Introduction

As a parasitic illness, leishmaniasis has been mostly ignored in society (1, 2). Although it is a common illness that globally affects many nations and locations, it is persistent in low-income countries and regions (3-5). It is verified that leishmaniasis is present in 98 countries worldwide (3). On a worldwide scale, it is estimated that there are between 12 and 15 million instances, and 1.5-2 million new patients are found annually (6). According to some studies (3, 6), Syria, Sudan, Iran, Brazil, and Peru were responsible for nearly 70% of all reported cutaneous leishmaniasis (CL).

CL is typically scarring when it is relatively basic, but it is not hazardous if left untreated; nevertheless, even when treated, mucocutaneous and diffuse cutaneous illness may develop in lethal secondary infections (7). Patients with CL may suffer from psychological and social problems, even though the disease is typically self-healing and does not threaten their lives (3, 8, 9). Leishmania species and the host’s immunological response determine the infection period (acute to long-term) and its severity (6). Approximately 20 distinct Leishmania parasite species are responsible for leishmaniasis across the globe (10, 11).

It is transmitted from an infected female phlebotomine sand fly with leishmaniasis (7). Most disease transmission cycles on the planet are caused by zoonoses, including reservoir hosts such as mice, monkeys, domestic dogs, and wild canids, as well as humans (7, 12). Sand flies may transmit a parasite that may effectively move from human-to-human hosts but does not need a reservoir for leishmaniasis, which may be anthroponotic (7). Overall, fewer than 100 species of sand flies out of roughly 1000 species have been identified as the vectors of the Leishmania parasite (13).

There is a link between the frequency of leishmaniasis and changes in environmental factors, including deforestation, dam building, agricultural initiatives,
and urban growth, among others (2). Numerous more factors affect those who live in poverty, including hunger, population shifts, insufficient infrastructure, weakened immune systems, and an absence of financial resources (2).

Iran reports around 20000 CL cases every year, according to one study, but the researchers believe the accurate figure is four to five times greater (9, 14). In earlier research, CL was classified into zoonotic (caused by *Leishmania major*) and anthropopotic (caused by *Leishmania tropica*) types, as well as wet and dry lesions in Iran’s rural and urban regions, respectively (14, 15).

*Phlebotomus papatasi*, *P. duboscqi*, *P. salehi*, and *P. caucasicus* are all the vectors of zoonotic (ZCL) in Iran (16). ZCL has been reported to be prevalent in 17 provinces of Iran, including Khuzestan province, where ZCL may be found in a wide range of locations (17). Throughout the province of Khuzestan, the *L. major* is the most abundant and vital CL species (18, 19).

The purpose of this study was to investigate the epidemiology parameters of this illness in Shush County from 2016 to 2020. It is required to undertake an epidemiological study to establish if the present interventions in Shush County would be successful against a causative CL strain; preliminary information on the illness was obtained and evaluated accordingly.

**Materials and Methods**

Shush county (48° 24’ E, 32° 19’ N) is situated in Khuzestan province, southwest Iran, at 87 m above sea level (Figure 1). It has an area of 3557 km² with a hot and arid environment. Many individuals work in agricultural and animal production in this area (20).

The incidence of CL was obtained from a retrospective study conducted on 2020 instances of CL reported to the Shush county health centers between 2016 and 2020. Some unique patient variables such as age, gender, occupation, and year (or years) were recorded based on the study purpose. Using the chi-square statistics test, an analysis was performed on the obtained data to find whether there were any relationships between the epidemiological parameters and the frequency of CL. The data were then analyzed by the SPSS software, version 26 (Chicago, IL).

**Results**

A total of 2020 cases of CL were reported between 2016 and 2020, with monthly distribution (Figure 2). The highest and lowest percentages of people who had the illness were 32% in 2020 and 13.5% in 2019, respectively. The incidence rate per 100,000 people statistically significantly differed across the several research years according to the chi-square goodness-of-fit test (*P* < 0.05). The disease’s yearly incidence peaked at 285.8 cases per 100,000 people in 2020, while its lowest rate was 126.2 cases per 100,000 people in 2019 (Table 1).

Females and males made up 45.3% and 54.7% of the patients, respectively. A chi-square goodness-of-fit statistic test was used to determine whether CL is differently distributed in terms of gender. Males and females significantly differed in the frequency with which they used CL (*P* < 0.05). Regarding the number of infected persons with CL, the results indicated that CL was not the same in both genders.

Based on a chi-square goodness-of-fit test, CL seems to have the highest frequency among under ten-year-olds (42.6%), while the lowest frequency was related to the age group of 50-59 years old (2.9%).

To evaluate whether the age of those infected patients with CL differs from chance, a statistically significant disparity was found in the number of persons infected with CL (*P* < 0.05). More than half (61.0%) of those surveyed were under 20 (Table 2). The youngest and oldest patients were 1 and 97 years old. Children were shown to have the most significant condition incidence (32.8%).

It was determined if the frequency of infected patients with CL in the 11 categories of jobs varies from chance using the chi-square goodness-of-fit test. There was a statistically significant difference in the frequency of infected patients with CL between the eleven groups related to the occupation (*P* < 0.05).

**Discussion**

Following malaria, leishmaniasis, a neglected tropical disease, is responsible for most impairments among parasite illnesses (21).

A total of 2020 confirmed cases of CL were found during 2016-2020. It seems that CL has had a surge in the number of years it has been under investigation. Both men and women of all ages were afflicted with CL; however, it was more prevalent in men (54.7%) than women (54.3%). Similar findings have been published throughout the country and worldwide (9, 14, 22-26). Men are more likely to get sand fly bites than women because they wear fewer garments and participate in more outside activities such as sports and night employment, which exposes them to more sand fly bites (9, 23, 24). Conversely, the results of a study conducted in southern France represented that CL had a similar effect on men and women (27).

Soldiers, miners, cops, and loggers are most at risk for contracting CL (24, 28). Among youngsters, a phenomenal

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**Table 1. Shush County’s Incidence of Cutaneous Leishmaniasis per 100,000 Residents (2016-2020)**

| Years | New Cases | Total Population at Risk | Incidence Rate Per 100,000 People | *P* Value |
|-------|-----------|--------------------------|----------------------------------|-----------|
| 2016  | 332       | 227511                   | 145.9                            |           |
| 2017  | 395       | 221440                   | 178.4                            |           |
| 2018  | 375       | 216919                   | 172.9                            | < 0.05    |
| 2019  | 272       | 215519                   | 126.2                            |           |
| 2020  | 646       | 226027                   | 285.8                            |           |
rate (32.8%) was observed in the occupational groupings according to our findings. We found that our results followed the outcomes of the studies that have been conducted in the other regions of Iran (9, 14, 26).

According to the research, both males and females under the age of 10 (42.6%) include female group which is most significantly influenced by the disease. It may also be ascribed to the greater likelihood of being bitten by a sand fly when participating in outdoor activities. Interestingly, the findings of this research are consistent with those of other investigations by Omidieh and Aran-va- Bidgol (9, 26). However, similar findings were not reported in the other areas of Iran or other parts of this Province (23, 25, 29, 30).

CL affected 61.2% of people who lived in rural areas, and the difference between the different residencies was significant.

The analysis findings revealed that CL happened more during the winter months than during the other seasons (Figure 2).

Based on the evidence, the number of people infected with CL illness is increasing in Iran and other parts of the globe (9). It was shown that the CL incidence was the lowest in 2019, while its highest frequency was observed in 2020 (per 100 000 people). In Shush County, we found an incidence rate of 182.4 per 100 000 people compared to the national average of 27.5 (14). As a result, the prevalence of CL in Shush was far greater than predicted, whereas the prevalence of CL across Iran was significantly lower. CL may be an endemic illness in this county, or the disease’s incidence may be growing due to the lack of the implementation of numerous critical tasks in the CL program, including reservoir and vector control, as well as early identification and treatment.

In light of these findings, public health education and management of the illness, reservoirs, and vectors in the Shush area may effectively eradicate CL in the human population.

**Conclusion**

According to the findings of this research, Shush seems
to be a significant endemic focus for CL in the country. As a result, to defeat the illness, implementing control programs such as vector and reservoir management, as well as raising people’s knowledge of personal protective techniques, should be resurrected in the area to combat the disease.

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Authors’ Contribution
KCR and AB developed the concept and designed the study. KCR and MM collected the epidemiological data. In addition, AB analyzed and interpreted the data. Finally, KCR and AB wrote the manuscript.

Conflict of Interest Disclosures
The authors declare that they have no conflict of interests.

Ethical Statement
This paper was derived from a research project entitled “Prevalence of cutaneous leishmaniasis in Shush Country, 2017-2021” and authorized by Ahvaz Jundishapur University of Medical Sciences with the ethical code IR.AJUMS.REC.1400.427.

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