

# Anthroponotic Cutaneous Leishmaniasis: Knowledge, Attitudes, Practices, and Risk Factors among residents in endemic Communities in Kerman City in the Southeast of Iran

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## Abstract

Anthroponotic cutaneous leishmaniasis (A.C.L) is a vector-borne protozoan disease transmitted to humans by the bite of blood-feeding female phlebotomine sand flies. In this study, we aimed to assess and compare the levels of knowledge, attitudes, and practices (KAP) towards A.C.L among residents in three endemic areas in the suburb of Kerman city. This study also aimed to identify the risk factors associated with the incidence of A.C.L in these endemic areas in the southeast of Iran. A descriptive cross-sectional study was conducted from January to March 2019 in three endemic areas in Kerman city; Allahabad, Shahrak Sanati, and Sarasiab. Overall, a structured questionnaire was used for data collection. A total of 195 residents who agreed to participate and complete the questionnaire were enrolled in this survey. Also, in this study, the risk factors for A.C.L in these areas were investigated, and the data were recorded with a checklist. Collected data were analyzed by using SPSS version 22. A total of 195 individuals responded to the questionnaire in this study. Among the respondents, 41.5 % were males and 58.5 % were females. Majority of the respondents (61%) claimed they have heard about A.C.L and are familiar with this infectious disease. Only 25%, 66.7% and 32% of the respondents had good knowledge, attitudes and practices, respectively towards A.C.L. The main risk factors for ACL identified in the study areas included construction waste, presence of old and dilapidated houses, poor sanitary conditions, refugee and immigration, and the presence of domestic animals in close physical proximity to humans. In general, the participants in this survey had a weak knowledge towards A.C.L. It is recommended that educational programs be implemented in order to improve the level of knowledge towards ACL among the residents in the endemic areas.

## 1 | INTRODUCTION

Leishmaniasis is a vector-borne protozoan disease transmitted to humans by the bite of blood-feeding female phlebotomine sand flies. Although it is often not fatal, it poses a major public health problem worldwide (Yaghoobi-Ershadi, 2016). Leishmaniasis remains a neglected vector-borne disease. It is estimated that about 1.3 million people are diagnosed with cutaneous leishmaniasis annually in the world (Pirooz et al., 2019). The presence of this vector-borne disease has been reported in 102 countries worldwide, including Iran, and an estimated one billion people are at risk of contracting the disease (Alvar et al., 2012; Razavinasab et al., 2019; WHO, 2018). According to the WHO report in 2018, most of the cases of cutaneous leishmaniasis were reported from 48 countries in the world (WHO, 2018).

Cutaneous leishmaniasis is more difficult to control in endemic areas than other infectious diseases, which has been attributed to the complexity of the epidemiological and biological aspects of the disease (Yaghoobi-

Ershadi, 2016). Despite many efforts to control the disease, it is still present in many parts of the world, and it is endemic in countries such as Syria, Afghanistan, Brazil, Iraq, Iran, Pakistan, Colombia, and Algeria (WHO, 2018).

There are two epidemiological forms of the vector-borne protozoan disease in Iran; Anthroponotic Cutaneous Leishmaniasis (A.C.L) and Zoonotic Cutaneous Leishmaniasis (Z.C.L) caused by *Leishmania tropica* and *Leishmania major*, respectively (M. R. Aflatoonian et al., 2019). Also, two sand fly species have been identified as the main vectors of the two forms of Cutaneous Leishmaniasis in Iran. ACL is mainly transmitted by *Phlebotomus sergenti* and ZCL by *Ph. Papatasi* (M. R. Aflatoonian et al., 2019). The annual incidence of cutaneous leishmaniasis in Iran is very high, and the country ranks among the first six countries in the world in terms of the incidence of the disease (Piroozi et al., 2019). A.C.L is widely distributed in several provinces in Iran, including Tehran, Kerman, Mashhad, Yazd and Shiraz (Afshar et al., 2017). Kerman province is one of the endemic focus of A.C.L in Iran, and several cases have been reported in different cities of the province, including Kerman, Bam, Rafsanjan, Baft, Shahrabak and Sirjan (M. Aflatoonian & Sharifi, 2014).

The distribution of A.C.L is affected by various factors, including epidemiological factors, environmental factors, migration, urbanization, and natural disasters (Desjeux, 2001). Some of the most effective ways of controlling A.C.L include prevention through the use of personal protective equipment and environmental interventions aimed at eliminating the vectors and the reservoirs of the disease (Nilforoushadeh, Bidabadi, Hosseini, Nobari, & Jaffary, 2014). Another effective way of controlling the disease and reduce its spread is to increase the awareness of the residents living in the endemic areas.

In general, health behaviors and hygiene practices can be influenced by gender, age, education and knowledge (Kirunda et al., 2015). Understanding the level of knowledge, attitudes, and practices (KAP) of residents living in endemic areas is necessary in designing health promotion interventions and reducing the risk of exposure. Also, identifying the risk factors associated with the disease in the endemic areas can help reduce the incidence of the disease. In recent years, many studies have been conducted on the KAP towards leishmaniasis in Asia and Africa (Akram, Khan, Qadir, & Sabir, 2015a; Amin et al., 2012; Awosan et al., 2013; Doe, Egyir-Yawson, & Kwakye-Nuako; Kebede et al., 2016; Khbou, Najahi, Zribi, Aoun, & Gharbi, 2019; Nandha, Srinivasan, & Jambulingam, 2014; Sarkari, Qasem, & Shafaf, 2014). In Iran, KAP studies on leishmaniasis have been conducted in Fars (Sarkari et al., 2014), Ilam (Vahabi et al., 2013a), and Isfahan provinces (Sabeti et al., 2012) in the past years.

Kerman, a city in the southwest of Iran, is one of the endemic foci of A.C.L. Therefore, there is a need to understand the KAP of residents living these areas and the risk factors associated with the disease. In this study, we aimed to assess and compare the levels of KAP towards A.C.L among residents in three endemic areas in the suburb of Kerman city. The present study also aimed to identify the risk factors associated with A.C.L in these areas. To the best of our knowledge, the present survey is the first KAP study on A.C.L and associated risk-related factors among residents in three endemic areas (Allahabad, Shahrak Sanati and Sarasiab) in the suburb of Kerman city.

## 2 | MATERIALS AND METHODS

### 2.1 | Study design

A descriptive cross-sectional study was conducted from January to March 2019 in endemic areas in Kerman city. Three endemic areas, including Allahabad, Shahrak Sanati, and Sarasiab in the suburb of Kerman City with indigenous A.C.L cases and a high potential for sand fly breeding were selected in the present study.

### 2.2 | Ethical consideration

This study received ethical approval from the Ethics Committee of Kerman University of Medical Sciences (IR.KMU.REC.1397.424). All the IDI participants provided written informed consent and also, heads of households provided written consent for the photos taking from the study areas. Results of this study have been presented to the Leishmaniasis Research Center, Kerman University of Medical Sciences and the

Department of vector biology and control in the School of Public Health, Kerman University of Medical Science.

### 2.3 | Study site

This study was conducted in three endemic and high risk zones affected by A.C.L in the suburb of Kerman city. The study areas include Allah Abad, Shahrak Sanati and Sar Asiab. Kerman city, which is capital of Kerman province, is located in the southeast of Iran (30.2839° N, 57.0834° E) and in the southwest of the Kavir-e Lut. The population of Kerman city is about 821.374 people living in 221389 households, making it the 10th most populous city in Iran (Figure 1).

### 2.4 | Data collection

A structured questionnaire was used for data collection. Data collection was done by a well briefed team of vector biology and control students. The questionnaire consisted of four sections of items. The first section of the questionnaire consisted of question for collecting the demographic data of the participants. The second section consisted of questions for assessing the knowledge level of the residents towards A.C.L. The third section assessed the attitude and the fourth section assessed practices of the residents towards ACL. A total of 195 residents who agreed to participate and complete the questionnaire were enrolled in this survey. Also, in this study, the risk factors for the incidence of A.C.L in these three endemic areas were investigated and data were recorded through a checklist. The checklist included environmental, behavioral and socioeconomic risk factors.

### 2.5 | Statistical analysis

Data analysis was performed by using SPSS version 22 statistical software package. Descriptive statistics (mean, standard deviation, charts, and frequency distribution tables) and appropriate inferential statistics such as independent T-Test, One-way ANOVA, Pearson correlation test, and Simple linear regression were used. In the statistical analyses, P-value of less than 0.05 was considered statistically significant.

## 3 | RESULTS

### 3.1 | Socio-demographic characteristics

A total of 195 individuals responded to the questionnaire in this study; 41.5 % males and 58.5 % females. About 20 % of the respondents were categorized as Illiterate. Eighty percent of respondents were literates, and majority of them had primary education (44.1%) and university education (8.7%). Most of the females (60.5 %) were housewives, whereas most of the male participants (32.8 %) were self-employed. The demographic characteristics of the residents in Kerman city have been described in Table 1.

### 3.2 | History of A.C.L infection in family members of respondents

The majority of the study population (88.2%) reported no family history of A.C.L infection. About 10 % reported that some of their family members had the infection before and have recovered, and 1 % reported that some of their families currently have A.C.L. The residents who reported that some of their family members had the infection before and have recovered (10%) had a better knowledge score ( $9.95 \pm 1.96$ ) than the other respondents.

### 3.3 | Respondents' Knowledge about A.C.L

Only 25% of the respondents had a good knowledge about A.C.L. The mean knowledge score (Mean  $\pm$ SD) was  $4.66 \pm 2.37$  (Score: Minimum 0, Maximum 12). The knowledge scores of females and males were  $4.69 \pm 2.34$  and  $4.62 \pm 2.42$ , respectively. There was no significant relationship between the knowledge of females and males ( $P = 0.827$ ). The residents in the age group 41-50 years had a higher knowledge ( $5.29 \pm 2.29$ ) about ACL. However, One-way ANOVA test showed no significant difference between the different age groups in terms of knowledge about ACL ( $P = 0.268$ ). University education was associated with a higher level of knowledge ( $4.88 \pm 2.1$ ) compared with other levels of education, but there was no significant relationship between knowledge about ACL and the level of education ( $P = 0.478$ ). Residents who were employed had a

better knowledge ( $5.29 \pm 2.81$ ) regarding ACL. Also, One-way ANOVA test showed no significant relationship between the level of knowledge and occupation ( $P = 0.478$ ), (Table 2).

Most of the respondents (61%) reported that they have heard about A.C.L and are familiar with the disease. Majority of the respondents (65.6%) knew that sandflies are the vectors of A.C.L. When asked about the time of peak incidence of ACL, 24.1 % reported summer time and 49.2 % reported winter as the peak incidence time for A.C.L. Majority of the participants had no knowledge about the agent (87%) and the reservoir (67%) of A.C.L. About 49.223% of the respondents chose daytime as the time of sand fly bites. More than half of the respondents (51.3%) believed that the use of door/window screens and sleeping under nets are preventive measures for A.C.L. Less than half of the respondents (41.5%) believed that the use of chemical drugs is the best method of treatment of A.C.L. The number and percentage of participant's answer to questions regarding knowledge towards A.C.L in the three study areas are described in Table 3.

### 3.4 | Attitudes towards A.C.L among the residents

In total, 66.7% of the respondents had good attitudes towards A.C.L. The mean attitude score (Mean  $\pm$ SD) of the residents was  $15.58 \pm 4.69$  (Score: Minimum 0, Maximum 21). Attitude scores of the male and female residents were  $15.89 \pm 4.91$  and  $15.37 \pm 4.53$ , respectively. There was no significant relationship between the attitudes of females and males ( $P = 0.446$ ) towards the disease. The number and percentage of the respondents' answer to questions on attitude towards A.C.L. have been represented in Table 4. Also, the heat map of the questions on respondents attitudes towards ACL (A to F, Table 4) in the three study areas have been shown in figure 2.

### 3.5 | Practices related to A.C.L

Based on our results, only 32% of the respondents had good practices towards A.C.L. The mean practice score (Mean  $\pm$ SD) was  $2.83 \pm 1.31$  (Score: Minimum 0, Maximum 5). The scores of practices of males and females were  $2.89 \pm 1.26$  and  $2.79 \pm 1.35$ , respectively. There was no significant relationship between the practices of females and males ( $P = 0.603$ ). The number and percentage of participant's answers to questions of practices in three study areas are described in Table 5.

### 3.6 | KAP scores of the three study areas

The Mean  $\pm$  Standard deviation of knowledge, attitudes and practices towards ACL in the three study areas have been described in Table 6. There was no significant difference in the Mean  $\pm$  Standard deviation scores of attitude towards ACL among the residents in the three study areas ( $P = 0.365$ ), but there were significant differences in the Mean  $\pm$  Standard deviation scores of knowledge ( $P = 0.000$ ) and practices ( $P = 0.006$ ) among the residents in the three study areas.

### 3.7 | Effect of knowledge and attitude scores on practice

Simple linear regression revealed a significant relationship between knowledge and practices ( $P = 0.000$ ) towards ACL. In general, for each unit increase in knowledge score, the average correct practices of the residents increased by 0.23 points. There was no significant relationship between attitudes and practices ( $P = 0.166$ ) towards ACL among the residents (Table 7).

### 3.8 | Pearson correlation among KAP

Pearson correlation revealed a significant positive correlation between knowledge and attitude ( $P = 0.000$ ,  $R = +0.270$ ), between knowledge and practice ( $P = 0.000$ ,  $R = +0.446$ ), and between practice and attitude ( $P = 0.004$ ,  $R = +0.207$ ).

### 3.9 | Risks Factors of A.C.L

The risk factors of ACL identified in the endemic areas of Kerman city included environmental, behavioral, and socioeconomic factors (Figure 3).

#### 3.9.1 | Environmental Risk Factors

The environmental risk factors identified in the study areas included construction waste, presence of old dilapidated buildings and the deposition of garbage in landfill and near abandoned or uncompleted buildings (Figure 4).

### 3.9.2 | Behavioral Risk factors

The behavioral risk factors identified in the study areas included poor sanitary conditions, refugees from Afghanistan living in the suburb, and immigration from nearby cities of Kerman city such as Bam and Jiroft. Also, some of the residents slept outdoors, which increases the risks of sand fly bites.

### 3.9.3 | Socioeconomic risk factors

In these areas, there were many houses made with mud. Mud houses attract provide shelter for sand flies (Figure 4, C). Keeping domestic animals such as stray dogs in close physical proximity to humans, education level, and poverty are other important socioeconomic risk factors of A.C.L in these endemic areas.

## 4 | Discussion

A.C.L is a major public health problem in Iran. Kerman province is one of the most susceptible areas to leishmania infections in Iran, and Kerman city is one of the endemic foci of ACL in this province. In recent years, A.C.L has emerged as a challenging infection in Allah Abad, Shahrak Sanati, and Sar Asiab in the suburb of Kerman city.

Identifying the socio-demographical and environmental risk factors of leishmaniasis is important for designing control programs. In general, assessment of the baseline knowledge and practices of residents in endemic areas is one of the initial steps towards the prevention and control of leishmaniasis (Nandha et al., 2014). Furthermore, understanding the believes and practices of the people living in leishmaniasis-endemic areas is an essential step towards a successful leishmaniasis control program (Sarkari et al., 2014).

Although many previous studies have focused on the knowledge, attitude and practices of people in various communities, little attention has been paid to the risk factors of A.C.L in these areas, particularly Kerman city. In the present study, we assessed and compared the levels of knowledge, attitudes, and practices towards A.C.L among residents in three endemic areas in the suburb of Kerman city. Also, we investigated the main risk factors associated with the incidence of A.C.L in these three endemic areas.

In the present study, 25%, 66.7%, and 32% of the respondents had good knowledge, attitudes and practices towards A.C.L, most of them (61%) reported that they have heard about A.C.L and are familiar with the disease.

Most of the previous Leishmaniasis KAP studies in Iran have focused on CL. A previous study conducted by Sarkari *et al.* (2014) in Fars province in Iran reported that only 83% of the studied population had heard about CL (locally called Salak ) (Sarkari et al., 2014). In the present study, 61% of the respondents reported that they have heard about A.C.L. In a study conducted by Hejazi *et al.* (2010) in Isfahan province in Iran, the overall KAP score of 28.9% of mothers of children affected by Cutaneous Leishmaniasis was weak (Hejazi et al., 2010). However, in the present study, 25%, 66.7%, and 32% of the residents had good Knowledge, Attitudes, and Practices towards ACL, respectively. The results of Vahabi *et al.*'s (2013) study show that only 47.9% of the studied population had good knowledge about Cutaneous Leishmaniasis (Vahabi et al., 2013b), whereas in this study, 25% of the total population had good knowledge regarding A.C.L.

The results of the study by Amin *et al.* (2012) in a CL endemic region in Saudi Arabia indicate that over 76% of the studied population recognized the infectious nature of the disease (Amin et al., 2012). Also, the results of their study show that the studied population had good awareness regarding the vector of the disease, which is not in concordance with our results. Akram *et al.* (2015) reported that the residents in Punjab in Pakistan had a poor knowledge regarding CL and its vector (Akram, Khan, Qadir, & Sabir, 2015b), which is agreement with the findings of our study. The results of Nandha *et al.*' (2014) study in India indicate that the residents had poor awareness regarding the vector, transmission, risk factors, and control measures of leishmaniasis (Nandha et al., 2014). In the present study, only 25% of the respondents

had good awareness towards A.C.L. In contrast to this finding, studies conducted by Singh et al. (2006) in epidemic areas in India (Singh, Reddy, Mishra, & Sundar, 2006) and Ahluwalia et al. (2003) in Bangladesh (Ahluwalia et al., 2003) revealed that most of the residents were aware of leishmaniasis.

The incidence of A.C.L is associated with some risk factors such as socioeconomic, cultural, demographic, religious, and environmental factors. Other risk factors such as migration of laborers from rural to urban areas and climate changes are important for the spread of A.C.L (Bamorovat et al., 2018).

The main environmental risk factors associated with A.C.L identified in the endemic areas included construction wastes, the presence of old and dilapidated buildings, and the deposition of garbage in landfills and near uncompleted and abandoned buildings. Some of the houses in the endemic areas were made from mud, which is a risk factor for A.C.L. A previous study in Kerman city indicated that poor interior housing condition was a risk factor for A.C.L (Bamorovat et al., 2018). Valero *et al.* (2020) demonstrated that houses built with nondurable wall materials, un-plastered walls, brick wall, and the presence of cracks or holes in the walls of houses increase the risks of acquiring this neglected disease (Valero & Uriarte, 2020).

Overall, the residents in the endemic areas had a weak knowledge towards A.C.L. It is recommended that educational programs be implemented in order to improve the residents' knowledge level in these endemic areas in Kerman city. Moreover, due to recent rise in the incidence rate of A.C.L in Kerman city and the presence of various risk factors in the endemic areas, we recommend that the disease be considered as a serious public health problem, and health strategies be implemented to control and prevent the expansion of the disease to new areas.

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## CONFLICT OF INTEREST

The authors declare that there are no conflicts of interest.

## DATA AVAILABILITY STATEMENT

The data that support the findings of this study are available from the corresponding author upon reasonable request.

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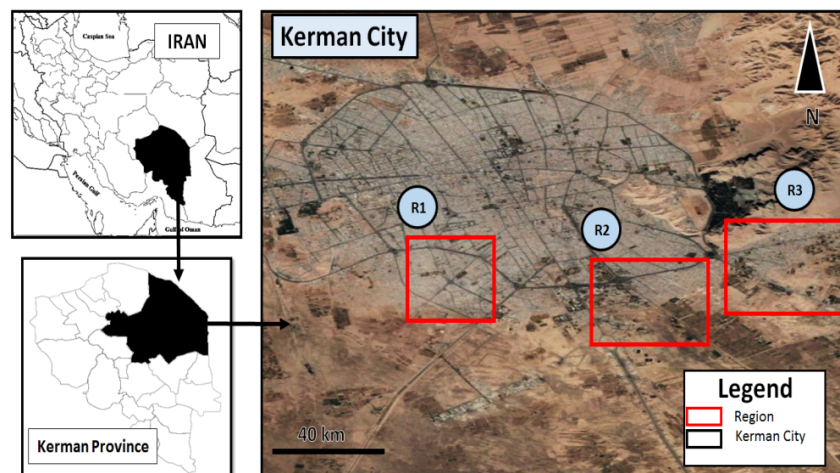
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## Tables And Figures:



**FIGURE 1** Location of the study areas in an Endemic Region in Kerman city, Southeast of Iran. (Allah Abad: **R1**, Shahrak Sanati: **R2**, and Sar Asiab: **R3**). Images provided through Google Earth Professional (<https://www.google.com/earth/versions/#download-pro>).



**TABLE 1** Socio-demographic characteristics of the study population in Kerman City, Southeast of Iran

Characteristics	N	Percentage (%)
<b>Gender</b>		
Male	81	41.5
Female	114	58.5
<b>Age groups (years)</b>		
< 20	12	6.66
21-30	47	24.12
31-40	64	32.82
41-50	48	25.12
over 50	22	11.28
<b>Education</b>		
Illiterate	39	20.0
Primary	86	44.1
Diploma	53	27.2
University	17	8.7
<b>Occupation</b>		
Self-employed	64	32.8
Housewife	118	60.5
Unemployed	6	3.1
Employed	7	3.6
Student	64	32.8
<b>Family size</b>		
1-3	60	30.8
3-6	107	54.9
6-9	20	10.3
over 9	8	4.1

**TABLE 2** Relationship between the knowledge of study population and socio-demographic characteristics regarding A.C.L in Kerman City, Southeast of Iran

Knowledge	Socio-demographic characteristics	Socio-demographic characteristics	Mean±SD	P-value
	<b>Gender</b>	Male	4.62±2.42	0.827
		Female	4.69±2.34	
	<b>Age</b>	< 20	4.17±2.17	0.268
		21-30	4.38±2.27	
		31-40	4.52±2.43	
		41-50	5.29±2.29	
		over 50	4.95±2.4	
	<b>Education</b>	Illiterate	4.13±2.4	0.478
		Primary	4.79±2.3	
		Diploma	4.77±2.5	
		University	4.88±2.1	
	<b>Occupation</b>	Self-employed	4.52±2.3	0.802
		Housewife	4.68±2.4	
		Unemployed	5.17±2.1	
		Student	4.66±2.37	
		Employed	5.29±2.8	

**TABLE 3** Knowledge towards A.C.L among the study population in Kerman City, Southeast of Iran

Variable	N	N	Percentage (%)
<b>Do you know A.C.L?</b>	<b>Do you know A.C.L?</b>	<b>Do you know A.C.L?</b>	<b>Do you know A.C.L?</b>
Yes	119	61	61
No	76	39	39
<b>Do you know A.C.L vector?</b>			
Stagnated water	12	6.2	6.2
Contact with infected human	2	1	1
Sandflies	128	65.6	65.6
I don't know	53	27.2	27.2
<b>What is the reservoir of A.C.L?</b>			
Rodents	32	16.4	16.4
Human	2	1	1
Other animals	27	13.8	13.8
I don't know	132	67.7	67.7
<b>What is the agent of A.C.L?</b>			
Bacteria	5	2.6	2.6
Parasites	11	5.6	5.6
Viruses	9	4.6	4.6
I don't know	170	87.2	87.2
<b>Time of sandflies biting?</b>			
Nighttime	63	32.3	32.3
Daytime	96	49.23	49.23
I don't know	36	18.47	18.47
<b>Peak A.C.L incidence time?</b>			
Summer	47	24.1	24.1
Winter	96	49.2	49.2
Spring	2	1	1
Autumn	4	2.1	2.1
I don't know	46	23.6	23.6
<b>A.C.L preventive measures?</b>			
Use of repellents on body	19	9.7	9.7
Use of door/window screens and nets	100	51.3	51.3
Both of repellents and screens and nets	35	17.9	17.9
I don't know	41	21	21
<b>Best method of treatment for A.C.L?</b>			
Chemicals drugs	81	41.5	41.5
Traditional drugs	16	8.2	8.2
Don't need	10	5.1	5.1
I don't know	88	45.1	45.1

**TABLE 4** Attitudes regarding A.C.L in the study population in Kerman City, Southeast of Iran

Variable	N	Percentage (%)	Percentage (%)
<b>How much are you probably getting the A.C.L?</b>			
Zero	43	43	22.1
Low	46	46	23.6

Variable	N	Percentage (%)	Percentage (%)
Medium	39	39	20.0
High	67	67	34.4
<b>Do you have concerns about A.C.L?</b>			
Zero	46	46	23.6
Low	28	28	14.4
Medium	19	19	9.7
High	102	102	52.3
<b>How much do you believe that A.C.L can be prevented?</b>			
Zero	36	36	18.5
Low	13	13	6.7
Medium	36	36	18.5
High	110	110	56.4
<b>How much impact does A.C.L have on your beauty?</b>			
Zero	19	19	9.73
Low	0	0	0
Medium	14	14	7.2
High	162	162	83.07
<b>Does education have impact on preventing A.C.L?</b>			
Zero	18	18	9.2
Low	7	7	3.6
Medium	30	30	15.4
High	140	140	71.8
<b>How much is the health authority's contribution in the control of A.C.L?</b>			
Zero	24	24	12.3
Low	9	9	4.6
Medium	37	37	19.0
High	125	125	64.1

**FIGURE 2** Heat map showing attitudes towards A.C.L in the study population in Kerman City, Southeast of Iran. Shahrak Sanati (total number of questioned persons = 60), Sar Asiab (total number of questioned persons = 70), and Allah Abad (total number of questioned persons = 65).

**TABLE 5** Practices towards A.C.L in the study population in Kerman City, Southeast of Iran.

Variable	N	Percentage (%)	Percentage (%)
<b>Do you use a bed net for sleeping?</b>			
Yes	123	123	63.1
No	72	72	36.9

Variable	N	Percentage (%)	Percentage (%)
<b>Do your doors and windows have screens?</b>			
Yes	66	66	33.8
No	129	129	66.2
<b>Do you use repellent?</b>			
Yes	15	15	7.7
No	180	180	92.3
<b>Are you interested in participating in A.C.L control program?</b>			
Yes	133	133	68.2
No	62	62	31.8
<b>Are you dressing your wound when having A.C.L?</b>			
Yes	83	83	42.5
No	112	112	57.5

**TABLE 6** Mean  $\pm$  standard deviation of KAP scores among the study population in Kerman City, Southeast of Iran.

Study areas	Knowledge	Attitudes	Practice
Shahrak Sanati	3.82 $\pm$ 2.311	15.39 $\pm$ 4.113	2.62 $\pm$ 1.250
Allah Abad	4.09 $\pm$ 2.363	16.24 $\pm$ 5.341	2.60 $\pm$ 1.367
Sar Asiab	5.91 $\pm$ 1.871	15.14 $\pm$ 4.492	3.23 $\pm$ 1.230

**TABLE 7** Effects of knowledge and attitude scores on practice among the study population in Kerman City, Southeast of Iran.

Variable	Estimate	P-value
<b>Knowledge</b>	0.233	0.000
<b>Attitudes</b>	0.026	0.166

**FIGURE 3** Risk factors of ACL in the endemic regions of A.C.L in Kerman City, Southeast of Iran.



**FIGURE 4** Photos of some risk factors in in the endemic regions of A.C.L in Kerman City, Southeast of Iran. **A & B.**construction waste in construction sites, **C.** Old and dilapidated houses, **D.** Deposition of garbage near uncompleted and abandoned buildings. Photos were taken during field work in April 2019.