37 were from surrounding districts (predominantly Tarsus). Previous research indicated that most cases in Mersin were from the districts of Mut, Tarsus, and Anamur [35,39]. In contrast, our findings reveal a higher proportion of city-center cases compared to previous reports. This difference may be attributed to residents spending summers in rural villages outside the city, predominance of agriculture as a livelihood, and the widespread practice of livestock farming in these areas. Additionally, migration from the Southeastern Anatolia Region may influence the current epidemiological pattern of CL in Mersin.

This study has several limitations. First, it included a relatively small number of cases as it was conducted at a single center. Therefore, the reported prevalence may not accurately reflect the actual disease burden in the region. Second, the *Leishmania* species were not identified, which limited the ability to perform species-specific clinical and epidemiological analyses.

Conclusions

This study indicates that although the incidence of CL in the region has decreased in recent years, it remains a significant public health concern. Migration from high-burden areas appears to contribute to increased disease prevalence and infection risk. Notably, CL frequency also declined during the COVID-19 pandemic, potentially due to pandemic-related measures and reduced patient visits; however, further research is needed to clarify these effects. Periodic monitoring of CL epidemiology is essential for sustaining effective infection control and enabling the early detection of potential resurgence. Public health strategies focusing on enhanced surveillance, targeted interventions, and education in high-risk communities are essential for sustainable prevention. Moreover, large-scale population movements from CL endemic regions underscore the importance of ensuring timely diagnosis and treatment of infectious diseases to reduce outbreak risk and protect public health. However, large-scale molecular epidemiological studies are needed to provide deeper insights into CL epidemiology and guide future control strategies.

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Conflict of interest

No conflict of interest is declared.

References

1. De Vries HJC, Schallig HD (2022) Cutaneous leishmaniasis: a 2022 updated narrative review into diagnosis and management developments. Am J Clin Dermatol 23: 823-840. doi: 10.1007/s40257-022-00726-8.
2. World Health Organization (WHO) (2022) Global leishmaniasis surveillance, assessing trends over the past 10 years. Available:

https://www.who.int/publications/i/item/who-wer9840-471-487. Accessed: 19 March 2024.
3. Alvar J, Vélez ID, Bern C, Herrero M, Desjeux P, Cano J, Jannin J, den Boer M (2012) Leishmaniasis worldwide and global estimates of its incidence. PLoS One 7: e35671. doi: 10.1371/journal.pone.0035671.
4. Gürel MS, Yeşilova Y, Olgen MK, Ozbel Y (2012) Cutaneous leishmaniasis in Turkey. Turkiye Parazitol Derg 36: 121-9. doi: 10.5152/tpd.2012.29.
5. Ok UZ, Balcioğlu IC, Taylan Ozkan A, Ozensoy S, Ozbel Y (2002) Leishmaniasis in Turkey. Acta Trop 84: 43-8. doi: 10.1016/s0001-706x(02)00134-1.
6. Aranson N (UpToDate) (2023) Cutaneous leishmaniasis: Epidemiology and control. Available: https://www.uptodate.com/contents/cutaneous-leishmaniasis-epidemiology-and-control. Accessed: 4 April 2024.
7. Hayani K, Dandashli A, Weisshaar E (2015) Cutaneous leishmaniasis in Syria: clinical features, current status and the effects of war. Acta Derm Venereol 95: 62-6. doi: 10.2340/00015555-1988.
8. Alawieh A, Musharrafieh U, Jaber A, Berry A, Ghosn N, Bizri AR (2014) Revisiting leishmaniasis in the time of war: the Syrian conflict and the Lebanese outbreak. Int J Infect Dis 29: 115-9. doi: 10.1016/j.ijid.2014.04.023.
9. Al-Salem WS, Pigott DM, Subramaniam K, Haines LR, Kelly-Hope L, Molyneux DH, Hay SI, Acosta-Serrano A (2016) Cutaneous leishmaniasis and conflict in Syria. Emerg Infect Dis 22: 931-3. doi: 10.3201/eid2205.160042.
10. Ergönül Ö, Tülek N, Kayı I, Irmak H, Erdem O, Dara M (2020) Profiling infectious diseases in Turkey after the influx of 3.5 million Syrian refugees. Clin Microbiol Infect 26: 307-312. doi: 10.1016/j.cmi.2019.06.022.
11. World Health Organization (WHO) (2010) Control of the leishmaniases: report of a meeting of the WHO expert committee on the control of leishmaniases, Geneva. Available: https://apps.who.int/iris/handle/10665/44412. Accessed: 14 April 2024.
12. Özbilgin A, Töz S, Harman M, Günaştı Topal S, Uzun S, Okudan F, Güngör D, Erat A, Ertabaklar H, Ertuğ S, Gündüz C, Çavuş İ, Karakuş M, Östan Ural İ, Ölgen MK, Kayabaşı Ç, Kurt Ö, Özbel Y (2019) The current clinical and geographical situation of cutaneous leishmaniasis based on species identification in Turkey. Acta Trop 190: 59-67. doi: 10.1016/j.actatropica.2018.11.001.
13. Koltas IS, Eroglu F, Alabaz D, Uzun S (2014) The emergence of *Leishmania major* and *Leishmania donovani* in southern Turkey. Trans R Soc Trop Med Hyg 108: 154-8. doi: 10.1093/trstmh/trt119.
14. Gurel MS, Ulukanligil M, Ozbilge H (2002) Cutaneous leishmaniasis in Sanliurfa: epidemiologic and clinical features of the last four years (1997-2000). Int J Dermatol 41: 32-7. doi: 10.1046/j.0011-9059.2001.01396.x.
15. Yemisen M, Ulas Y, Celik H, Aksoy N (2012) Epidemiological and clinical characteristics of 7172 patients with cutaneous leishmaniasis in Sanliurfa, between 2001 and 2008. Int J Dermatol 51: 300-4. doi: 10.1111/j.1365-4632.2011.05059.x.
16. Uzun S, Gürel MS, Durdu M, Akyol M, Fettahlıoğlu Karaman B, Aksoy M, Aytekin S, Borlu M, İnan Doğan E, Doğramacı ÇA, Kapıcıoğlu Y, Akman-Karakaş A, Kaya TI, Mülayim MK, Özbel Y, Özensoy Töz S, Özgöztaşı O, Yeşilova Y, Harman M (2018) Clinical practice guidelines for the diagnosis and treatment of cutaneous leishmaniasis in Turkey. Int J Dermatol 57: 973-982. doi: 10.1111/ijd.14002.
17. Karvar Ş, Gülbudak H, Görgülü Y, Tezcan Ülger S, Ersöz G, Çalıkoğlu M, Çimen MBY, Balcı Y, Özdemir AA, Yapıcı G, Delialioğlu N, Aslan G (2021) Clinical classification of SARS-CoV-2 positive patients; evaluation of laboratory and radiological findings. FLORA 26: 401-9. doi: 10.5578/flora.20219708. [Article in Turkish].
18. Ersoy L, Tezcan Ülger S, Gülbudak H, Yaşar N, Yapıcı G, Aslan G (2022) Longitudinal monitoring of seroconversion status in SARS-CoV-2 RT-PCR positive healthcare workers. Mikrobiyol Bul 56: 114-123. doi: 10.5578/mb.20229910.[Article in Turkish].
19. Komori A, Mori H, Naito T (2022) The impact of the COVID-19 pandemic on other infections differs by their route of transmission: A retrospective, observational study in Japan. J Infect Chemother 28: 1700-1703. doi: 10.1016/j.jiac.2022.08.022.
20. Aslan G, Gülbudak H, Delialioğlu N, Kaya H, Özdemir AA (2022) Impact of the COVID-19 pandemic on tuberculosis control in Mersin province. Turk Hij Den Biyol Derg 79: 646-655 doi: 10.5505/TurkHijyen.2022.88965. [Article in Turkish].
21. Gülbudak H, Bozok T, Karvar Ş, Delialioğlu N, Aslan G (2023) Frequency of *Giardia Intestinalis* in a university hospital: impact of the COVID-19 pandemic. Mersin Univ Saglık Bilim Derg 16: 453-60. doi: 10.26559/mersinsbd.1261376. [Article in Turkish].
22. Ghatee MA, Ebrahimi SS, Kohansal MH (2023) COVID -19 pandemic and epidemiological pattern of cutaneous leishmaniasis occurrence in Iran. New Armenian Med J 17: 35-41 doi: 10.56936/18290825-2023.17.2-35.
23. Shams M, Rashidi A, Mohamadi J, Moradi M, Pakzad R, Naserifar R, Abdi J, Ghelichi F, Bozorgomid A, Maspi N, Kenarkoohi A, Mohammadi Y, Abdoli A, Falahi S (2023) Real-time impact of COVID-19 pandemic on cutaneous leishmaniasis case finding and strategic planning, preventive interventions, control and epidemiology in a region with a high burden of cutaneous leishmaniasis and COVID-19: A cross-sectional descriptive study based on registry data in Ilam-Iran. Health Sci Rep 6: e1489. doi: 10.1002/hsr2.1489.
24. Mazaherifar S, Solhjoo K, Abdoli A (2022) Outbreak of cutaneous leishmaniasis before and during the COVID-19 pandemic in Jahrom, an endemic region in the southwest of Iran. Emerg Microbes Infect 11: 2218-2221. doi: 10.1080/22221751.2022.2117099.
25. Republic of Türkiye Ministry of Health (n.d.) Cutaneous Leishmaniasis cases (2008-2017). Available: https://hsgm.saglik.gov.tr/depo/birimler/zoonotik-ve-vektorel-hastaliklar-db/Dokumanlar/Istatistikler/Sark_Cibani_Istatistik.jpg. Accessed: 16 April 2024.
26. World Health Organization (WHO) Number of imported cases of cutaneous leishmaniasis reported. Available: https://www.who.int/data/gho/data/indicators/indicator-details/GHO/number-of-imported-cases-of-cutaneous-leishmaniasis-reported. Accessed: 16 April 2024.
27. Eroglu F, Ozgoztasi O (2019) The increase in neglected cutaneous leishmaniasis in Gaziantep province of Turkey after mass human migration. Acta Trop 192: 138-143. doi: 10.1016/j.actatropica.2019.01.026.
28. Özkeklikçi A, Karakuş M, Özbel Y, Töz S (2017) The new situation of cutaneous leishmaniasis after Syrian civil war in Gaziantep city, Southeastern region of Turkey. Acta Trop 166: 35-38. doi: 10.1016/j.actatropica.2016.10.019.

29. Yazısız H, Çekin Y, Tığlı GA, Koçlar FG, Gür N (2020) Retrospective evaluation of cutaneous leishmaniasis results: Data from a tertiary hospital in Antalya. Akd Med J 6: 506-510. doi: 10.17954/amj.2020.2842.
30. World Health Organization (WHO) (2013) Number of cases of cutaneous leishmaniasis reported. Available: https://apps.who.int/neglected_diseases/ntddata/leishmaniasis/leishmaniasis.html. Accessed: 23 May 2024.
31. Inci R, Ozturk P, Mulayim MK, Ozyurt K, Alatas ET, Inci MF (2015) Effect of the Syrian civil war on prevalence of cutaneous leishmaniasis in Southeastern Anatolia, Turkey. Med Sci Monit 21: 2100-4. doi: 10.12659/MSM.893977.
32. Turhanoglu M, Alp Erdal S, Bayindir Bilman F (2014) A nine-year evaluation of cutaneous leishmaniasis patients in Diyarbakir training and research hospital, Turkey. Mikrobiyol Bul 48: 335-40. doi: 10.5578/mb.7265.
33. Korkmaz S, Özgöztaşı O, Kayıran N (2015) The assessment of cutaneous leishmaniasis patients admitting to Gaziantep university of medicine faculty leishmaniasis diagnosis and treatment center. Turkiye Parazitol Derg 39: 13-6. doi: 10.5152/tpd.2015.3741.
34. Turan E, Yeşilova Y, Sürücü HA, Ardic N, Doni N, Aksoy M, Yesilova A, Oghumu S, Varikuti S, Satoskar AR (2015) A comparison of demographic and clinical characteristics of Syrian and Turkish patients with cutaneous leishmaniasis. Am J Trop Med Hyg 93: 559-63. doi: 10.4269/ajtmh.
35. Cömert-Aksu M, Deniz S, Togay A, Güneş F (2020) Epidemiological evaluation of the patients diagnosed with cutaneous leishmaniasis during the period of 2010-2015 in Mersin province. Turk Hij Den Biyol Derg 77: 139-148. doi: 10.5505/TurkHijyen.2019.93271. [Article in Turkish].
36. Soares L, Abad-Franch F, Ferraz G (2014) Epidemiology of cutaneous leishmaniasis in central Amazonia: a comparison of sex-biased incidence among rural settlers and field biologists. Trop Med Int Health 19: 988-95. doi: 10.1111/tmi.12337.
37. Belen A, Alten B (2011) Seasonal dynamics and altitudinal distributions of sand fly (Diptera: Psychodidae) populations in a cutaneous leishmaniasis endemic area of the Cukurova region of Turkey. J Vector Ecol 36: 87-94. doi: 10.1111/j.1948-7134.2011.00116.x.
38. Uzun S, Durdu M, Culha G, Allahverdiyev AM, Memisoglu HR (2004) Clinical features, epidemiology, and efficacy and safety of intralesional antimony treatment of cutaneous leishmaniasis: recent experience in Turkey. J Parasitol 90: 853-9. doi: 10.1645/GE-185R.
39. Köktürk A, Baz K, Aslan G, Kaya T, Yazıcı A, İkizoğlu G, Çamdeviren H (2002) Cutaneous leishmaniasis in İçel province, Turkey. Türkiye Parazitol Derg 26: 367-9. [Article in Turkish].