Osong Public Health and Research Perspectives

Journal homepage: http://www.kcdcphrp.org

Original Article

Designing and Evaluating Educational Intervention to Improve Preventive Behavior Against Cutaneous Leishmaniasis in Endemic Areas in Iran

Musalreza Ghodsi [a], Mina Maheri [b], Hamid Joveini [c], Mohammad Hassan Rakhshani [d], Ali Mehri [c,*]

[a] Student Research Committee, Sabzevar University of Medical Sciences, Sabzevar, Iran
[b] Department of Public Health, School of Health, Reproductive Health Research Center, Urmia University of Medical Sciences, Urmia, Iran
[c] Department of Health Education, School of Health, Sabzevar University of Medical Sciences, Sabzevar, Iran
[d] Department of Biostatistics & Epidemiology, School of Health, Sabzevar University of Medical Sciences, Sabzevar, Iran

Article history:

Received: March 15, 2019
Revised: May 2, 2019
Accepted: June 13, 2019

Keywords:

cutaneous leishmaniasis, behavior, education, prevention

ABSTRACT

Objectives: Health education programs are one of the most important strategies for controlling cutaneous leishmaniasis (CL) in endemic areas such as Neshabur city. This study aimed to develop and evaluate a comprehensive health education program to improve preventive behaviors for CL.
Methods: This was an interventional study conducted on 136 high school students in Neishabur city. Data collection instruments included a demographic questionnaire and a researcher-made questionnaire based on the "Health Belief Model" and "Beliefs, Attitudes, Subjective Norms and Enabling Factors Model" constructs. The control and intervention groups completed the questionnaires before and 2 months after the intervention. The intervention was conducted in 6, 1-hour educational sessions for the intervention group students and 2, 1-hour sessions for school administrators, teachers, and students' parents.
Results: There was no significant difference between the 2 groups in the pre-intervention phase. However, in the post-intervention phase, there were significant differences between the 2 groups for mean scores of knowledge, perceived susceptibility, perceived severity, perceived benefits, cues to action, self-efficacy, attitude, subjective norms, behavioral intention, enabling factors, and behavior associated with CL.
Conclusion: Health education program based on the "Health Belief Model" and the "Beliefs, Attitudes, Subjective Norms and Enabling Factors Model" model constructs may be a comprehensive and effective educational program to improve preventive behaviors against CL in students.

https://doi.org/10.24171/j.phrp.2019.10.4.09
pISSN 2210-9099 eISSN 2233-6052

Introduction

Leishmaniasis is a worldwide disease caused by *Leishmania* which is a protozoan parasite transmitted into humans by sandfly (certain types) bites . Leishmaniasis is common in humans and animals, and results from cutaneous, visceral (kala-azar), and mucocutaneous *Leishmania* parasites [1]. Cutaneous *Leishmania* (CL) parasites occur in humans in both dry (mainly urban) and wet (mainly rural) areas. The domestic sandfly *Phlebotomus sergenti*, is the vector most commonly found in urban areas and responsible for transmitting the parasite to humans. In rural areas, the main vector is a semi-wild sandfly (*Phlebotomus papatasi*) [1-4].

Leishmaniasis is an endemic disease in 88 countries, and it is estimated that approximately 0.7 to 1.2 million new cases of CL, and 0.2-0.4 million new cases of visceral leishmaniasis

*Corresponding author: Ali Mehri
Department of Health Education, School of Health, Sabzevar University of Medical Sciences, Sabzevar, Iran
E-mail: minamina176@yahoo.com

occur every year [2]. It has also been estimated that over 350 million people in the world are at risk of the disease and about 12 million are diagnosed with Leishmaniasis [2]. Although 20,000 cases approximately of CL are reported annually in Iran, due to under-reporting, the true incidence is probably 4-5 times higher in the general population [1]. CL is a public health problem in Iran, and in 2008, more than 26,000 cases (an incidence of 37 per 100,000) were reported [4]. In Iran, CL is seen in both rural and urban areas. The rural sandfly is common in most rural areas of the 15 provinces of the country, and the urban sandfly is endemic in many parts of the country, including the Bam and Neishabur cities [1,3].

This disease causes ulcers and ugly scars, and may result in secondary infections due to the duration of symptoms. The length of the treatment period, and the complications of existing medical treatments pose huge health costs for the community. In the absence of treatment, the disease lasts between 5 months to 2 years, which prolongs the risk of contagion [2,3]. However, studies have indicated that community knowledge about CL is low [5,6]. Educational preventive measures, such as raising people's knowledge of preventive skills for personal protection in endemic areas, can be one of the most important strategies for controlling CL [7].

In educational planning, an important measure is selecting a model or theory, based on conditions, recognition of the problem, and the alignment of the efficiency and purpose of the model or theory, in line with the aim of the educational program [7]. The effectiveness of health education programs depend on the correct use of theories and models by health promotion practitioners [8]. The conceptual framework used in this study includes constructs of the Health Belief Model (HBM) and Beliefs, Attitudes, Subjective Norms and Enabling Factors (BASNEF) model. The HBM is a model developed exclusively for health behavior and was used in this study due to the prevalence of CL in the region, as well as the need to take action to prevent it.

Moreover, the findings of the study conducted by Motamedi et al [7] indicated that education based on the HBM can promote preventive behaviors in students and help to reduce the risk of this disease. One of the limitations of the HBM is that it highly emphasizes the individuals and only considers the effects of health beliefs on behaviors [9,10]. However, factors affecting behavior are beyond personal beliefs and individual's behaviors is influenced by a set of personal factors, such as knowledge, attitude, cultural environment such as customs, social environment such as family members, friends, and other influential people (subjective norms), enabling factors like resources and skills [11]. Based on findings from other studies, the effectiveness of HBM-based interventions could be enhanced by combining HBM with other theories or models [12].

The BASNEF model is used to study behavior and it helps to plan changes in behavior by determining the factors that are involved in the decision making. Furthermore, in studies that examined the constructs of the BASNEF model, their effectiveness in establishing and modifying the behaviors associated with CL, has been proven [13,14]. Therefore, the educational program based on constructs of the HBM and the BASNEF model will have all the necessary aspects to create a consistent change in the behavior of the students in relation to CL; since the BASNEF model, due to the existence of subjective norms and enabling factors, completes the HBM and can promote the effectiveness of educational interventions [13,14].

1. Conceptual framework

The HBM includes perceived susceptibility constructs (likelihood of having a disease or a harmful condition caused by a particular behavior), perceived severity (severity of harm which can be result of a disease or a harmful condition caused by a particular behavior), perceived benefits (benefits of the recommended behavior to reduce the risk or severity of a disease or a harmful condition resulting from a particular behavior), perceived barriers (actual and possible costs of engaging in the recommended behavior), cues to action (includes accelerating forces to make the individual act), and perceived self-efficacy (refers to an individual's perception of his or her competence to successfully perform a behavior) [15].

The BASNEF model incorporates constructs including attitude, subjective norms, and behavioral intention, along with the concept of enabling factors as the distinguishing feature of this model from others [16]. The attitude towards behavior is an individual's assessment of the desirability or undesirability of a behavior. A more favorable attitude towards a behavior makes the intention to engage in the behavior, stronger. Attitude is determined by 2 factors, an individual's belief in the potential result of the behavior, and the evaluation of these results lead to attitude formation (behavioral beliefs and evaluation of behavioral outcomes) [16,17]. The second construct of this model is parallel with the attitude construct of motivation, and ultimately the intention of behavior, is a subjective norm. Subjective norms are based on the belief that individuals are affected by different individuals in their community such as family members, spouses, friends, and healthcare providers, and behave as a result of their influence and support. The subjective norms are influenced by normative beliefs and the individual's motivation to comply with others. Normative beliefs are individuals' beliefs about the extent to which other people who are important to them, think they should or should not conform to particular behaviors, and motivation to comply refers to the extent to which a person wants to act in accordance with the tendencies of people who

are important in their life [16,17]. The third construct is the behavioral intention or decision and is the individual's desire to engage in a particular behavior. Behavioral intention is the most important determinant of the individual's behavior. Behavioral intention is an individual's readiness index for performing a certain behavior and is considered an immediate antecedent of behavior. In this model, behavioral intention is a result of an attitude towards behaviors and subjective norms [16,18]. The fourth construct is the enabling factor or resources and skills that allow the individual's intention or desire to turn into a behavior. Enabling factors are one of the important constructs of this model. Someone may want to engage in the recommended behavior, but due to the lack of required skills and resources (money, time, etc.) or due to the presence of obstacles, cannot perform the intended behavior [19]. Ultimately, the final construct of this model, which is also its general consequence, is called behavior or health behavior change [19]. Behavior is the individual's visible response in a given position concerning a particular goal. The central definition of behavior in the BASNEF model is the same as the definition of health behavior, which is the action taken by a person or group to change or maintain a health status or to prevent a disease or harm [16].

CL is endemic in Neishabor city, has a high prevalence in the age group of 10-18 years [3], and has complications of disease requiring scientific and practical approaches where educational planning is needed to reduce its prevalence. This study aimed to use the HBM and the BASNEF model constructs to develop a comprehensive CL health education program to promote preventive behaviors among students in Neishabur city.

Materials and Methods

This study is a quasi-experimental interventional study. The study population were high school students (grades 10 and 11) from Neishabur city in the academic year of 2016-2017. The inclusion criteria included voluntary participation and absence of physical and psychological disorders (approved by a physician and available in the students' health record). The exclusion criteria included residence in the endemic region for less than 6 months, history of CL, and more than 2 absences during educational sessions.

To power the study to determine the treatment effect, multi-stage cluster sampling was used to select 68 people who were included in the intervention group (n = 34) and the control group (n = 34). Neishabur city has 2 regional municipalities; one was randomly chosen as the control group, and the other was the intervention group. There were a total of 50 high schools in these 2 regional municipalities; each of them was considered a cluster. A girls' school and a boys' school were randomly selected from both the control and intervention group. Proportional to the number of students in each high school, sampling was performed among those who were willing to participate in the study (convenient sampling).

The data collection instrument was a 2-part questionnaire. The first part was the demographic information including gender, age, educational level, place of residence status, place of residence, parents' education, and information related to the previous history of CL disease. The second part was a novel questionnaire based on the constructs of the HBM and BASNEF model. The preliminary questions were based on a literature review and health education specialists' viewpoints. The following steps were taken to determine the validity and reliability of this instrument.

To determine face validity, 2 qualitative and quantitative methods were applied. In the qualitative study of face validity, the questionnaire was provided to 20 high school students. The difficulty of understanding the words and phrases, the degree of appropriateness and the correct relationship between phrases with the questionnaire dimensions, and the ambiguity about the misconceptions of the phrases were examined. In the next step, inappropriate phrases were omitted and the importance of each phrase was determined. The quantitative face validity was used, and an impact score of 1.5 was considered acceptable [20]. To determine content validity, 2 qualitative and quantitative methods were used. In the qualitative method, the prepared pilot questionnaire was given to a panel of 10 experts in health education and designing instruments. They were asked to investigate the questionnaire based on the grammatical criteria, using the correct words, placing items in the right place, appropriate scoring, appropriateness of selected dimensions, questions related to the constructs, and provide the required feedback. The content validity was measured quantitatively by the same 10 experts and calculated for the Content Validity Ratio and Content Validity Index. Items with a content validity ratio of more than 0.62 and a content validity index of more than 0.79 were accepted [21,22]. To measure the instrument reliability, Cronbach's alpha coefficient and intra-cluster correlation coefficient were used.

The preliminary questionnaires were administered to 30 high school students with a time interval of 2 weeks. After completing the questionnaires, the Cronbach's alpha coefficient and the intra-cluster correlation coefficient were calculated. For all domains, Cronbach's alpha coefficient and intra-cluster correlation were higher than 0.7 therefore, the reliability level of the instrument used in this study was reached [23]. The preliminary questionnaire consisted of 80 constructive questions that after measuring the validity and reliability of the questionnaire, the number of questions was reduced to 69 questions. The final questionnaire consisted of 4 knowledge

questions, 6 attitude (behavioral beliefs and evaluation of behavioral outcomes), 8 subjective norms (normative beliefs and motivation to comply), 8 behavioral intention, 5 enabling factors, 5 perceived susceptibility, 9 perceived severity, 3 perceived benefits, 4 perceived barriers, 4 self-efficacy, 8 cues to action, and finally 5 questions about preventive behaviors for CL. Responses to knowledge questions included 3 options of "correct" (2 scores), "incorrect" (zero score), and "I do not know" (1 score). Responses to questions related to the HBM and the BASNEF model constructs were scored according to the Likert scale of 5 options and ranked 0 to 4.

In the pre-test phase, the questionnaires were provided to the students of the intervention and control group. After analyzing the results, design of the educational intervention was based on the constructs predicting the preventive behaviors for CL. The intervention was conducted in 6, 1-hour educational sessions for intervention group (n = 34) and 2, 1-hour sessions for the school administrators, teachers and students' parents during 1 month. After the introduction meeting, at the first session, using lecture and question-answer methods, the overall status of CL was reported in Iran and the world, and a video about the pain and suffering caused by CL infection and treatment was also displayed. At the second session, a general description of the disease and its significance was presented using lecture, and question-answer methods. The pamphlets and facts about this disease were distributed among the students, with a brief explanation. At the third session, the importance of prevention, as well as the ways of controlling and preventing CL were explained using lecture and question-answer methods. A wire mesh, mosquito net, and insecticide spray were shown to the students. Moreover, each student was given an insect repellent and an educational poster titled "Taking into account 8 key points in preventing and controlling CL" which was put up on the board, the classroom, and the entrance door of the schools. At the fourth and fifth sessions, the intervention groups were divided into 2 groups of 17 people, where they discussed CL and brainstormed. Any questions the students had were also answered. At the sixth session, preventative behaviors against CL were discussed using lecture and question-answer methods. Then, a video of the ways to control and prevent CL was presented. Moreover, questionnaires and invitations to parents' were also distributed requesting them to participate in a CL workshop. In order to facilitate preventive behaviors, prevent and control the disease, and intervene in the enabling factors, 2 separate educational workshops were held for the parents, teachers and school officials at the Department of dialysis, 22-Bahman Hospital, Neishabur. In this workshop, the audiences were given general information about the disease condition and how to control and prevent Leishmaniasis globally, nationally and in cities especially Neishabur. Furthermore, a summary of educational videos on how to control and prevent the disease and the pain and complications caused by the treatment of this disease was shown. At the end of the session, a pamphlet and a training tract were given to each person. Two health education specialists and 1 infectious disease specialist measured and approved the contents of videos. Two months after the intervention, the questionnaires were completed again in both groups (post-test). Post-test was scheduled 2 months after the intervention in order to avoid its coincidence with exam season and school holidays.

Finally, the data were entered into SPSS version 23 (IBM Corp., Armonk, NY, USA) using descriptive (Frequency, Percentage, Mean, Standard deviation) and analytical statistics (Kolmogorov Smirnov, Chi-square, Fischer's exact test, Independent T-test, Multiple linear regression, Paired T-test, and Analysis of Covariance: ANCOVA). Statistical significance was considered when $p < 0.05$.

The ethical considerations of this study included obtaining an ethics code (IR.MEDSAB.REC.1395.104) from Sabzevar University of Medical Sciences, obtaining written consent from the Department of Education in Neishabur, presence of the researcher in selected schools and communicating the goals of the research, obtaining oral informed consent from the students to participate in the study, and assurance about the confidentiality of their personal information.

Results

The main objective of this study was to determine the effectiveness of an educational intervention based on the constructs of the HBM and the BASNEF model to improve preventive behaviors against CL among students. The study results indicated that educational intervention designed and implemented based on these 2 models were effective in improving and promoting preventive behaviors against CL among students. In addition the demographic variables of participants were described and the predictability of the HBM and the BASNEF model constructs in preventive behaviors against CL among students was determined.

Based on the results of this study, the mean age of the control and intervention groups was 16.74 ± 0.53 years, and 16.31 ± 0.98 years, respectively. Most of the fathers of the control group participants had high school and diploma education, whereas the majority of fathers of the intervention group participants had primary/secondary school education. The majority of mothers had high school and diploma education

Regarding the place of residence, the most frequently reported place of residence by the control group participants was the newly built apartments and free-standing houses,

Table 1. Distribution of absolute and relative frequency of demographic information and the history of CL in the 2 groups before the intervention.

Variables		Intervention group number (%)	Control group number (%)	*p*
Gender	Male	34 (50)	34 (50)	1*
	Female	34 (50)	34 (50)	
Grade	10th	34 (50)	34 (50)	1*
	11th	34 (50)	34 (50)	
Father's education level	Illiterate	2 (3)	3 (3.5)	0.004†
	Primary and junior high school	39 (59.5)	19 (28.9)	
	High school and diploma	19 (28.8)	28 (42.4)	
	≥ Diploma and academic	6 (9.1)	16 (24.2)	
Mother's education level	Illiterate	2 (2.9)	1 (1.5)	0.106†
	Primary and junior high school	38 (55.9)	24 (36.9)	
	High school and diploma	18 (26.5)	22 (33.9)	
	≥ Diploma and academic	10 (14.7)	18 (27.7)	
Place of residence status	Newly built apartment	6 (10.7)	15 (22.4)	0.076†
	Renovated apartment	3 (5.4)	4 (6)	
	Old apartment	4 (7.1)	14 (20.19)	
	Newly built free-standing house	18 (32.2)	15 (22.4)	
	Renovated free-standing house	14 (25)	12 (17.9)	
	Old free-standing house	11 (19.6)	7 (10.4)	
Place of residence	Suburb	21 (30.9)	21 (31.3)	0.954*
	Downtown	47 (69.1)	46 (68.7)	
Experience of with CL disease	I have had CL disease	0	1 (1.6)	0.039†
	I have a previous history of CL	0	5 (8.1)	
	I do not have a previous history of CL	64 (100)	56 (90.3)	
CL disease in the family	A family member has had CL disease	1 (1.5)	1 (1.6)	0.481†
	One of my family members has a previous history of CL	2 (3.1)	5 (7.9)	
	No previous history of CL in my family	62 (95.4)	57 (90.5)	
Hearing the name of the disease, or seeing a person with CL	Yes	33 (49.3)	28 (42.4)	0.429*
	No	34 (50.7)	38 (57.6)	
Keeping livestock in or around the house	Yes	6 (13)	8 (17.4)	0.562*
	No	40 (87)	38 (82.6)	
Age (y)	Mean ± SD	0.98 ± 16.31	0.53 ± 16.74	0.001‡

* Chi-square, † Fisher's exact test, ‡ Independent *T*-test.
CL = cutaneous leishmaniasis.

while the newly built and renovated free-standing houses were the most frequently reported place of residence by the intervention group participants. Moreover, the most frequent place of residence in both groups was in the downtown area. Based on the findings of the present study, most students in the control and intervention groups reported that neither their family members nor themselves, have been infected by CL.

The highest frequency, hearing the term CL, or seeing a person with this disease, as well as keeping livestock in or around the house in both groups, was related to the option

Table 2. The Influence of HBM and BASNEF model constructs on preventive behavior against CL, based on multiple linear regression model in the target group before educational intervention.

Construct (independent variable)	Dependent variable	Non-standardized coefficient (B)	Standard error	Standardized coefficient (β)	R^2	*p*
Perceived susceptibility	Behavior	0.187	0.159	0.141	0.35	0.24
Perceived severity		-0.026	0.088	-0.035		0.76
Perceived benefits		0.077	0.299	0.026		0.79
Perceived barriers		-0.293	0.257	-0.119		0.25
Self-efficacy		0.580	0.184	0.325		0.002
Cues to action		0.252	0.061	0.430		0.001
Knowledge	Behavior	-0.135	0.351	-0.040	0.24	0.70
Attitude		0.061	0.050	0.148		0.22
Subjective norms		-0.004	0.320	-0.013		0.91
Behavioral intention		0.057	0.119	0.060		0.63
Enabling factors		0.364	0.107	0.402		0.001

BASNEF = beliefs, attitudes, subjective norms and enabling factors; CL = cutaneous leishmaniasis; HBM = health belief model.

"No." There was no significant difference between the control and intervention groups in terms of gender, educational level, maternal education, the place of residence status, place of residence, personal history of the disease, family history of the disease, the status of hearing the name of the disease, or seeing the person with the disease, and the status of keeping livestock in or around the house in the pre-intervention phase ($p > 0.05$; Table 1).

Based on the results of multiple linear regression, the cues to action ($p < 0.001$, $\beta = 0.430$), enabling factors ($p < 0.001$, $\beta = 402$) and self-efficacy ($p < 0.002$, $\beta = 0.325$), were the most significant predictors of preventive behaviors among the high school students in Neishabur. Moreover, based on the results of the present study, about 35% of the variance in preventive behavior against CL was predicted by the HBM constructs and about 24% by the BASNEF model constructs [2].

The mean and standard deviation of knowledge score, as well as the HBM and the BASNEF model constructs, in the control and intervention groups before and after the intervention, are reported in Table 2. The results of the independent T-test showed that there was no significant difference between the control and intervention group in the pre-intervention phase in terms of the mean score of knowledge and perceived susceptibility constructs, perceived severity, perceived benefits, perceived barriers, cues to action, self-efficacy, attitude, subjective norms, behavioral intention, enabling factors and, behavior in relation to CL. However, the results of ANCOVA showed that, by controlling the effect of the results of the pre-test phase, these differences were significant between the 2 groups at the post-interventional phase (except for the perceived barriers). Moreover, the results of the paired T-test showed that there was no significant difference in the knowledge score and the constructs of the HBM and the BASNEF model before and after the educational intervention. However, in the intervention group, these differences were statistically significant (except for the perceived barriers; Table 3).

Discussion

Based on the findings of this study, following the implementation of educational intervention, the mean score of the study constructs (knowledge, perceived susceptibility, perceived severity, perceived benefits, cues to action, self-efficacy, attitude, subjective norms, behavioral intention, enabling factors, and behavior in relation to CL) in the intervention group significantly increased compared to the pre-intervention phase (except for the perceived barriers). However, these differences were not significant in the control group. Moreover, following the implementation of educational intervention, the mean score of the study constructs (except for the perceived barriers) in the intervention group significantly increased compared to the control group. However, these differences were not significant in the pre-intervention phase. These findings indicate that educational intervention designed

Table 3. Mean and standard deviation of the HBM and the BASNEF model constructs in the 2 intervention and control groups at the pre and post-intervention phases.

Construct	Research phase	Mean ± SD		*p*
		Control	Intervention	
Knowledge	Pre-intervention	5.16 ± 1.28	5.32 ± 1.40	0.55*
	Post-intervention	4.95 ± 1.36	7.42 ± 1.17	0.001†
	p	0.10‡	0.001‡	
Perceived susceptibility	Pre-intervention	12.27 ± 4.22	12.06 ± 3.48	0.77 *
	Post-intervention	12.20 ± 4.13	17.06 ± 3.44	0.001†
	p	0.67‡	0.001‡	
Perceived severity	Pre-intervention	17.75 ± 7.45	19.01 ± 5.01	0.35 *
	Post-intervention	17.32 ± 7.06	24.52 ± 5.10	0.001†
	p	0.09‡	0.001‡	
Perceived benefits	Pre-intervention	7.21 ± 1.68	7.34 ± 1.96	0.71 *
	Post-intervention	7.28 ± 1.76	9.24 ± 1.68	0.001†
	p	0.82‡	0.001‡	
Perceived barriers	Pre-intervention	8.71 ± 2.45	8.01 ± 2.11	0.14 *
	Post-intervention	8.44 ± 2.50	8.41 ± 2.55	0.89†
	p	0.23‡	0.39‡	
Cues to action	Pre-intervention	10.97 ± 8.04	10.68 ± 7.70	0.85 *
	Post-intervention	11.18 ± 8.19	15.39 ± 7.21	0.002 †
	p	0.32‡	0.002‡	
Self-efficacy	Pre-intervention	9.25 ± 2.55	9.22 ± 2.94	0.96 *
	Post-intervention	9.22 ± 2.47	11.91 ± 2.86	0.001 †
	p	0.37‡	0.001‡	
Attitude	Pre-intervention	24.51 ± 13.13	23.29 ± 10.23	0.62 *
	Post-intervention	24.06 ± 12.53	31.73 ± 7.07	0.001 †
	p	0.87‡	0.001‡	
Subjective norms	Pre-intervention	30.97 ± 14.92	29.23 ± 17.27	0.60 *
	Post-intervention	28.27 ± 16.62	36.88 ± 11.52	0.002 †
	p	0.08‡	0.006‡	
Behavioral intention	Pre-intervention	18.44 ± 4.12	19.18 ± 5.02	0.46 *
	Post-intervention	18.57 ± 4.81	25.79 ± 3.86	0.001 †
	p	0.42‡	0.001‡	
Enabling factors	Pre-intervention	12.45 ± 5.31	11.95 ± 4.93	0.62 *
	Post-intervention	12.07 ± 6.01	14.83 ± 3.47	0.001 †
	p	0.13‡	0.001‡	
Behavior	Pre-intervention	8.56 ± 5.09	8.42 ± 4.27	0.88 *
	Post-intervention	9.23 ± 5.22	12.18 ± 3.35	0.001 †
	p	0.87 ‡	0.001 ‡	

* Independent T-test, † ANCOVA, ‡ Paired T-test
BASNEF = beliefs, attitudes, subjective norms and enabling factors; HBM = health belief model.

and implemented based on the HBM and the BASNEF model has been effective in improving and promoting preventive behaviors against CL among the students studied. The effectiveness of educational interventions based on the HBM by promoting preventive behaviors against CL has also been reported by Motamedi et al [7]. Furthermore, in this study, following the implementation of an educational intervention, all the constructs of the HBM significantly increased compared to the pre-intervention phase among the students who were in the intervention, which is in line with the findings of the present study [7].

In the intervention group during the educational sessions, information related to CL was provided to the students by a teacher therefore, increased knowledge among them was expected. Knowledge is a prerequisite of healthy behaviors. Therefore, educational interventions to increase knowledge should be included in all health education and promotion programs that are designed and implemented to provide preventive behaviors against CL among different target groups. Although it was not enough that the only knowledge for adopting healthy and preventive behaviors is given, there is not necessarily a positive relationship between this knowledge and healthy behaviors [24], because determinants of behavior are beyond knowledge and other factors such as customs, culture, economics, family support, peers and other important people, inner and outer strata, macro policies, individual skills should all be taken into account [11,25]. Perceived susceptibility and severity are predictive factors for adopting appropriate health behavior, including preventive behaviors against CL [7,15]. Therefore, it is recommended individuals' beliefs about CL and severity of harm caused by the disease are modified using specific educational approaches for attitudes changes, such as group discussion and role-playing during the implementation of educational interventions in promoting preventive behaviors against CL [26,27].

Increased understanding of the benefits of having healthy behaviors and reducing the barriers of engaging in these behaviors also significantly stimulates healthy behaviors, including preventive behaviors against CL [7,15,28]. Therefore, it is recommended that specific educational approaches, such as group discussion and role-playing are used when implementing educational interventions to promote preventive behaviors against CL [26,27].

Based on the findings of the present study, the cues to action was the strongest predictor of preventive behavior among the students in the study. Moreover, the cues to action construct had a direct, positive, and statistically significant effect on the preventive behavior against CL. Based on the results of other studies, the cues to action has been a significant predictor of adopting healthy behaviors, including preventive behaviors against CL [15,28]. It has also been suggested that educational interventions are effective in improving the cues to health action [7], and cues to action is a predictor of healthy behaviors [15,28]. It is therefore recommended that a variety of educational methods, such as booklets, pamphlets, posters, visual media, such as television, radio are used. In addition, people who are trusted by individuals, such as doctors, political and religious leaders can help people to adopt preventive behaviors against CL [7].

Furthermore, self-efficacy was a significant predictor of preventive behaviors against CL among the students in this current study, therefore, increasing self-efficacy should improve preventive behaviors. Self-efficacy has been shown to be a significant predictor of adopting healthy behaviors [29]. Perceived self-efficacy is the individual's judgment of his ability to organize and execute a series of actions [29]. Therefore, considering the importance of self-efficacy in adopting healthy behaviors, and the effectiveness of educational interventions in promoting this construct, educational strategies should be used to promote self-efficacy of individuals. This would include breaking complex behaviors into small and applicable stages, using a trusted role model, using persuasion and reinforcement, and reducing the stress caused by engaging in new behavior or changing behavior, when implementing educational interventions to promote preventive behaviors against CL [16].

The effectiveness of educational interventions based on the BASNEF model in promoting preventive behaviors against CL has also been observed in other studies [13,14,30,31]. In these studies, following the implementation of educational intervention, the BASNEF model constructs significantly increased among the students compared to the pre-intervention phase [13,14,30,31], which is in line with the results of the present study.

Attitude towards behavior is, an individual's assessment of the desirability or undesirability of a behavior. When the attitude towards a behavior is more favorable, the intention to engage in that behavior will be stronger [16,17]. Therefore, the effectiveness of educational interventions in improving the individuals' attitude, and the importance of this construct in adopting healthy behaviors should be considered [32], by using methods and strategies for changing attitudes (including group discussion and role-playing [26,27]) towards the benefits of adopting preventive behaviors against CL and are essential when implementing educational interventions. By using these educational methods, educational materials were not forced on to the learners they could participate in the discussion process and express their opinions which enabled them to feel responsibility for changing their attitudes. In general, it is expected that the improvement of knowledge and attitude will affect and improve behavior. However, this relationship is not linear and determinants of behavior are beyond attitude

and knowledge [11,33]. Other factors, such as customs, culture, economic factors, family support, peers and other important people, internal and external motives, macro policies, individual skills, also play a significant role in behavior [11,25]. One of the factors that may influence and predict healthy behaviors, including preventive behaviors against CL, is enabling factors [14,32]. Someone may want to engage in preventive behavior against CL, however, due to the lack of skills and resources (money, time) or obstacles, they cannot perform the intended behavior [19]. Therefore, providing enabling factors, including access to educational information, funding for purchasing wire mesh, insect repellent, insecticide sprays, and access to doctors [13,14,30,31] when designing and implementing educational interventions to promote preventive behaviors of CL, is essential.

The educational intervention implemented in this study has been effective in improving the perceived subjective norms for adopting preventive behaviors against CL. Subjective norms are one of the most important factors in adopting preventive behaviors against CL, and educational interventions have been effective in promoting this construct [14]. Moreover, individuals often act on the basis of their perceptions of what others (friends, family, colleagues) think they should do [19]. Therefore, in addition to implementing educational interventions for the students, it is suggested that influential people in the students' lives are involved including parents, school administrators and teachers, as well as friends and classmates, to promote preventive behaviors among students and encourage them to carry out the recommended behaviors.

Behavioral intention is an individual's readiness index for performing a particular behavior, and is considered as an immediate antecedent of behavior [16,18]. Regarding the importance of this construct in adopting preventive behaviors against CL and the ability to upgrade and modify this construct through educational interventions [13,14,30,31], it is suggested that specific methods of promoting behavioral intention in educational interventions, to promote preventive behaviors of CL are used. Note that behavioral intention does not necessarily lead to behavior, and there are enabling factors, such as money, skill, accuracy, and available services between intention and behavior [19]. Therefore, along with improving people's behavioral intention through educational interventions, enabling factors should also be provided. Finally, the educational intervention designed and implemented based on the HBM and the BASNEF model in the present study has been effective in promoting preventive behaviors against CL among the students under the intervention. The results of other studies have also been consistent with this finding [7,13,14,30,31].

It should be explained that, following the implementation of the educational intervention, the mean score of the perceived barrier construct in the intervention group, was not significantly decreased compared to the pre-intervention phase. Other studies have shown that an educational intervention based on the HBM model can decrease the perceived barriers significantly [7,14]. However, some barriers could not be remedied by the educational intervention for example barriers like "not having free time to adopt preventive behaviors of CL," "not having money to buy the required equipment" and the impact of friends and others (who we do not have access to them for intervention), cannot be removed through an educational intervention among the participants. Other solutions to reduce such barriers should be considered [34,35].

Conclusion

The educational program implemented on the basis of the HBM and the BASNEF model had all the necessary elements to make a change to the students in relation to the preventive behaviors against CL. The BASNEF model, completed the HBM, due to the subjective norms and enabling factors constructs, and the combination of the constructs of the 2 models significantly facilitated the behaviors associated with the prevention of CL among the studied students. Therefore, the educational intervention designed in the present study against CL endemic regions, especially among high-risk groups, such as the age group of 10-18, the elderly, and pregnant women should be implemented.

The strengths of this study were the simultaneous use of the constructs of HBM and BASNEF model as a conceptual framework. Together with the identification of the predictors of preventive behaviors against CL based on the HBM and BASNEF model constructs. All of which were determined before designing the intervention, and focusing on the predictive constructs of the educational intervention. One potential limitation of this study was that the findings obtained in relation to the predictability of the HBM and the BASNEF model constructs in preventive behaviors of CL, were based on a cross-sectional study. However, this was resolved by conducting a quasi-experimental interventional study [36]. Another potential limitation of this study was that the data collection instrument in this study was a self-report questionnaire, and there may be unrealistic responses from the participants, especially in questions related to behavior. Therefore, briefing sessions were held to enable accuracy in the self-report questionnaire, and where applicable the necessary measures were applied to maximize anonymity and gain their trust.

Conflicts of Interest

The authors have no conflicts of interest to declare for this study.

Acknowledgments

The present study has been the basis of a Master's thesis in Health Education approved by Sabzevar University of Medical Sciences at No. b/93238/10. Thanks are owed to Sabzevar University of Medical Sciences and all the students who voluntarily participated in this study.

References

[1] Norouzinezhad F, Ghaffari F, Norouzinejad A, et al. Cutaneous leishmaniasis in Iran: Results from an epidemiological study in urban and rural provinces. Asian Pac J Trop Biomed 2016;6(7):614-9.
[2] Georgiadou SP, Makaritsis KP, Dalekos GN. Leishmaniasis revisited: current aspects on epidemiology, diagnosis and treatment. J Transl Int Med 2015;3(2):43-50.
[3] Ghodsi M, Mehri A, Joveyni H, et al. Development and Psychometric of Assessment Tool of Students' Preventive Behaviors of Cutaneous Leishmaniosis Based on BASNEF Model. J Neyshabur Univ Med Sci 2017;5(2):32-46. [in Persian].
[4] Holakouie-Naieni K, Mostafavi E, Boloorani AD, et al. Spatial modeling of cutaneous leishmaniasis in Iran from 1983 to 2013. Acta Trop 2017;166:67-73.
[5] Mazloumi S, Servat F. Knowledge, attitude and practice regarding to leishmaniasis: A descriptive study in Bafroye region. J Yazd Univ Med Sci 2004;3(1):38-2. [in Persian].
[6] Amirian H, Safavi M. Effect of education about leishmaniasis transmission and prevention in knowledge and practice of female high school student in Yazd in 2002. Tolooebehdasht 2002;2(4):20-5. [in Persian].
[7] Motamedi N, Hejazi SH, Hazavehei SMM, et al. Effect of education based on Health Belief Model on promoting preventive behavior of coetaneous leishmaniasis. J Mil Med 2010;11(4):231-6. [in Persian].
[8] Armitage CJ, Conner M. Social cognition models and health behaviour: A structured review. Psychol Health 2000;15(2):173-89.
[9] Sharifzadeh G, Moodi M, Majd HM, et al. Application of Health Belief Model in predicting preventive behaviors against cardiovascular disease in individuals at risk. J Health Sci Technol 2017;1(2):64-9.
[10] Ahmadpoor H, Maheri A, Shojaizadeh D. Effectiveness of Nutrition Education Based on Health Belief Model during Pregnancy on Knowledge and Attitude of Women Referred to Health Centers of Gonbad Kavoos City. J Neyshabur Univ Med Sci 2015;3(2):52-60. [in Persian].
[11] Hamzah SR, Suandi T, Ismail M, et al. Association of the personal factors of culture, attitude and motivation with health behavior among adolescents in Malaysia. Int J Adolesc Youth 2019;24(2):149-59.
[12] Sharifi F, Moodi M, Sharifzade G, et al. The Effects of an Educational Intervention Based on the Health Belief Model and Self-Regulation on Women's Eating Behaviors During Menopausal Transition. Mod Care J 2017;14(2):e65305.
[13] Khani Jeihooni A, Hatami M, Kashfi SM, et al. The effectiveness of education based on BASNEF model program in promotion of preventive behavior of Leishmaniasis among health workers and families under health centers coverage. J Fasa Univ Med Sci 2012;2(1):26-33. [in Persian].
[14] Saghafipour A, Nejati J, Mozaffari E, et al. The Effectiveness of Education Based on BASNEF Model on Promoting Preventive Behavior of Cutaneous Leishmaniasis in Students. Int J Pediatr 2017;5(6):5125-36.
[15] Maheri A, Tol A, Sadeghi R. Assessing the effect of an educational intervention program based on Health Belief Model on preventive behaviors of internet addiction. J Educ Health Promot 2017;6:63
[16] Safari M, Shojaeizadeh D, Ghofranipour F, et al. Theories, models and methods of health education and health promotion, 2nd ed. Tehran (Iran): Asaresobhan Publications; 2012. p.76-86. [in Persian].
[17] Bashirian S, Hidarnia A, Allahverdipour H, et al. Application of the theory of planned behavior to predict drug abuse related behaviors among adolescents. J Res Health Sci 2012;12(1):54-9.
[18] Beiranvand S, Asadizaker M, Fayazi S, et al. Efficacy of an Intervention Based on the Theory of Planned Behavior on Foot Care Performance in Type II Diabetic Patients. Jundishapur J Chronic Dis Care 2015;5(1):e30622.
[19] Askari A, Jeihooni AK, Kashfi SM, et al. The effect of educational program based on belief, attitude, subjective norm, and enabling factors model on changing the metabolic indices in elderly patients with type II diabetes. Int J Prev Med 2018;9:74.
[20] Mousazadeh S, Rakhshan M, Mohammadi F. Investigation of Content and Face Validity and Reliability of Sociocultural Attitude towards Appearance Questionnaire-3 (SATAQ-3) among Female Adolescents. Iran J Psychiatry 2017;12(1):15-20.
[21] Saber A, Tabatabaei SM, Akkasheh G, et al. Face and content validity of the MacArthur Competence Assessment Tool for the treatment of Iranian patients. Int J Prev Med 2017;8:75.
[22] Lawshe CH. A quantitative approach to content validity. Pers Psychol 1975;28(4):563-75.
[23] Imani V, Lin C-Y, Jalilolgadr S, et al. Factor structure and psychometric properties of a Persian translation of the Epworth Sleepiness Scale for Children and Adolescents. Health Promot Perspect 2018;8(3):200-7.
[24] Hazavehei S, Faghih Solaimani P, Moeini B, et al. Factors affecting nutritional behaviors of ageing population based on BASNEF Model: Sanandaj. J Geriatr Nurs 2016;2(2):61-70. [in Persian].
[25] Saeed AK, Siddiqui N, Inayat A. Impact of workshops on Themes of World AIDS Days. J Ayub Med Coll Abbottabad 2001;13(4):9-11.
[26] Levendusky MS, Druckman JN, McLain A. How group discussions create strong attitudes and strong partisans. Res Polit 2016;3(2):1-6.
[27] Nurdin TA, Japar M, Bachtiar IG. Improving Social Attitudes and Knowledge Through Role Playing Method. Am Educ Res J 2018;6(7):1040-5.
[28] Shirzadi S, Doshmangir P, Jafarabadi MA. Explaining the Role of Health Belief Model Constructs On Physical Puberty Health Among Teen Girls: Structural Equation Modeling. Women Health Bull 2015;2(3):e23873.
[29] Zielińska-Więczkowska H. Relationships between health behaviors, self-efficacy, and health locus of control of students at the universities of the third age. Med Sci Monit 2016;22:508-15.
[30] Hosseini S, Rajabzadeh R, Jajarmi H, et al. The effect of educational program based on BASNEF model on Volunteer Health Workers(VHWs) on Preventive behaviors among families under supported of VHWs. J North Khorasan Univ Med Sci 2016;7(3):561-72. [in Persian].
[31] Dehghanitafti A, Dehghanitafti A, Zobeydi M, et al. The Effect of Education Based on the Pattern of Behaviors in Promoting Preventive Behaviors of Cutaneous Leishmaniasis in Between Parent Families Living in the City Rāmhormoz in 2015. Tolooebehdasht 2017;16(2):62-74. [in Persian].
[32] Nazari M, Taravatmanesh G, Kaveh MH, et al. The Effect of Educational Intervention on Preventive Behaviors towards Cutaneous Leishmaniasis at Kharameh City in 2014. Shiraz E Med J 2016;17(10):e39957.
[33] Shrifian E, Estebsari F, Haghjou L, et al. Determining Behavioral Preventive Factors of Blindness based on BASNEF Model in the Chaharborj Village, City of Esfarayen. Iran J Health Educ Health Promot 2014;2(3):186-98. [in Persian].
[34] Zare F, Aghamolaei T, Zare M, et al. The effect of educational intervention based on the transtheoretical model on stages of change of physical activity in a sample of employees in Iran. Health Scope 2016;5(2):e24345.
[35] Hall WJ, Schneider M, Thompson D, et al. School factors as barriers to and facilitators of a preventive intervention for pediatric type 2 diabetes. Transl Behav Med 2014;4(2):131-40.
[36] Mohaddes Hakkak H, Joveini H, Rajabzadeh R, et al. Health literacy level and related factors among pregnant women referring to bojnord health centers in 2017. Int J Pharm Res 2019;11(1):152-8.