

# Awareness of the public about cutaneous leishmaniasis in an endemic area, Aseer region, Saudi Arabia

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## Abstract

**Background:** Leishmaniasis is a group of chronic infections affecting humans and several animal species. Cutaneous leishmaniasis (CL) is a protozoal infection transmitted by bites of the infected female sandflies. CL is endemic throughout the desert of the Middle East. The awareness of the people is an important tool in the success of disease prevention and control programs.

**Methods:** We undertook a descriptive cross-sectional web-based study and a questionnaire in the Aseer region. The first part of the questionnaire included demographic data (age, gender, geographic location, personal and family history of CL). The second part of the questionnaire included the awareness of the participants regarding the frequency of infection, clinical signs, types, treatment methods, consequences, and preventive measures of CL.

**Results:** A total of 402 participants completed the questionnaires. Their age ranged from 18 to 65 years with a mean age of  $34.1 \pm 13.9$  years. Good awareness about CL was statistically significantly higher among the following: i) participants less than 30 years (26.6%) as compared to those aged 50 years or more (6.9%), ii) females (17.6%) as compared to males (8.9%), and iii) participants who never had any previous exposure to CL (18.4%) as compared to those who exposed before (8.7%).

**Conclusion:** Overall, the public awareness regarding CL in Aseer region was very poor, especially the general knowledge including the nature of the disease, and mode of transmission. In KSA, more focus should be paid to improve public awareness regarding CL as a preventable disease.

## Keywords:

Leishmaniasis, population, awareness, knowledge, prevalence, Kingdom of Saudi Arabia, and Aseer region.

## Introduction

Leishmaniasis is a group of chronic infections affecting humans and animals that is endemic in more than 90 countries worldwide [1]. The annual global incidence of CL is 0.7 to 1 million new cases per year. In 2020, nearly 80% of CL was reported from seven countries: Afghanistan, Algeria, Brazil, Colombia, Iraq, Pakistan, and Syria [2]. The human gets infected through the bite of female sandflies (mostly the genera *Phlebotomus* and *Lutzomyia*) [3]. There are more than 20 species of *Leishmania*. The infection can cause protean clinical manifestations such as cutaneous leishmaniasis (CL), mucocutaneous leishmaniasis, and visceral leishmaniasis [4]. CL is the most frequent type and is featured by the development of several dermal cutaneous lesions. The spontaneous healing of the latter leaves disfiguring scars, resulting in social and psychological stigma [5].

The Kingdom of Saudi Arabia (KSA) is the fourth most endemic area of CL in Western Asia [6] with an average number of 2500 cases per year [2]. CL is endemic in several regions of KSA. In the Eastern region, CL is endemic, especially in the Al-Hassa Oasis. Over there, the vector of the disease is the sandfly, and the desert rodents are the alternative natural hosts. The causative agent of CL in the Al-Hassa Oasis is *L. Tropica* [2, 7]. In the Eastern region, sand-fly is the most common vector, and *L. major* is the most causative agent. In the Southwestern region, *L. Tropica* is the most causative agent [8]. Alraey et al examined the epidemiology of 1565 CL in Aseer region over a period of 9 years (2011-2020). They used R statistic language (version 4.0.5), and the spatial distribution of cases was mapped using QGIS (version 3.20.0). 2011 to 2020. The highest risk of contracting CL was seen among children under the age of 13 years [9]. The highest areas of CL infection included Abha, Sarat-Abidah, and Khamis-Mushait. The face was the most commonly affected site [9]. Public awareness of certain diseases can improve the active participation of individuals and communities in disease prevention and control programs. In 1987, 1198 cases were reported among the Saudi populations of the Aseer region with an annual incidence of 12 per 10000 [10]. Khan et al examined the level of awareness regarding CL in the Malakand region (Pakistan). The authors conducted a cross-sectional survey on a total of 400 respondents. Most of the participants (61.2%) were aware of the role of the transmitting vector (sand flies). Most of the participants were not aware of the behavior of the sandflies. A quarter (24.5%) of the participants were not aware of the proper measures to control CL. Alarmingly, about half (49.8%) of the participants did not adopt any strategy to control CL [11].

To the best of our knowledge, there are no available reports about the public awareness of CL in the Aseer region. We conducted the current investigation to fill this existing gap in the literature. To achieve our goals, we conducted a descriptive cross-sectional web-based study in the Aseer region using two questionnaires.

## Material and Methods

The current descriptive cross-sectional study was conducted to assess the public awareness of CL among 402 participants living in the Aseer region. The latter is a well-known endemic area of CL in KSA. The study included all individuals aged 18 years or older who consented to participate in the investigation. The exclusion criteria included individuals under 18 years old, people who declined to consent, or non-Arab language-speaking people. We designed the two-part questionnaire of the study based on a literature review and following consultation with experts in the field of epidemiology, community medicine, and infectious diseases residing in the Aseer region. The validity, applicability, and clearness of the questionnaire were assessed by the experts independently. Their suggestions were discussed thoroughly, and the appropriate ones were included in the final version of the questionnaire.

The final questionnaire was disseminated using social media platforms in the period between 1st of October 2022 to 31 December 2022. We encouraged the respondents to participate by emphasizing the strict confidentiality of their participation and clarifying the importance of this research to the health of their society. The first part of the questionnaire included the demographic data of the participants (age, gender, geographic location, personal and family history of CL). The second part of the questionnaire covered the general awareness of the participants, frequency of infection, clinical signs and types of leishmaniasis, treatment modalities, outcome, complications, and preventive measures against CL. All the questions had either one or more than one correct answer.

### Data analysis

The data were collected, reviewed, and then fed to the Statistical Package for Social Sciences version 21 (SPSS: An IBM Company). All statistical methods were two-tailed. The alpha level of 0.05 is considered statistically significant if the P value is less than or equal to 0.05. The overall awareness level of CL was assessed by summing up discrete scores for different correct knowledge items. The overall awareness score was categorized as a poor level if the participant's score was less than 60% of the overall score. Alternatively, it was scored as a good level of awareness if the participant's score was 60% or more of the overall score. Descriptive analysis was done by prescribing frequency distribution and percentage for study variables, including respondents' data, medical, and family history of CL. The awareness regarding leishmaniasis, clinical signs, related treatment methods, consequences, and preventive measures was also tabulated, and overall awareness was graphed. Cross tabulation for showing the distribution of participants' overall awareness level by their data was carried out with the Pearson chi-square test for significance and the exact probability test if there were small frequency distributions.

## Results

A total of 402 participants (233 females and 169 males) completed the questionnaire. The mean age of the participants was  $34.1 \pm 13.9$  years old. Sixty-nine participants had a history of CL, whereas 111 participants had a family history of CL. A summary of these findings is shown in Table 1. We examined the public awareness regarding leishmaniasis in the Aseer region. The percentages of the participants aware of the following regarding CL were as follows: CL is a dangerous (43.8%), parasitic disease (26.6%) that is common in KSA (42.8%). CL is transmitted by sand-fly bite (28.9%), which can infect all age groups (60.4%), and can present as nodules or ulcers (35.8%). A summary of these findings is shown in Table 2.

Analysis of the public awareness regarding the treatment, consequences, and prevention of leishmaniasis in the Aseer region revealed several observations. The percentages of public awareness were as follows: CL infection can heal without treatment but with a scar (40.5%), and local injections are the most common treatment modality (27.6%). The infection can result in the development of scars and deformities (33.1%). The most effective preventive measure is to avoid sleeping in open areas (15.7%). A summary of these findings is shown in Table 3. The overall public awareness regarding leishmaniasis in the Aseer region was poor (86.1%; 346 participants), whereas 56 (13.9%, 56 participants) had a poor awareness level. A summary of these findings is shown in Table 2.

The factors associated with public awareness regarding CL included the following: age (26.6% of participants less than 30 years had a good awareness level versus 6.9% of those who were 50 years or more), gender (17.6% of female participants had a good awareness level versus 8.9% of male participants), and history of previous exposure to CL. A summary of these findings is shown in Table 4.

**Table 1. Personal data of study participants, Saudi Arabia**

Personal data	No	%
<b>Age in years</b>		
< 30	128	31.8%
30-39	170	42.3%
40-49	75	18.7%
50+	29	7.2%
<b>Gender</b>		
Male	169	42.0%
Female	233	58.0%
<b>Have you ever had cutaneous leishmaniasis?</b>		
Yes	69	17.2%
No	250	62.2%
I don't know	83	20.6%
<b>Have any of your relatives had cutaneous leishmaniasis?</b>		
Yes	111	27.6%
No	179	44.5%
I don't know	112	27.9%

Table 2. Public awareness regarding leishmaniasis and endemic area, Kingdom of Saudi Arabia

Domain	Awareness		No	%
General awareness	What is leishmaniasis?	Parasitic infection.	107	26.6%
		Bacterial infections	74	18.4%
		Viral infection	80	19.9%
		I don't know	141	35.1%
	How is leishmaniasis transmitted?	By sand-fly bite	116	28.9%
		By pets	19	4.7%
		By food & drink	24	6.0%
		By sexual relations	53	13.2%
		By breathing	73	18.2%
		I don't know	117	29.1%
	Is leishmaniasis contagious?	Yes	156	38.8%
		No	99	24.6%
		I don't know	147	36.6%
	Is leishmaniasis dangerous?	Yes	176	43.8%
		No	79	19.7%
		I don't know	147	36.6%
	Who are the vulnerable groups?	Children	47	11.7%
		Adults	112	27.9%
		All groups	243	60.4%
Leishmaniasis in Saudi Arabia	Is leishmaniasis common in Saudi Arabia?	Yes	172	42.8%
		No	65	16.2%
		I don't know	165	41.0%
	What are the most common areas of the Kingdom for Leishmaniasis?	Southern region	86	21.4%
		Central region	91	22.6%
		Northern region	25	6.2%
		Eastern region	17	4.2%
		Western region	38	9.5%
		I don't know	145	36.1%
	Is leishmaniasis common in the Aseer region?	Yes	195	48.5%
		No	69	17.2%
		I don't know	138	34.3%
Clinical data	Types of leishmaniasis	Cutaneous leishmaniasis.	205	51.0%
		Mucocutaneous leishmaniasis.	20	5.0%
		Intestinal leishmaniasis.	25	6.2%
		All of them	152	37.8%
	Places where leishmaniasis is common	Areas near valleys and dams.	82	20.4%
		Agricultural areas.	167	41.5%
		Overcrowded areas	22	5.5%
		In the city	15	3.7%
		I don't know	116	28.9%
	Signs of cutaneous leishmaniasis	Small nodule	163	40.5%
		Large nodule	25	6.2%
		Multiple nodules	39	9.7%
		Ulcer	31	7.7%
		All are signs	144	35.8%
	Most sites of infection	Face	157	39.1%
		Arms	31	7.7%
		Foot	9	2.2%
		Abdomen and back	9	2.2%
		All are sites	196	48.8%



Table 3. Public awareness regarding leishmaniasis and endemic area, Kingdom of Saudi Arabia, continued

Domain	Items		No	%
Treatment	Can the infection heal without treatment?	Yes, with scar	163	40.5%
		Yes, without scar	31	7.7%
		Never	208	51.7%
	Treatments for cutaneous leishmaniasis	Local injections	111	27.6%
		IM injections	54	13.4%
		Oral medications	57	14.2%
		Local creams	39	9.7%
		I don't know	141	35.1%
	Are there effective folk remedies for cutaneous leishmaniasis?	Yes	80	19.9%
		No	117	29.1%
		I don't know	205	51.0%
Consequences	Consequences of untreated cutaneous leishmaniasis	Leave scars and deformities.	133	33.1%
		No consequences	68	16.9%
		I don't know	201	50.0%
Prevention	Preventive measures of leishmaniasis?	Wearing long-sleeved clothes	57	14.2%
		Use of pesticides	49	12.2%
		Use insect repellent creams	59	14.7%
		Do not sleep in open areas	63	15.7%
		All of them	174	43.3%

IM: Intra-muscular

Table 4. Factors associated with public awareness regarding leishmaniasis, Kingdom of Saudi Arabia

Factors	Overall awareness level				p-value
	Poor		Good		
	No	%	No	%	
Age in years					
< 30	94	73.4%	34	26.6%	.001*
30-39	155	91.2%	15	8.8%	
40-49	70	93.3%	5	6.7%	
50+	27	93.1%	2	6.9%	
Gender					
Male	154	91.1%	15	8.9%	.013*
Female	192	82.4%	41	17.6%	
Have you ever had cutaneous leishmaniasis?					
Yes	63	91.3%	6	8.7%	.003*
No	204	81.6%	46	18.4%	
I don't know	79	95.2%	4	4.8%	
Have any of your relatives had cutaneous leishmaniasis?					
Yes	95	85.6%	16	14.4%	.306
No	150	83.8%	29	16.2%	
I don't know	101	90.2%	11	9.8%	

P: Pearson X2 test                      \$: Exact probability test                      \* P < 0.05 (significant)

## Discussion

CL represents a major health problem in KSA. CL is endemic in KSA and as such, represents a major health problem. Hassanein and his colleagues examined the epidemiology of CL in the Tabuk region, the KSA, during the period from 2006 to 2021. Their study included 1575 CL patients. The patients with leishmaniasis included 53.1% Saudis and 46.9% non-Saudi citizens. They included 83.17% males and 16.83% females. Most of the participants were in the age group of 15-45 years. The continuous immigration to the region contributed to the increased incidence of CL in this region [12]. Rasheed et al investigated the types of *Leishmania* species causing CL infection in the Qassim region, KSA. Examination of the DNA from 206 skin biopsies from CL patients revealed that the causative species included *L. major* (49.5%), *L. tropica* (28.6%), *L. infantum*, and *L. donovani* (3.9%) infections [1].

Our current study took an aim to assess public awareness regarding CL in the Aseer region. Our study revealed several important observations. Importantly, the public awareness regarding CL was very poor, as nearly 14% of the participants were knowledgeable regarding leishmaniasis. Only one-fourth of the participants know that leishmaniasis is a parasitic disease, and more than one-fourth of them know that CL is transmitted by a sand-fly bite. Nearly the same percent knew that leishmaniasis is not contagious, but less than half (43.8%) knew that it is a dangerous infection, and less than two-thirds (60.4%) reported that leishmaniasis can infect all age groups. The level of awareness was higher among young participants, females, and those without a prior history of the disease.

Our results agree with previous studies in the other endemic areas of CL in the KSA, such as Al-Hassa [8,13], Tabuk [12], Qassim [1], and Tabuk [14], and the Malakand region (Pakistan). Amin et al conducted a cross-sectional descriptive survey including 1824 participants. The authors reported a low awareness regarding the epidemiological aspects of CL in Al-Hassa, located in the Eastern region of KSA [13]. Amin TT et al. reported that more than 76% of the participants (in the Al-Hassa region) recognized the clinical features of CL. Alternatively, the awareness regarding the vector, transmission, risk factors, and preventive methods was very poor [8]. Alatawi et al examined the attitude and knowledge regarding CL in 385 adult participants in the region of Tabuk, KSA, in the period from April to May 2022. They used an online survey [14]. The awareness regarding the risk factors of CL was prevalent among participants older than 61 years old and the Saudi male gender. The overall knowledge was poor regarding risk factors, transmitting vector, disease transmission, presentations, and gender prevalence [14].

Our results also call for the development of effective health strategies to combat the problem of CL. They include the improvement of public awareness regarding CL. The lack of sufficient knowledge about CL results in a delay in the diagnosis and treatment of patients afflicted by the disease.

To sum up, alarmingly, our work demonstrated overall poor public awareness of CL. The results of our investigations can help the health authorities fill the existing gap in knowledge regarding the public awareness of CL in the Aseer region. Our investigation calls for improving the public awareness of CL. This goal can be achieved through school education and public education campaigns. This will help improve public awareness to improve the policies to prevent and control CL in the endemic areas. More effort should be paid and focused on the role of sand-fly as a vector and the recognition/identification of sand-flies with the role of animal reservoirs in the spread of CL. This, in turn, will reduce the risk of outbreaks of CL in the future.

## Conclusion and Recommendations

This study showed a significant defect in public awareness about cutaneous leishmaniasis (CL) in the Aseer region, despite it being an endemic area in Saudi Arabia. Only 13.9% of participants demonstrated a good level of knowledge about the disease's cause, symptoms, transmission, treatment, and prevention. Misconceptions were common, and understanding of preventive practices was particularly low. Notably, younger individuals, females, and those without prior exposure to CL were more likely to have better awareness. To improve public awareness of cutaneous leishmaniasis in the Aseer region, targeted health education campaigns should be implemented using schools, universities, and trusted media channels. Community outreach through healthcare providers and integrating CL education into routine medical visits can help correct misconceptions and promote preventive behaviors. Special focus should be placed on high-risk areas and vulnerable populations to enhance understanding and reduce disease transmission.

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