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RESEARCH ARTICLE **OPEN ACCESS**

Factors Predicting the Perceived Threat of Cutaneous Leishmaniasis among Healthcare Workers in Bam County, Iran

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Abstract:

Background: Leishmaniasis is a widely spread but neglected tropical disease. Preventive measures play a crucial role in managing this disease due to the lengthy, costly, and potentially side-effect-ridden treatment process. This study aimed to investigate the determinants of factors predicting the perceived threat of cutaneous leishmaniasis among Healthcare Workers in Bam County.

Methods: This descriptive-analytical cross-sectional study was conducted on 211 healthcare workers in Bam County. All eligible staff were included in the study using a census method. Data collection involved a demographic characteristics questionnaire and researcher-made questionnaires related to knowledge, perceived susceptibility, and perceived severity (perceived threat). Data were analyzed using descriptive and analytical statistics, including t-test, Pearson's correlation, and linear regression *via* SPSS 22.

Results: The participants had a mean age of 36.5 ± 7.52 years. The variables of age ($\beta = 0.206$, $p < 0.001$), marital status ($\beta = 3.687$, $p < 0.001$), work experience ($\beta = 0.219$, $p < 0.001$), history of cutaneous leishmaniasis ($\beta = -3.855$, $p = 0.002$), participation in training courses ($\beta = -4.003$, $p < 0.001$), and knowledge ($\beta = 2.280$, $p < 0.001$) had a significant effect to predict perceived threat. Based on the multivariate regression test, knowledge ($\beta = 1.998$, $p < 0.001$) was a strong predictor of perceived threat. Thirty-six percent of the variance in predicting perceived threat was attributed to knowledge.

Discussion: The participants possessed moderate knowledge about cutaneous leishmaniasis and had a good level of perceived threat. A significant and direct relationship was observed between knowledge and participation in training courses with the level of perceived threat. When individuals perceive themselves to be at risk of a disease with irreversible consequences, they consider it a serious threat and are more likely to take preventive measures.

Conclusion: Knowledge was the strongest predictor of perceived threat. Targeted educational interventions are necessary to enhance knowledge, promote risk awareness, and encourage preventive behaviors in different communities.

Keywords: Knowledge, Health belief model, Leishmaniasis, Health personnel, Risk perception, Preventive behaviors, Educational interventions.

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1. INTRODUCTION

Leishmaniasis is an infectious disease that affects both humans and animals, posing a significant public health concern in certain regions, particularly in the Eastern Mediterranean region [1]. The disease is caused by flagellated protozoans of the genus Leishmania (Family: Trypanosomatidae) [2], and is transmitted to humans through the bites of female sandflies of the genera Phlebotomus and Lutzomyia in the Old World and New World, respectively [3]. Leishmaniasis presents in three clinical forms, including Cutaneous Leishmaniasis (CL), Mucocutaneous Leishmaniasis (MCL), and Visceral Leishmaniasis (VL).

Leishmaniasis is the ninth major disease burden in terms of morbidity and mortality among infectious diseases [4]. Leishmaniasis is endemic in 140 countries across Asia, America, Africa, and Europe; over one billion people are at risk of the disease [1, 3]. In 2018, over 253,000 new CL cases were reported to the World Health Organization. The region accounts for over 80% of the CL caseloads worldwide, only from the Eastern Mediterranean Region countries [5].

Iran is among the first six countries in the world to be challenged with the CL and is classified as a high-risk country for the disease [6]. In Iran, cutaneous leishmaniasis is divided into ACL and Zoonotic Cutaneous Leishmaniasis (ZCL) forms and is widely distributed across numerous Provinces in the central, western, southwestern, southern, southeastern, eastern, and northeastern regions [7-9]. The incidence of cutaneous leishmaniasis in Iran has been reported as 17.82 per 100,000 people [10]. According to a systematic review and meta-analysis (from 2000 to 2019), the prevalence of leishmaniasis was estimated at 45% in Iran [8]. Leishmaniosis has a considerable economic burden on society and the healthcare system [11]. According to a study by Salimi *et al*. in Iran, the economic burden of the disease was estimated at 291,046,430,125 Rials ($ 5,820,928) [10].

Bam County is the most important highly endemic focus of anthropometric CL in Iran and has been under consideration by WHO [6]. Aflatoonian *et al*. reported 40,164 cases of ACL that occurred in the past five decades, between 1971 and 2020, in Bam. The average annual cases were approximately 893 in a median population of 93,000 [12]. Before 2003, Bam city was the most infected focus of ACL in south east Iran; however in this year, due to the occurrence of a severe earthquake in the city, which led to the destruction of almost all human dwelling, the incidence of the disease is increasing, and in addition, the migration of residents to surrounding areas has caused the creation of new foci of the disease in these clear areas [13].

The incidence and spread of the disease are influenced by various risk factors, including individual characteristics, environmental conditions, and socioeconomic status [14]. Leishmaniasis profoundly impacts public health, socioeconomic status, and the country's development [15]. In addition to the high treatment costs and the long course of treatment, the disease often leaves undesirable scars on different parts of the body, causing psychological, social, and economic problems, especially among young individuals [16, 17]. Currently, there is no vaccine to prevent ACL, and treatment still relies on drugs that are expensive and have numerous side effects. Therefore, it is crucial to focus on preventive measures at both the individual and community levels to minimize the number of infections [18].

The most effective method to control vector-borne diseases is to control the vector population and reduce human-to-vector contact. This can be achieved through strategies such as Indoor Residual Spraying (IRS), environmental management, health education, and personal protection measures, such as using insecticide-treated or untreated bed nets and repellents. Additionally, it is essential to reduce reservoirs, including treating infected individuals as primary reservoirs and controlling dogs as secondary reservoirs [19].

The effectiveness of the control methods of each region depends on the ecology and biology of the vectors and reservoirs in each area. Additionally, insufficient knowledge about disease management and prevention methods among residents in affected areas has further hindered the success of preventive measures [20].

Preventive measures for leishmaniasis may be influenced by various factors, including individual factors such as age, gender, education level, occupation, as well as environmental, social, cognitive, and economic factors. Therefore, understanding the factors influencing health behaviors becomes essential.

A group of social psychologists in the U.S. introduced the Health Belief Model in the early 1950s as a way to explain why certain individuals do not engage in disease prevention and control programs. According to this model, individuals who believe that taking preventive measures will protect them from disease or improve their condition are more likely to prioritize their health and avoid risky behaviors [21]. Previous studies have demonstrated the effectiveness of the Health Belief Model in promoting behaviors to prevent infectious diseases such as cutaneous leishmaniasis [22, 23]. Today, the model has gained popularity in interventions and research due to its inherent concepts and adaptable beliefs [21].

Furthermore, in recent years, researchers have emphasized perceived threat as a crucial motivator for preventive measures. According to the Health Belief Model, perceived threat plays a pivotal role in driving individuals to adopt protective behaviors. A higher perceived threat is positively associated with individuals' intention to take preventive measures [24]. Studies on the prevalence of infectious diseases have revealed a direct correlation between perceived threat and adherence to health measures [24, 25].

Building upon these theoretical approaches and previous research, our study focuses on defining perceived threat in two dimensions: perceived susceptibility toward the disease (individuals' perception of their own risk) and

perceived severity (the assessment of how serious the risk is). We anticipate that individuals with a higher perceived threat will prioritize their health and adopt preventive behaviors to reduce the risk of contracting leishmaniasis.

Despite considerable efforts over several decades to control CL in endemic countries, it appears that the CL rate is still high. In this respect, the behavior of patients and the healthcare system are two basic pillars for disease control, which are of great importance [4].

Healthcare workers play a vital role in the management, prevention, and control strategies of leishmaniasis. If health workers have a high perceived threat of leishmaniasis, they are more likely to take action to increase public awareness about the disease, detect cases early, provide appropriate treatment, and provide adequate diagnosis and treatment, which in the long term can help improve control strategies for the disease.

This study aimed to investigate the determinants of factors predicting the perceived threat of cutaneous leishmaniasis among Healthcare Workers in Bam County, as the main focus of Anthroponotic Cutaneous Leishmaniasis (ACL) in southeastern Iran.

2. METHODS

2.1. Study Design and Sampling

This descriptive-analytical cross-sectional study was conducted among healthcare workers in Bam County, 29° 06′.52″ N latitude and 58° 22′.67″ E longitude, of the Kerman Province, Iran, in 2023. The study population consisted of personnel working in urban and rural health centers (10 health centers) in Bam County in Kerman province, Iran. In this study, the census method was used, and all healthcare workers ($n = 211$) participated in the study.

2.2. Inclusion Criteria

The inclusion criteria consisted of individuals who expressed willingness to participate, had a minimum of two years of work experience in Bam health systems, and were capable of self-reporting by completing an online questionnaire.

2.3. Exclusion Criteria

Employees who declined participation or provided incomplete questionnaires were excluded from the study.

2.4. Data Collection Tools

Data collection involved using a demographic characteristics questionnaire, and researcher-made questionnaires related to knowledge (6 items) and perceived threat (12 items). The initial questionnaire was developed by studying books, theses, articles, scientific publications, and existing questionnaires, and was based on a thorough consultation with professors and experts in the field. The keywords "questionnaire," "instrument," "scale," "tool," "leishmaniasis," "knowledge," and "health belief model" were used to identify existing questionnaires related to this research. The keywords "health belief model," "knowledge," and "leishmaniasis" were used to identify relevant articles. A search was conducted in Web of Science, Scopus, PubMed, Google Scholar, and Persian databases. The initial instrument items were developed. Then, each item was reviewed with the research team during two sessions. During these sessions, duplicate items were removed (6 items), and then the questionnaire was prepared for validation.

2.5. Demographic Characteristics Questionnaire

The questionnaire included age, gender, marital status, education level, place of residence, work experience, nativeness of Bam, history of cutaneous leishmaniasis, and participation in training courses related to infectious diseases in the past.

2.6. Knowledge Questionnaire

The researcher-made questionnaire related to knowledge consisted of 6 questions. Each question was assigned a score of one for a correct answer and a score of zero for a wrong answer or "I do not know." A higher score on the questionnaire indicated a greater level of knowledge.

These questions cover: (i) Leishmaniasis is caused by the Leishmania parasite, (ii) Leishmaniasis is transmitted through the bite of an infected sandfly, (iii) Leishmaniasis occurs most often in tropical and subtropical regions, (iv) Skin sores that last more than two weeks can be a sign of leishmaniasis, (v) The scar caused by leishmaniasis has a permanent and lasting effect, and (vi) It takes about a year to recover from cutaneous leishmaniasis.

2.7. Perceived Threat Questionnaire

This questionnaire aimed to measure the constructs of perceived susceptibility and perceived severity in preventing ACL based on the Health Belief Model. Six questions were formulated for each construct. The constructs of perceived severity and susceptibility are collectively referred to as perceived threat (12 questions). The questionnaire was scored on a five-point scale. Participants were asked to indicate their response using the following options: strongly agree (5 points), agree (4 points), no idea (3 points), disagree (2 points), and strongly disagree (1 point).

2.8. Validity and Reliability of the Questionnaire (Knowledge and Perceived Threat)

The face validity was evaluated using qualitative approaches. To ensure face validity, the questionnaire was given to 30 healthcare workers who provided feedback on the clarity and relevance of the items. Based on the suggestions of the healthcare workers, difficult and incomprehensible items were modified.

The content validity of the tool was evaluated *via* the qualitative and quantitative approaches. In the qualitative approach, the tool was sent to 10 experts in health education, medical entomology, and vector control. Comments were received regarding grammar, appropriate words, placement of items in the appropriate place, and clarity. During this process, some items were modified based on the expert's feedback.

Quantitative content validity was performed by calculating the Content Validity Ratio (CVR) and the Content Validity Index (CVI). CVR reflects whether the items were deemed essential by professionals. Thus, we asked the ten professionals to evaluate the necessity of each item on a three-point Likert scale (Not essential, Useful but not essential, and Essential). The CVR of each item was calculated by using the following formula: CVR = $(n_e - (N/2))/(N/2)$. In this formula, N and n_e are, respectively, equal to the total number of experts and the number of experts who score the intended item as Essential. According to Lawshe (1975), when the number of experts is ten, the minimum acceptable CVR is equal to 0.62 [26].

CVI indicates the degree to which the items of the scale are related. Thus, we asked the ten professionals to evaluate the relevance of the tool items on a four-point Likert scale (Not relevant, Somewhat relevant, Quite relevant, and Highly relevant). Tilden *et al*. have verified the proper CVI of more than 0.70 to confirm the acceptability of the items in a questionnaire [27]. In the validity stage, no items were removed.

To establish reliability, internal consistency was employed, and the Cronbach's alpha coefficient was calculated, yielding a value of 0.81.

2.9. Procedure

After obtaining the code of ethics from the Bam University of Medical Sciences, the researchers discussed the study's significance and methodology with relevant authorities.

Subsequently, a list of eligible health centers was collected from the Bam County Health Center. The phone number of the health center managers was provided to the researcher by the Bam City Health Center. The researcher sent the questionnaire link to the managers of the comprehensive health service centers. Then the manager sent it to other employees. Furthermore, the participants were assured of the anonymity and confidentiality of their responses.

To facilitate data collection, the questionnaire was converted into an online format using. The participants were then provided with the questionnaire link through messaging platforms, such as Bale, WhatsApp, and Telegram, based on their preferred method of communication. It is worth mentioning that the average time required to complete each questionnaire was 8 to 10 minutes. Finally, the collected data were extracted in Excel format and analyzed using SPSS 22. Data collection lasted from 06/08/2023 to 24/12/2023.

2.10. Statistical Analysis

Data were analyzed using descriptive and analytical statistics, including t-test, Pearson's correlation, and linear regression using SPSS Software (version 22). A *p*-value of less than 0.05 was considered statistically significant. Descriptive statistics (frequency, percentage, mean, and standard deviation) were employed to assess the demographic variables, as well as the levels of knowledge and perceived threat.

3. RESULTS

The participants had a mean age of 36.5 ± 7.52 years and a mean work experience of 9.88 ± 6.81 years. The majority of participants were married women with an academic education. They were mostly citizens and natives of Bam County. Additionally, the majority had no history of leishmaniasis or participation in training courses related to infectious diseases (Table **1**).

The participants had a mean knowledge score of 3.97 ± 1.66, indicating a moderate level based on the questionnaire. Additionally, the participants had a mean perceived threat score of 49.62 ± 6.24, also falling within the high range according to the questionnaire. The mean perceived susceptibility score was 25.09 ± 3.47, and the perceived severity score was 24.52 ± 3.52, both of which were considered high.

Table 1. Demographic characteristics and their relationship with perceived threat and knowledge.

Variable		Frequency (Percent)	Perceived Threat (*p*-value)	Perceived Susceptibility (*p*-value)	Perceived Severity (*p*-value)	Knowledge (*p*-value)
Gender	Male	69 (32.7)	0.966	0.838	0.900	0.750
	Female	142 (67.3)				
Marital status	Single	61 (28.9)	0.000	0.000	0.002	0.000
	Married	150 (71.1)				
Education level	Non-academic	28 (13.3)	0.596	0.807	0.237	0.746
	Academic	183 (86.7)				
Place of residence	Urban	155 (73.5)	0.467	0.491	0.543	0.105
	Rural	56 (26.5)				
Native of Bam County	Yes	177 (83.9)	0.609	0.379	0.969	0.001
	No	34 (16.1)				
History of leishmaniasis	Yes	28 (13.3)	0.002	0.000	0.048	0.000
	No	183 (86.7)				
Participation in training courses related to infectious diseases	Yes	103 (48.8)	0.000	0.000	0.000	0.000
	No	108 (51.2)				

Table 2. The knowledge and perceived threat levels in the participants.

Knowledge Level	Frequency (%)	Score Range	Perceived Susceptibility Level	Frequency (%)	Score Range	Perceived Severity Level	Frequency (%)	Score Range	Perceived Threat	Frequency (%)	Score Range
High	91 (43.1)	5-6	High	166 (78.7)	23-30	High	156 (73.9)	23-30	High	173 (82)	45-60
Moderate	88 (41.7)	3-4	Moderate	43 (20.4)	15-22	Moderate	53 (25.1)	15-22	Moderate	37 (17.5)	29-44
Low	32 (15.2)	0-2	Low	2 (0.9)	6-14	Low	2 (0.9)	6-14	Low	1 (0.5)	12-28

Table 3. Relationship between knowledge, perceived threat, and its dimensions.

Variable	Knowledge	Perceived Susceptibility	Perceived Severity	Perceived Threat	Age (year)	Work Experience (year)
Knowledge	1	$p < 0.000$ r = 0.595	$p < 0.000$ r = 0.490	$p < 0.000$ r = 0.608	$p = 0.013$ r = 0.171	$p = 0.004$ r = 0.197
Perceived susceptibility	-	1	$p < 0.000$ r = 0.590	$p < 0.000$ r = 0.890	$p < 0.000$ r = 0.302	$p = 0.000$ r = 0.284
Perceived severity	-	-	1	$p < 0.000$ r = 0.893	$p = 0.039$ r = 0.142	$p = 0.037$ r = 0.144
Perceived threat	-	-	-	1	$p < 0.000$ r = 0.248	$p < 0.000$ r = 0.239

Table 4. Regression results in predicting perceived threat according to demographic variables and knowledge.

Variable	Univariate Regression			Multivariate Regression			
	β	*p*-value	R2	β	*p*-value	R2	*p*-value
Age	0.206	0.000	0.057	0.117	0.198	0.384	0.000
Gender	-0.040	0.966	-0.005	-	-		
Marital status	3.687	0.000	0.067	0.746	0.396		
Education level	-0.675	0.596	-0.003	-	-		
Place of residence	0.711	0.467	-0.002	-	-		
Work experience	0.219	0.000	0.053	-0.032	0.753		
Nativeness	-0.600	0.609	-0.004	-	-		
History of cutaneous leishmaniasis	-3.855	0.002	0.039	-0.707	0.500		
Participation in training courses on infectious diseases	-4.003	0.000	0.099	-1.088	0.146		
Knowledge	2.280	0.000	0.367	1.998	0.000		

To determine the participants' knowledge level, the levels were classified as high (5– 6), moderate (3–4), and low (1–2) (Table **2**).

There was a significant positive correlation between knowledge and perceived threat ($r = 0.608$, $p < 0.000$) (Table **3**).

According to the univariate regression test, age, marital status, work experience, history of leishmaniasis, participation in training courses, and knowledge were found to have significant associations with perceived threat. Based on the multivariate regression test, 38% of the variance in predicting perceived threat was attributed to these variables, and knowledge remained a significant predictor of perceived threat ($\beta = 1.998$, $p < 0.0001$). According to the univariate regression test, knowledge accounted for 36% of the variance in perceived threat (Table **4**).

4. DISCUSSION

This study aimed to investigate the determinants of factors predicting the perceived threat of cutaneous leishmaniasis among Healthcare Workers in Bam County. The findings revealed that the participants possessed moderate knowledge about ACL. However, Dires *et al*. found that approximately three-quarters of the participants had poor knowledge of cutaneous leishmaniasis [28]. Similarly, Ahmad *et al*. reported very poor knowledge among participants, with only a few individuals being aware of the role of sand flies as disease vectors [29]. Another study conducted in Saudi Arabia showed that only 37.4% of participants recognized sandflies as the vector of cutaneous leishmaniasis [30]. Additionally, a study conducted in indigenous communities of Ghana revealed that 80.2% of participants were unaware of disease transmission ways, and 39.6% did not know about preventive measures [31]. These variations in findings can be attributed to factors such as cultural differences, the clinical manifestation of the disease, and differences in study methodologies.

When individuals become aware that leishmaniasis is a preventable parasitic disease transmitted through the

bites of sandflies, they are more likely to seek ways to prevent it. Lacking sufficient knowledge about the disease and attributing the responsibility for disease control solely to the government and health authorities can undermine individual preventive efforts [32-34]. It is undeniable that the lack of knowledge about the role of sandflies in cutaneous leishmaniasis and the ecology of these vectors contributes to the failure to utilize personal protective measures. Furthermore, inadequate knowledge about available treatments [35, 36] can lead to treatment delays or ineffective self-treatment. Therefore, it is crucial to develop community-based interventions aimed at enhancing public awareness [29].

The results of this study indicated that the participants had a good level of perceived threat. When individuals perceive themselves to be at risk of a disease with irreversible consequences, they consider it a serious threat and are more likely to take preventive measures. According to the HBM, perceived susceptibility and perceived severity, collectively referred to as perceived threat, are key factors that influence an individual's behaviour and performance [37]. Vesali Monfared *et al*. also reported that individuals with a higher perception of leishmaniasis risk are more likely to take precautionary measures [38].

According to a study by Berhe *et al*., migrant workers in Ethiopia have a low perception of the risk associated with visceral leishmaniasis and do not believe that mosquito bite prevention behaviours are effective in controlling the disease [21]. Similarly, Maaoui *et al*. demonstrated that a majority of participants were unaware of the severity, preventive methods, and treatment options for leishmaniasis [39]. Additionally, Motamedi *et al*. found that most participants had a poor perceived threat of cutaneous leishmaniasis, but this significantly improved after their participation in educational courses [23]. These conflicting results may be attributed to various factors, including variations in the study population, the clinical manifestation of the disease, research methodologies employed, social factors, and environmental conditions.

In this study, a significant and direct relationship was observed between knowledge and the level of perceived threat. As knowledge levels increased, the perceived threat also increased, and vice versa. While no comparable studies were found, it is evident that the relationship between knowledge and perceived threat can significantly influence health-related behaviours. When individuals perceive a high level of threat to their health, they are more likely to engage in preventive actions to reduce that threat [40]. Increased knowledge coupled with a strong understanding of the threat related to cutaneous leishmaniasis can motivate individuals to take preventive measures, such as using insect repellents, wearing appropriate clothing, or seeking medical advice if symptoms arise. Further studies are needed to delve deeper into this topic and explore related aspects.

This study found significant relationships between participation in training courses and the level of perceived threat. Training and improving preventive knowledge and skills are among the most important strategies in a cutaneous leishmaniasis control program for personal protection in endemic areas.

According to the results of studies, participating in training courses can improve the perceived threat of leishmaniasis. For example, in the studies by Shadkam *et al*. in Shahin Shahr [41] and Motamedi *et al*. in Isfahan [23], the educational intervention had a significant effect on increasing the mean scores of perceived sensitivity, severity, and preventive behaviors. Another study demonstrated that employees from various organizations possessed good knowledge about visceral leishmaniasis due to their participation in in-service training courses [42]. These results align with the results of the present study. In-service training courses not only address organizational issues and empower employees but also enhance their knowledge of various topics. The high knowledge of employees can have an effect on increasing the knowledge of health service recipients. If people believe that they are at risk of disease, and the problem is serious, and this problem can lead to death or other serious consequences for them, they take preventive measures.

The results of the present study showed that individuals with a history of leishmaniasis had a higher perceived threat. Motamedi *et al*. revealed that students who had been infected with cutaneous leishmaniasis before recieved higher scores in the whole variable of HBM, including perceived sensitivity and severity [23]. Devipriya *et al*. supported this study and demonstrated that a family history of visceral leishmaniasis was an important factor in diagnosis [42]. Additionally, another study conducted in Ethiopia revealed that families with confirmed cases of visceral leishmaniasis had better knowledge about the disease [43]. Those who have a history of the disease may gain more knowledge about the disease by searching for more information sources. Also, experiencing a lot of suffering due to the treatment process may lead to a report of more perceived threat.

5. LIMITATIONS

The study's limitations include its cross-sectional design and focus on healthcare workers in Bam County, suggesting caution in generalizing the results. Future studies should consider employing qualitative methods to provide deeper insights into the perceived threat to people working in the health sector and the barriers they face in adopting protective behaviors. Additionally, factors beyond knowledge and demographic variables, such as social, environmental, and cognitive factors, institutional support, and access to protective resources, should be considered in predicting perceived threat.

In this study, the variable of preventive behaviors against leishmaniasis was not examined. To predict preventive behaviors, it is recommended that studies be designed based on all constructs of the Health Belief Model (perceived susceptibility, perceived severity, perceived benefits of behavior change, perceived barriers to action, self-efficacy, and cues to action).

CONCLUSION

The study results highlighted the relationship between perceived threat and knowledge of cutaneous leishmaniasis. Knowledge was observed to be the strongest predictor of perceived threat.

The study revealed significant associations between perceived threat and personal experiences, and participation in training courses. The study emphasizes the importance of interventions aimed at enhancing perceived threat and knowledge to improve preventive behaviors against leishmaniasis.

Training disease transmission and personal protection methods to individuals in populations at risk can play a vital role in mitigating the spread of this disease and protecting public health. With proper planning, the enormous potential of social media can be harnessed to convey appropriate messages that increase knowledge, perceived threat, and improve preventive and protective behaviours. It is recommended that public health planners design and implement periodic training workshops and in-service courses for healthcare workers.

It is suggested that educational interventions be designed based on the Health Belief Model and other theories and models of behavior change to promote knowledge and perceived threat, and finally, preventive behaviors against cutaneous leishmaniasis.

Empowering healthcare professionals ultimately leads to providing appropriate training to people at risk, empowering and increasing self-protection in vulnerable populations.

Further research involving different population groups is recommended to expand upon these results.

AUTHORS' CONTRIBUTIONS

The authors confirm contribution to the paper as follows: A.G and P.A.: Study conception and design; P.A.: Data collection; R.S. and S.Y.: Validation; F.RD: Analysis and interpretation of results; F.RD: Draft manuscript. All authors reviewed the results and approved the final version of the manuscript.

LIST OF ABBREVIATIONS

MCL	=	Mucocutaneous Leishmaniasis
VL	=	Visceral Leishmaniasis
ZCL	=	Zoonotic Cutaneous Leishmaniasis
IRS	=	Indoor Residual Spraying
ACL	=	Anthroponotic Cutaneous Leishmaniasis
CVR	=	Content Validity Ratio
CVI	=	Content Validity Index

ETHICS APPROVAL AND CONSENT TO PARTICIPATE

This study was approved by the Ethics Committee of the University of Medical Sciences, Bam, Iran (Ethics code: IR.MUBAM.REC.1402.028).

HUMAN AND ANIMAL RIGHTS

All human research procedures followed were in accordance with the ethical standards of the committee responsible for human experimentation (institutional and national), and with the Helsinki Declaration of 1975, as revised in 2013.

CONSENT FOR PUBLICATION

Informed consent was obtained from all participants in this study.

STANDARDS OF REPORTING

STROBE guidelines were followed.

AVAILABILITY OF DATA AND MATERIALS

All the data and supportive information are provided within the article.

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None.

CONFLICT OF INTEREST

The authors declare no conflict of interest, financial or otherwise.

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