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Awareness and behavioral practice of cutaneous leishmaniasis among hail population, kingdom of Saudi Arabia

Abstract

Background: One of the important public health policy for the control of Cutaneous Leishmaniasis (CL) is to investigate awareness of the community towards the disease so as prevention and control strategies can be developed accordingly.

Aim of the study: This study aims to assess knowledge, attitudes, and practices (KAP) of among Hail population towards cutaneous leishmaniasis (CL).

Material and methods: The current study was conducted in Hail city, which is located in north of Saudi Arabia. A total of 1200 participants, from urban and rural districts, agreed to participate in the current study. Data were collected through individual interviews to fill a structured questionnaire.

Results: Mean age of participants was 34 years and the main age group was 25-35 years. Males constituted (67.8%) of subjects and majority of the participants were either illiterate or had low level of education. Although most of the participants in the current study (69.4%) reported they were aware about CL, their depth of knowledge was poor as only few participants (6.4%) had sufficient information about the causative agent of CL and (9.1%) of them knew that treatment of CL is available. 26.8% only of the respondents gave the right answer that treatment of CL is medically, and only 33.7% knew the Cl is a self limited diseases, while (65.1%) of the respondents thought wrongly that CL is treated by herbal preparation. About half of the respondents (50.1%) believe wrongly that CL is a deadly disease and 90.9 % of them thought wrongly that CL has no available treatment. As expected, the main source of information in the current work was the internet and social media (76.3%). Unfortunately, (32.3 %) of the respondent mentioned wrongly that mosquito bite was a possible cause of CL while only (5.4%) of the participants knew the correct vector transmitting CL which is the sand fly. 34.4% of contributors only knew that CL affects mainly face and extremities and 54.3% recognized that the disease affects mainly children. Majority of the respondents (73.0%) of the participants knew that CL cause blister or ulcer.

Conclusion: In conclusion, the current study proved that Hail population has low level of knowledge as well as they are lacking the necessary preventive behavior to CL infection. Furthermore, the physicians should be at the first line to educate people about the disease. Moreover, the current study could put baseline information regarding knowledge and behavioral practice related to CL disease.

Keywords: Cutaneous Leishmania, hail, knowledge, behavioral practice

Volume 7 Issue 2 - 2019

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Received: March 12, 2019 | **Published:** March 29, 2019

Introduction

Cutaneous Leishmaniasis (CL) is part of a larger number of Leishmaniasis disease caused by an obligatory intracellular protozoa of the genus Leishmania.[1] In the Middle East, old World cutaneous leishmaniasis is caused mainly by Leishmania tropica, and Leishmania major.[2] Currently CL is endemic in 87 countries worldwide (WHO EMRO 2014). More than 1.5 million cases of Leishmaniasis occur annually, of which 0.7–1.2 million are CL.[1] Since CL was First described in Saudi Arabia (1976) by Morsy and Shoura and until (1996) Saudi Arabia was among the top 10 endemic countries globally.[3] Currently Saudi Arabia is considered the fourth most endemic area in western Asia.[4] The total number of reported incidence of CL in Saudi Arabia from 2006-2015 was 24,970 of which 2100 were recorded from Hail, which was the most consistent endemic region throughout the study with high incidence (>10 cases/100,000 population). As per the incidence data by regions for the year 2015, Hail is the highest endemic focus (282 newly detected cases).[5]

Phlebotomus papatasi (L. major vector) is the major and most predominant leishmaniasis vector species in many regions including Hail.[6] The main animal reservoirs of CL caught in Northern and Western Saudi Arabia are desert rodents including: Meriones libycus, Psammomys obesus, Rattus rattus, jaculus, and Hystrix indica, the first species was the most abundant (90%), and the isoenzyme electrophoresis identification of the Leishmania isolates from both human patients and rodents showed an identical species (zymodeme LON-4).[7] Abundance of incidence in the northern region including hail could be explained by the presence of perfect living conditions for Leishmania parasite where transmission is running in some plains at the periphery of cities among populations of rodents (Psammomys obesus) by the efficient sand fly vector (P. papatasi). Through the interruption of this habitat by construction sites and emerging closer neighborhoods or villages, the transmission through sand fly bites increases among human inhabitants of these regions.[5]

Symptoms and Signs of CL include: Cutaneous swellings which

appear 1 week to several months after sand fly bites and can be single or multiple. Characteristics of lesions and courses of disease vary depending on the Leishmania species and host immune response. Lesions begin as small papules and develop into nonulcerated dry plaques or possibly large encrusted ulcers with well-demarcated raised and indurated margins. Satellite lesions may be present. The lesions are painless unless secondarily infected. Local lymph nodes may be enlarged. Systemic symptoms are uncommon, but fever, constitutional symptoms, and regional lymphadenopathy may be seen.[2] Although CL is a self limited disease, the most common medical treatment modality used is sodium stibogluconate. Other alternative medications include either ketoconazole or itraconazole.[8]

While cutaneous leishmaniasis is an endemic in Saudi Arabia and especially in Hail, the amount of research in this field seems to be insufficient. Knowledge of CL as a self-healing condition and the fact that scarring may occur even with treatment, combined with low income of patients, as most of them are poor people, would lead to non-reporting to health facilities, and sometimes searching for traditional therapies.[5] This highlights the importance of community awareness regarding this disease. Various studies have shown that improving community knowledge, attitudes and practices (KAP) can play an effective role in preventing and controlling infectious diseases such as CL.[5] Numerous studies to assess the level of CL KAP have been done in different regions of the world. To the best of our knowledge, little studies have been reported in the Saudi Arabia. Therefore, we conducted this survey to assess the level of awareness of CL among people living in Hail region, Saudi Arabia. The ultimate goal was to provide local evidence to inform policy makers in developing strategies to reduce the incidence of CL in this region. This study provides baseline data for future investigations regarding CL prevention and control. The study findings also provide baseline data that could be used for evaluating the effectiveness of strategies following implementation of CL control programs.

Objectives

This study aimed to assess the public awareness regarding CL among Hail population, Saudi Arabia.

Material and methods

Setting

The current study was conducted in Hail city, which is located in north of Saudi Arabia and found at distance of 690 km from Riyadh, the capital city of Saudi Arabia during the year 2018-2019.

Sampling

A total of 1200 participants agreed to participate in the current study. Samples were randomly chosen from urban and rural districts of Hail area, Saudi Arabia.

Data collection

Data were collected through individual interviews to fill A structured questionnaire including information regarding:

a) Socio-demographic data included age, gender, current residence, educational, marital status and occupational status.

b) 2-General knowledge towards CL including the infectious nature of CL, etiology, mode of transmission, vulnerable groups, disease identification, symptomatology, possible risk factors for infection, treatment, and the protective measures for disease prevention.

c) 3-Behavioral practice of the participants regarding the preventive measures that should be considered as recommended by Centers for Disease Control and Prevention and others.[9] The question formats included mixture of yes/no (closed ended) and open ended questions. At the end of the interview participants were inquired about their sources of information.

Pilot testing

Initial questionnaire was compiled in English, which was translated into Arabic and then tested on a small sample of Saudi persons. From the results of the pilot testing CL is known among Saudi individuals as Domol, Neshmania, Okhet (sister), Nafra (the rash), Domal (boil) and El-Mohtafura (the digger)" so, the previous term was used all through the interview.

Data analysis

All data collected were analyzed and expressed as percentage distribution.

Ethical considerations

Full orientation of the approached participants about the study purposes was carried out with the emphasis on their right of not to participate. An individual verbal consent to participate and fill the questionnaire was taken from each participant and data confidentiality was maintained all through the study.

Results

The results encountered in the present study are presented in the form of the following tables and graphs (Table 1–15).

Table 1 Percentage distribution of age as one of the socio-demographic profile among Hail population, Saudi Arabia (2018-2019)

Age in years	Age distribution	
	No	%
15-< 25	220	18.3
25-< 35	469	39.1
35-< 45	271	22.6
45-< 55	116	9.7
> 55	124	10.3
Total	1200	100%

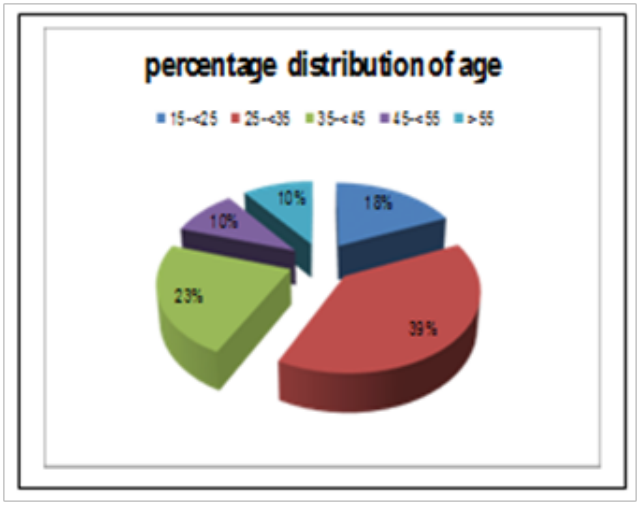


Table 2 Sex distribution as one of the socio-demographic profile among Hail population, Saudi Arabia (2018-2019)

Gender	Sex distribution	
	No	%
Males	813	67.8
Females	387	32.2
Total	1200	100%

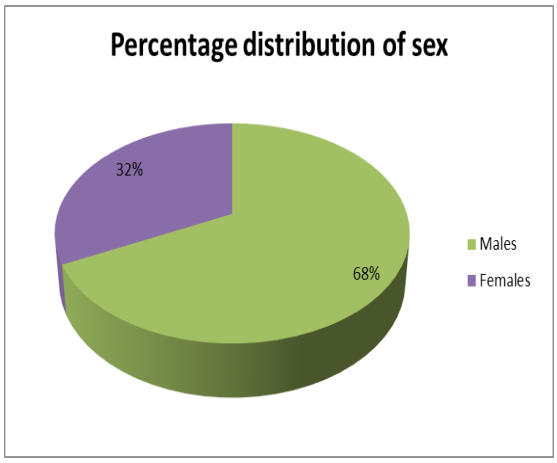


Table 3 Percentage distribution of educational level as one of the socio-demographic profile among Hail population, Saudi Arabia (2018-2019)

Education level	Educational distribution	
	No	%
Illiterate	204	17
Primary school	161	13.4
Preparatory school	190	15.9
Secondary school	275	22.9
High education	370	30.8
Total	1200	100%

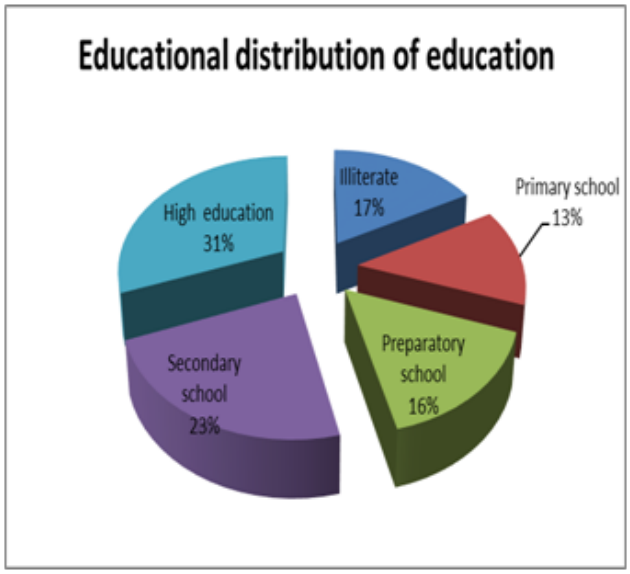


Table 4 Percentage distribution of occupation as one of the socio-demographic profile among Hail population, Saudi Arabia (2018-2019)

Occupation	Occupational status	
	No	%
Students	381	31.8
Working	599	49.9
Not working	220	18.3
Total	1200	100%

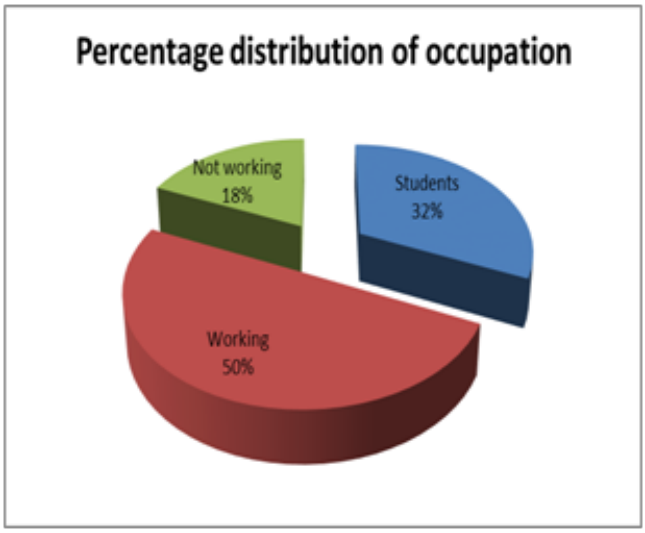
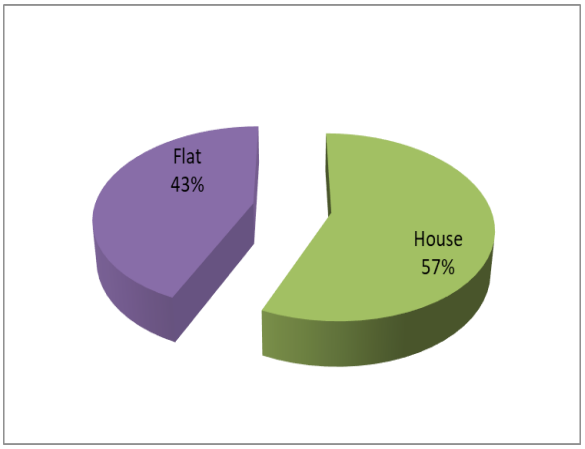


Table 5 Percentage distribution of residency as one of the socio-demographic profile among Hail population, Saudi Arabia (2018-2019)

Residency	Residency distribution	
	No	%
House	680	56.7
Flat	520	43.3
Total	1200	100%

Percentage distribution of residency



Citation: Moussa S, Alshammari TH, Alhudaires KM, et al. Awareness and behavioral practice of cutaneous leishmaniasis among hail population, kingdom of Saudi Arabia. *J Microbiol Exp.* 2019;7(2):88–99. DOI: 10.15406/jmen.2019.07.00248

Table 6 Percentage distribution of marital status as one of the socio-demographic profile among Hail population, Saudi Arabia (2018-2019)

Marital status	Marital status distribution	
	No	%
Married	585	48.8
Non married	615	51.2
Total	1200	100%

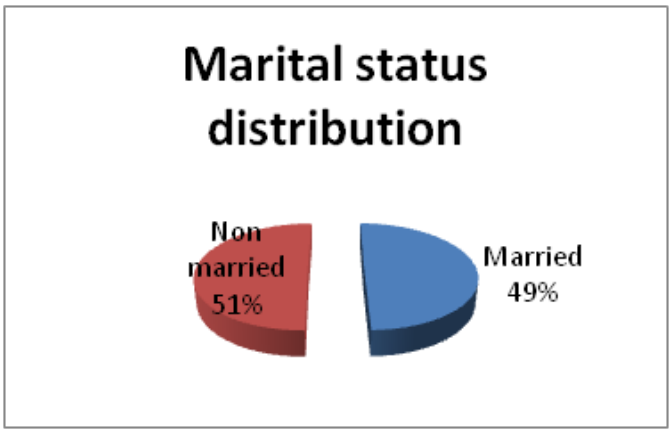


Table 7 Percentage distribution of residency according to rural or urban nature as one of the socio-demographic profile among Hail population, Saudi Arabia (2018-2019)

Residency	Residency distribution	
	No	%
Rural	387	32.3
Urban	813	67.7
Total	1200	100%

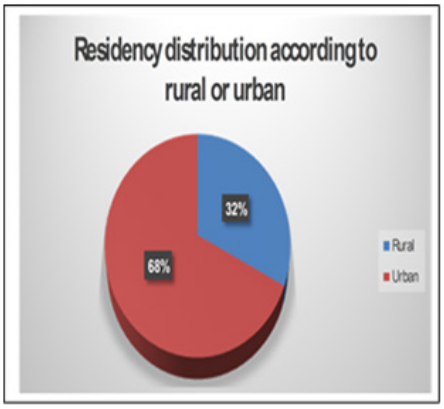


Table 8 General knowledge about cutaneous leishmaniasis among Hail population, Saudi Arabia (2018-2019)

Knowledge about	Participants having knowledge		Participants lacking knowledge		Total
	No.	%	No.	%	
Definition of cutaneous leishmaniasis (hearing or reading about it)	833	69.4	367	30.6	1200(100%)
Cutaneous leishmaniasis is a deadly disease (False)	601	50.1	599	49.9	
Cutaneous leishmaniasis is a communicable disease (True)	387	32.3	813	67.7	
The correct causative agent ; being a protozoa (true)	77	6.4	1123	93.6	
Treatment availability (true)	109	9.1	1091	90.9	
Cutaneous leishmaniasis is self-limited (true)	404	33.7	796	66.3	
Cutaneous leishmaniasis is treated by injections of ulcers and local creams (true)	322	226.8	878	73.2	
Cutaneous leishmaniasis is treated by traditional and herbal preparations (false)	781	65.1	419	34.9	

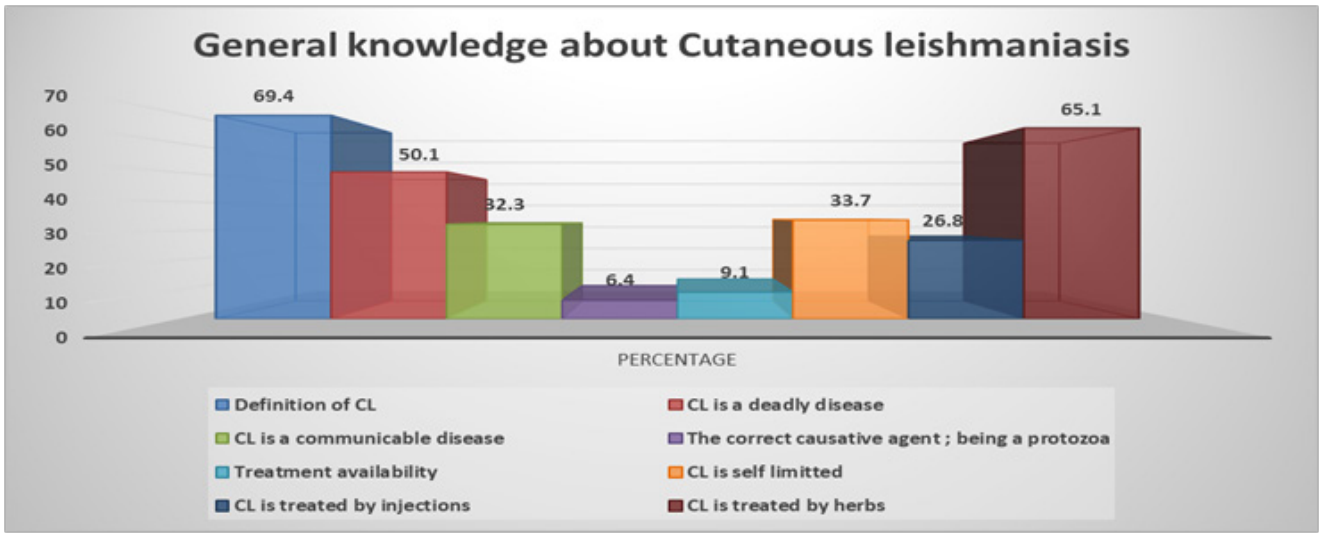


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Table 9 Source of information about cutaneous leishmaniasis among Hail population, Saudi Arabia (2016-2017)

Source of knowledge	Participants having knowledge		Total
	No.	%	
Television	234	19.5	1200
Newspaper	82	6.8	
University or school	241	20.1	
Internet	915	76.3	
Health worker	97	8.1	
Friends and relatives	680	65.7	
Books	21	1.8	

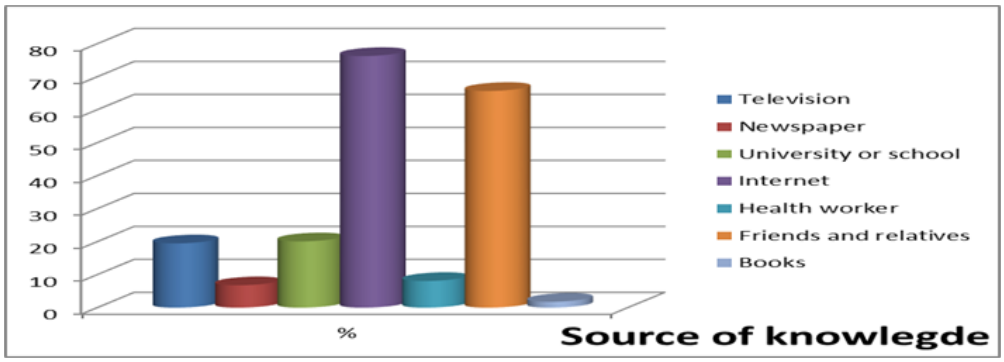


Table 10 Awareness (knowledge) about the mode of transmission of cutaneous leishmaniasis among Hail population, Saudi Arabia (2018-2019)

Knowledge about	Participants gave the answer Yes		Participants gave the answer No		Total
	No.	%	No.	%	
Bite by a tinny flying insect (Sand fly)	114	5.4	1,086	94.6	1200(100%)
Bite by Mosquito bite(false)	387	32.3	813	67.7	
Bite by House fly(false)	223	18.6	977	81.4	
Sneezing or coughing from infected person(false)	89	7.4	1,111	92.6	
Consumption of raw or inadequately cooked meat (Salami, Pastrami, luncheon, sausages, burgers, minced meats) (false)	211	17.6	989	82.4	
Consumption of unwashed vegetables and fruits (false)	98	8.2	1,102	91.8	
Blood Transfusion(false)	188	15.7	1,012	84.3	
Physical contact (True)	112	9.3	1,088	90.7	
Don't know	225	18.8	975	81.2	

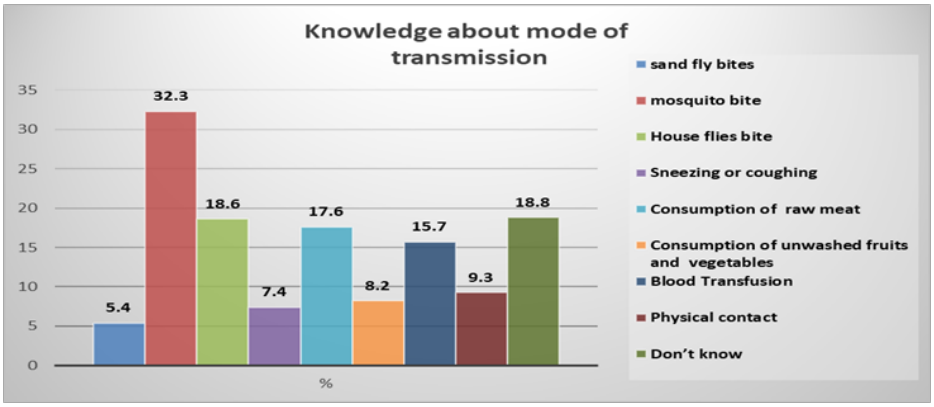


Table 11 Awareness (knowledge) about the characters and breeding places of the causative vector among Hail population, Saudi Arabia (2018-2019)

Knowledge about	Participants gave the answer Yes		Participants gave the answer No		Total
	No.	%	No.	%	
Dirty places and wastes (true)	402	33.5	798	66.5	1200(100%)
Water ponds(false)	254	21.2	946	78.8	
Garbage collection (false)	334	27.8	866	72.2	
Caves, animal burrows, cracked walls, tree-holes (true)	97	8.1	1103	91.9	
Don't know breeding places	90	7.5	1110	92.5	
The activity time of the insect is usually diurnal (false).	331	27.6	869	72.4	
The activity time of the insect is usually nocturnal (true) Don't know activity time	675	26.3	525	73.7	

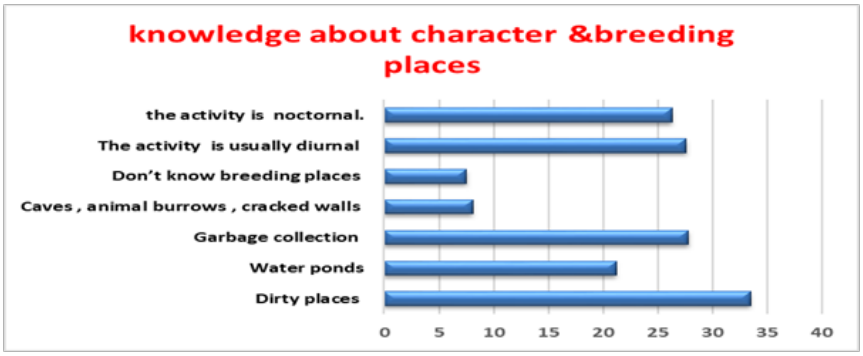


Table 12 Awareness (knowledge) about the clinical manifestations of cutaneous leishmaniasis among Hail population, Saudi Arabia (2018-2019)

Knowledge	Participants gave the answer Yes		Participants gave the answer No		Total
	No.	%	No.	%	
Children are most commonly affected (true)	651	54.3	549	45.7	1200(100%)
Adults are most commonly affected(False)	432	36	768	64	
Face and extremities (exposed areas) are most commonly affected(true)	761	43.4	439	56.6	
Chest and abdomen are most commonly affected (false)	231	19.3	969	80.7	
Blister / Papule /ulcer(true)	876	73	324	27	
fever(false)	213	17.8	987	82.2	
Jaundice(false)	129	10.8	1071	89.2	
Diarrhea(false)	349	29.1	851	70.9	
Constipation(false)	431	35.9	769	64.1	

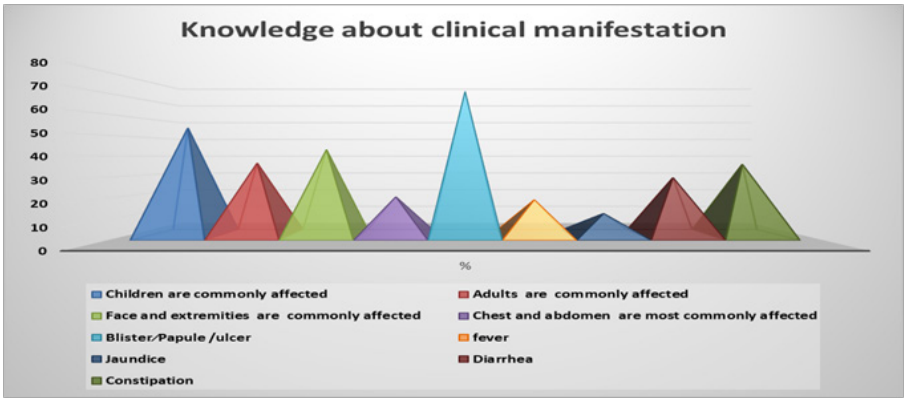


Table 13 Behavioral own practice (risk behaviors) towards the preventive measures against cutaneous leishmaniasis among Hail population, Saudi Arabia (2018-2019)

practice towards preventive measures	participants with +ve practice		participants with -ve practice		Total
	No	%	No	%	
Cutaneous leishmaniasis is a preventable disease(True)	231	19.3	969	80.7	1200 (100%)
personal precautions measures (trousers, full-sleeve shirts at the activity time of mosquito, which usually between sunset and dawn).	431	35.9	769	64.1	
Sleeping under bed-nets	211	17.6	989	82.4	
It is annoying to use bed nets	543	45.3	657	54.7	
The presence of the vector bother me	324	27	876	73	
spray Insecticide inside home	145	12.1	1055	87.9	
Fill cracks and animal burrows inside home	278	23.2	922	76.8	
Narrow nets on windows and doors	405	33.8	795	66.2	
I don't contact with infected person	209	17.4	991	82.6	
Always closed doors	176	14.7	1024	85.3	
Using skin repellant	104	8.7	1096	91.3	
Washing vegetable	345	28.8	855	71.2	
Well cooking of meat	569	47.4	631	52.6	
Wearing masks	476	39.7	724	60.3	
Spending nights in the open increase the risk for disease	109	9.1	1091	91	
Camping in the desert/farm (in the open) increase the risk for disease	218	18.2	982	81.8	

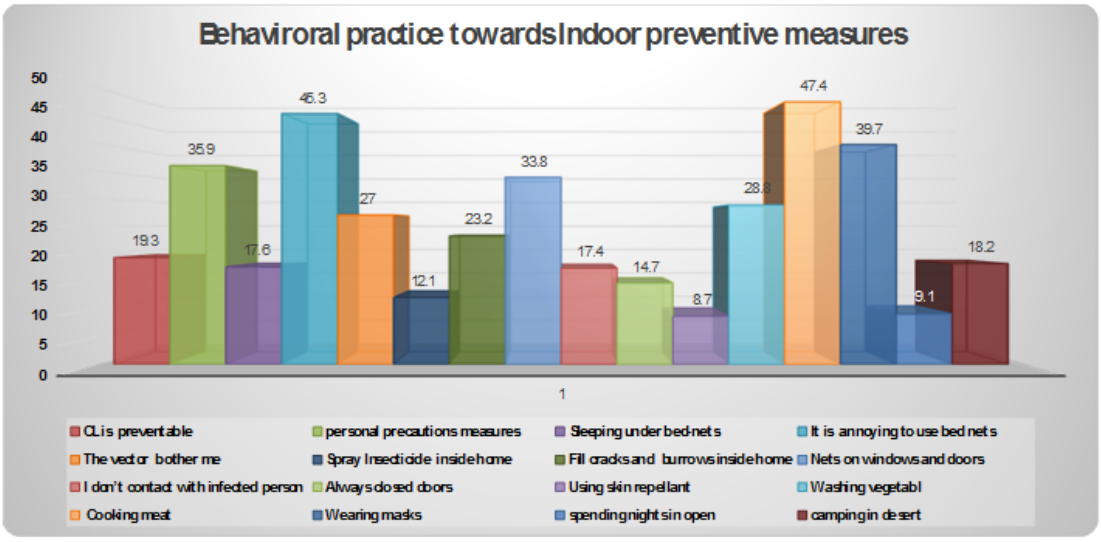


Table 14 Behavioral own practice (risk behaviors) towards the outdoor preventive measures against cutaneous leishmaniasis among people living in houses Hail population, Saudi Arabia (2018-2019)

Practice towards preventive measures	participants with +ve practice		participants with -ve practice		Total
	No	%	No	%	
residual spraying outside home	98	14.4	582	85.6	680 (100%)
Monitor and Fill cracks and animal burrows outside home	86	12.6	594	87.4	
Living close to dogs, cats, rodents and poultry	320	47.1	880	52.9	
Presence of wastes around the house	378	55.6	822	44.4	
Don't take any measures	578	85	102	15	

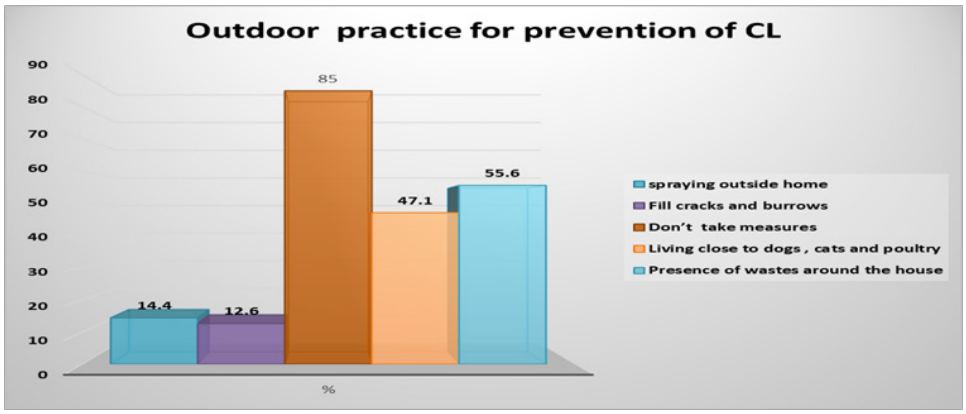
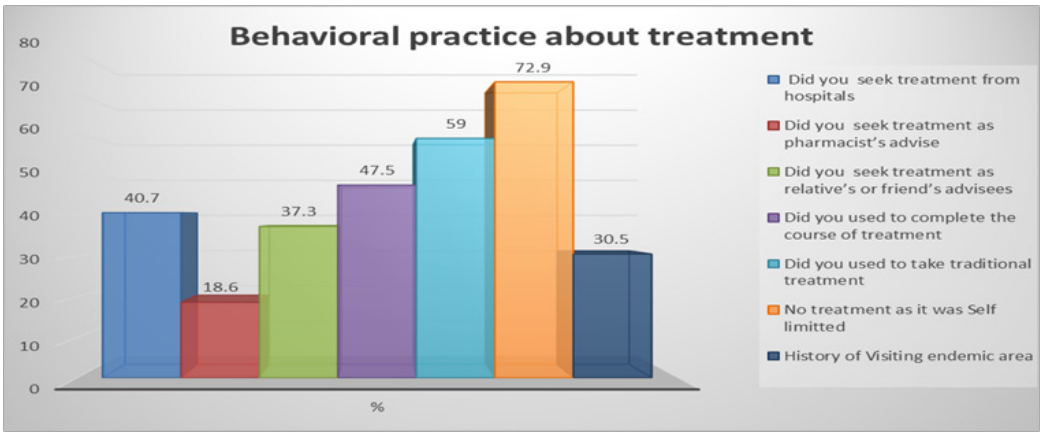


Table 15 Behavioral practice about the treatment when getting cutaneous leishmaniasis in Hail Region, Saudi Arabia (2016-2017)

Behavioral practice	Participants having +ve practice	
	No	%
Did you seek treatment from hospitals	24	40.7
Did you seek treatment as pharmacist's advise	11	18.6
Did you seek treatment as relative's or friend's advisees	22	37.3
Did you used to complete the course of treatment	28	47.5
Did you used to take traditional treatment	35	59
I didn't use treatment and the disease was self limited	43	72.9
Did you visit areas endemic in cutaneous leishmaniasis before	18	30.5
Total participants getting CL in the past	59	100%



Discussion

To the best of our knowledge, this is the first cross-sectional study about the knowledge and the behavioral practices regarding CL in Hail region, Saudi Arabia. This date could be considered as a baseline data to evaluate and to conduct control measures for CL in the Hail region and or similar areas. In addition, the current study is one of the largest in terms of the studied population size (total 1200 participants) it included presentative samples from all over Hail province . Other study from Colombia agreed by only 249 respondents.[10] In addition a study from Iran concentrated mainly on mothers of affected children in included only 166 participants.[11]

Although most of the participants in the current study (69.4%) reported that they were aware about CL, their depth of knowledge was poor as only few participants (6.4%) had sufficient information about the causative agent of CL and (9.1%) of them knew that treatment of CL is available. On the contrarily to the present study, the general awareness regarding CL in Al-Ahsaa province in Saudi Arabia was satisfactory in the sense that 76% of the respondents at least knew the infectious nature of the disease.[12] Deficient knowledge about CL in the current work could be explained that majority of the participants were either illiterate or had low level of education. It can be noted, therefore, that use of health educational written material in Hail region has no much benefits on prevention of CL and the use of other methods like interview is more beneficial. Unfortunately, in the present work, 26.8% only of our respondents gave the right answer that treatment of CL is medically, and only 33.7% knew the Cl is a self limited disease and 65.1% of them thought wrongly that CL is treated by herbal preparation. Similarly, 90.2 % of Indian population believes in herbal treatment for CL.[13] This could be contributed to the deep

traditional thought and belief of both Hail population and Indians in the herbal treatment for most of the diseases. Moreover, in South Iran, a noticeable proportion of respondents (21%) believed in rational medicine for the treatment of CL.[14] Unluckily, our study showed that about half of the respondents (50.1%) believe wrongly that CL is a deadly disease. Similar study in Pakistan also reported that 42% of their participants believed that CL is a fatal disease.[15] Furthermore, approximately 90.9 % of the participants in the present study thought wrongly that CL has no available treatment. These findings go hands in hands with a previous study done in India.[13] Regarding knowledge about the infectivity of CL, low percentage (32.3 %) of participants in the current work knew that CL is a contagious disease. This is in contrast to a study done in south Iran where most of their cases knew that CL is an infectious disease.[14]

Generally, it was noticed in the present study that the knowledge about CL is deficient. Similarly, in a study done in Alexandria–Egypt, most of the respondents (90%) had not heard about leishmaniasis. On the contrarily, other studies in India, Nepal, and Bangladesh and Brazil showed much more better knowledge as almost all (98%) of respondents reported their awareness about Leishmaniasis.[16–20] This high awareness about CL in those regions, is probably because these are endemic areas; inhabitants of these areas had seen many cases of the disease, unlike our study as well as Alexandria study where leishmaniasis is not considered as much as common disease. As expected, the main source of information in the current work (Table 9), was the internet and social media (76.3%). The friends, relatives, health workers, university, schools, television and newspapers were less. Books as source of information were the least source (1.8%). These results are in consistent to the study conducted in many areas in the world.[16–19] These findings could be explained on the basis that there is a great effect internet and social media on public health. However, there is a well-known risks that the public get their information from the internet and social media, but there is a fact that it is the most common available and accessible source of information.

Concerning the knowledge about the mode of transmission, unfortunately the high percentage of the respondent (32.3%) mentioned wrongly that mosquito bite was a possible cause of CL while only (5.4%) of the participants knew the correct vector transmitting CL which is the sand fly. Unexpectedly, 18.6%, 17.6.1 %, 7.4 %, 8.2%, 9.3% of respondents believed wrongly that house fly bites. Consumption of raw or inadequately cooked meat, sneezing or coughing, consumption of unwashed vegetables and fruits, and physical contact can transmit CL respectively (Table 10). This unsatisfactory knowledge about the sand-fly vector transmitting CL in the current study is in keeping with similar studies conducted in Al-Ahsaa, Saudi Arabia where only 37.4% of participants could identify sand fly as the vector of CL. In another study by Hejazi et al.,[11] only 13.9% of respondents had enough information about sand fly vector. Findings of Alexander et al., in Brazil, revealed that 23.1% of the study population were aware about sand fly as the vector of CL.[21] On the contrarily to our study , in Isfahan , the knowledge was very high as 97.9% of their respondents were aware that sand flies carry the CL.[22]

Confusion of the vector transmission in the current work was similar to that of rural communities of Nepal that found that most of the villagers perceived that mosquitoes rather than sand flies were responsible for transmission of the disease.[16] Correction of this knowledge is important as inhabitants in this way may not perceive mosquitoes to be responsible for diseases such as malaria and they do not take enough measures to protect themselves against the vector.[17,21] In the current work, unluckily knowledge about clinical manifestation was not enough as 43.4% of contributors only knew that CL affects mainly face and extremities and 54.3% recognized that the disease affects mainly children. Fortunately 73.0% of the participants knew that CL cause blister or ulcer but surprisingly 17.8 %, 10.8%, 29.1%, 35.9% of respondents thought wrongly that CL can cause fever, jaundice, diarrhea and constipation respectively (Table 12).

Unluckily, majority of participants (85.0%) living in houses didn't know about the suitable preventive measures outdoor. However 14.4% of them used to spray insecticides outdoor and 12.6 % of them used to fill the cracks and animal burrows outside their homes. Unfortunately 47.1% said that they are living close to animals like dogs, cats, cattle and poultry. 55.6% had wastes around the house (Table 14). In a study conducted in Alexandria, Egypt, 51.7% of the respondents have animals such as dogs, cats and cattle inside or around the house, (30%) breed poultry and (61.7%) of the respondents said they have rodents either inside or around their houses. The vector of CL (phlebotomas papatasi) is proved to be anthropophilic and beside human blood, it feed also on animals, rodents and poultry. Many authors agreed to this, among them Svobodová et al.,[23] who found that P. papatasi feed on domestic animals and wild rodents and to lesser extent on poultry blood. Moreover, in 2005 Ershadi et al.,[24] in Iran proved the same fact Svobodova et al.[23] Like the present study, (66.7%) of the surveyed houses Iran study had a dump place or wastes around the house. Waste is considered a breeding place for sand fly Müller & Gomes,[25] several authors agreed that poor housing conditions and unsuitable waste management was suspected to provide ideal conditions for sand fly breeding.[26,27]

Leishmania Reservoir animals species for CL in Saudi Arabia five species of rodents caught in Northern and Western Saudi Arabia (zymodeme LON-4).[7] The cycle of Leishmania parasite will be completed as a circle of sand fly vector (P. papatasi) and rodents which provide the blood meals and their burrows provide shelters for them to breed. When humans come closer or inhabit these areas, they become accidently bitten by infected sand flies and develop CL. Those kinds of rodents are always depending on trees and plant for feeding and make their burrows underneath these shrubs. Amongst the participants of the present study, approximately 89.9% and 81.8% failed to recognize that sleeping outdoor or camping are possible risk factors involved in contacting CL. On the contrarily, In Al-Ahsaa study, better knowledge was detected as 40% of their participants didn't realize that kind of knowledge.[12]

With regard to prevention of CL, 35.9% of participants of the current work, stated that sufficient protective clothing is the best way for prevention whilst going to endemic areas, 17.6% stated that sleeping under protective nets is necessary, 12.1% & 14.4% mentioned spraying of insecticides indoor and outdoor are necessary for prevention of the diseases. Unfortunately 28.8%, 47.4 & 39.7% mentioned non-specific measures including washing vegetables, cooking meat and wearing masks are protective measures (Table 13). Similar to the present study, in Al-Ahsaa region, 33.1% of their respondents mentioned the importance of protective clothing, 13.4% recognized the usefulness of the protective nets and 11.8% realized the preventive role of spraying of insecticides. Likewise, about half of their respondents mentioned non-specific measures including food water hygiene, avoiding contact with soil and avoiding close contact with animals.[12]

Unfortunately, in the present study, 19.3% of our respondents believed that the disease could be prevented. On the other hand, in

Halab study in Syria, 62.2% knew that the diseases are preventable. This high knowledge of Syrian people is expected as the disease is endemic there specially in Halab.[28] In addition more than two-third (69%) of respondents in South Iran, believed that the disease is preventable although most of interviewees did not know about preventive measures.[14] As regards the indoor personal prophylactic measures practiced by participants in the present study, it was not sufficient as only 12.1% of people used to spray insecticides indoor and 17.6 % of them reported that they have insect nets in their houses and 8.7 % of them used to rub with skin repellant to avoid the insect bites. This is in consistent with Hejazi's study in Isfahan, who found that the unsatisfactory behaviors among their study population about preventive measures, such as using of mesh for windows and using bed net or replants.[11] In another study in Isfahan, Saberi et al. reported that 47.2% of students believed in fortune as a factor in acquisition of CL infection.[14,22]

Our results unfortunately are very far from WHO guidelines, which recommend that more than 80.0% of households within targeted communities should sprayed against sand fly. In the present study, 23.2% of the participants used to fill cracks indoor either the walls or the floors while only 12.6% used to do it outdoor. Cracks and crevices provide more microhabitats for sand flies to retreat to during daylight hours. The female sand fly lays its eggs in cracks in house walls.[7] Poché et al.,[29] studied the bionomics of phlebotomine sand fly from three villages in Bihar, India; he collected sand fly from cracks and crevices between mud bricks used in the construction of houses.

In the current work, 33.8% disclosed the use of door and window narrow nets; sand flies are only about 1/16 of an inch, they can easily fly through window screens unless they have very fine mesh which will prevent the entry of sand fly. Impregnated window and bed nets, although they are rarely used in Saudi Arabia, provide better protection against sand fly.[3] In Maroli M et al.,[30] in Italy found out that indoor use of wide-mesh cotton curtains around windows impregnated with permethrin 1 g/m2 almost completely eliminate the occurrence of endophilic sand fly species. As for the outside housing conditions, 680 (56.7 %) of the surveyed participants in the present study have houses with gardens most of them having sandy nature with plants and trees. It was establish in many previous studies that vegetations act as attractive shelters for sand fly populations which is proven by many investigators to be important for resting habitat of the insects.[31,32] So the presence of gardens in which trees and plants are cultivated makes the area of the study a possible micro-habitat for sand fly.

In the present work, 59 (4.9% of total participants) respondents disclosed that they were infected by CL before. 5 cases were children (3-12 years) and others were (12-48 years) of age. Majority of them 43 (72.9%) were males and 33 cases (55.9%) used to spend nights or camp outside homes in Al-Barr regions. 37 cases (62.7%) were living in houses and said that they have animals in their gardens, 34 persons (57.6%) of them had burrows and cracks in the walls of their gardens outdoors. Majority of case 51 (86.4%) were represented by singly dry sores on exposed areas (face, hands & legs) unfortunately 12 case (20.3%) didn't practice covering of their lesion during the active phase (ulceration).

The present study follows other studies in that male gender, spending nights outside and frequent camping were proven risk factors for CL where identical observation has been displayed in an earlier report.[33] This is expected as and could be explained by the Islamic catechistic where the ladies cover their whole body by wearing Hijab. However, males are more exposed to the risk of sand fly bites because of their behavior like camping and spending night(s) at the periphery of towns, where the flies are abundant. In contrast to our finding, patients aged 20-30 years have been described as a high-risk group, in one study[34] while older patients (40-60 years) were the most vulnerable group in another.[35] Regarding gender distribution, a definite male preponderance was defined in our study. The same path has been widely perceived in other Saudi[36,37] and non-Saudi endemic loci. Farahmand et al.[38] Inconsistent with our finding, an equal distribution of CL cases between males and females has been also reported in one study[8] and the female gender predominance has been reported in another.[39] Perhaps, the above clear differences among studies are related to the cultural difference, behavioral patterns and occupational activities of the studied population.

Concerning the age distribution, it was proved that teenagers and adults (15–44 years) were the most commonly affected age category. In addition, the demographic features of CL patients as per regional assessments did not differ from the overall cumulative data (studies from Al-Hassa, Taif, and Hail regions).[33,36,37] Our results indicate that studies on behavioral practices related to CL prevention and treatment is not sufficient in Hail region, Saudi Arabia. This may be possibly due to low incidence of the disease in the region compared with other more common diseases such as diabetes, cardiovascular and obesity among other diseases. Unfortunately, only 40.7% of participants sought treatment for CL from hospitals or health facilities, 18.6% from pharmacists and 37.3% from relatives and friends' advices. Out of the 35 cases, 29 cases (82.9 %) used skin burning 'Kaii', whilst 23 cases (65.7%) mentioned that covering the lesions with the use of antibiotics or herbal therapy. Most of the cases didn't mention the name, type and nature of the herb used during filling of the questionnaires and said that it was local and they denied any oral or systemic therapy. In contrast to our study, local traditional healers were preferred by 14.8%, in Al-Ahsaa area (awareness in AHSAA).[12]

Likewise, in Al-Ahsaa region, 50.5% of the participants stated that cases with skin lesions should consult a physician 11.2% sought pharmacists and others, including Sheikhs (religious leaders) by 12%, whilst 11.5% could not specify who should ideally treat the condition. In the present study, 43 cases (72.9%) mentioned that they didn't use any treatment and they left the lesion to heal spontaneously. In Al-Ahsaa study, 30% of their respondents mentioned that CL skin lesions are self limited which needs no treatment.[12] In the present study, 72.9% of the contributors realized that CL is a self limited disease. 40 cases gave a mean time to healing of 10.73 (SD 6.1) months and the median was 12 (5–11.65) months. 11 respondents recognized that the lesion healed in 1 year, and 8 respondents mentioned that the disease does not heal unless treated. This goes hand in hands with the study of the study of Abazid et al.,[28] in Alippo, Syria in 2012. Finally, we would like to clarify that many CL control programs are needed to improve insufficient knowledge and behavioral practice encountered in the current study.[40,41]

Conclusion

The current study proved that Hail population has low level of knowledge as well as they are lacking the necessary preventive behavior to CL infection and hence, they are vulnerable to the disease. However, most of the preventive behaviors that are applied could be explained by the cultural habits and low level of education in the region. Likewise, this study reflects the necessity to educate Hail people about the preventive measures which are essential to avoid the infection. These measures should stress on vector control. Furthermore, the physicians should be at the first line to educate

people in order to reduce the risk of CL infection and to close the gap between the knowledge and practice of the population. In addition, face to face education and use of instructional aides are recommended as the written material, may not be beneficial due to low level of education of participants.

Recommendations

I. Although this study, included 800 participants, this sample is not considered enough to represent the whole Hail community, so in the future, it should extend to cover more areas of Hail region specially the remote villages.

II. Constructing a new project to study the comparative relationship between socio-demographic data, knowledge and risk behaviors.

III. Constructing a further study to assess the effect of risk behaviors through biopsy analysis to detect CL as well as to get the prevalence of the disease in the region.

IV. An appropriate health education program should be adopted so as to educate people, especially in rural areas of KSA, in groups like in schools, hospitals and other work areas. Special education should stress on the role of sand-fly as a vector and the recognition / identification of sand-flies and highlight the role of animal reservoirs in the spread of CL as well.

Limitations of the study

To our knowledge, this is the first study that explores CL related knowledge and risk behaviors among Hail population, Saudi Arabia. Most of the study limitations are due to the shortage of the time of the study. Nevertheless, the results of the current study should be cautiously interpreted in the lights of the following limitations:

a) The study population might have been increased to be more accurately representative of all Hail region Saudi Arabia.

b) Comparative relationship between socio-demographic data, knowledge and risk behaviors might have been better to fulfilled.

c) The effect of risk and preventive behavior was not assessed through biopsy analysis to detect the causative organisms.

d) Our study did not include Non Saudi and focused only on the Saudi citizens who have actual increased exposure to Leishmania as they are exposed to risk factors like animal houses and their immunity is also different if they come from areas not endemic in CL.

Acknowledgments

None.

Conflicts of interest

Author declares that there is no conflict of interest.

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