ORIGINAL ARTICLE

The Effect of a Volunteer-led Training Program in Empowering Women about Food Safety: An Application of Social Cognitive Theory

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Abstract

Background: The aim of this study was to examine the effect of a volunteer-led food safety training program based on social cognitive theory on behaviors and their determinants among community women.

Methods: This is a single-blinded randomized controlled trial conducted in 8 urban health centers in Marvdasht city, southern Iran. 60 volunteers and 502 women who were selected through multi-stage cluster random sampling method participated in the study. A 4-session food safety training program was implemented for health volunteers in the experimental group (n=30). They then trained the women in the experimental group (n=260) in their local community for a month. Data were collected using validated questionnaires in the group of volunteers before and one week after the intervention and in the group of women before and one month after the intervention. Data were entered in SPSS software version 22 and analyzed using Chi-Square and comparisons between the two groups were conducted by ANCOVA. $P<0.05$ was considered as the significant level.

Results: The results of the study showed significant improvements in food safety-related behaviors and their determinants in the experimental groups, i.e., among both health volunteers and community women after the intervention. No significant changes in the study constructs (knowledge, self-efficacy, outcome expectations and behavior) were observed among women in the control group after the intervention.

Conclusion: The findings of this study were in favor of the success of health volunteers in food safety training with the aim of improving food safety-related behaviors and their determinants (within the framework of cognitive theory) among community women.

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Introduction

Food-borne diseases have been a major concern in the word.[1] About 30% of the population of industrialized countries suffer from food-borne diseases once a year, and it imposes a great economic burden on treatment systems.[2] Evidence shows that most foodborne diseases are caused by contamination or spoilage of food at different stages of production, processing, storage, and consumption chain.[3] These can happen due to improper handling of food, unhealthy practices, and environmental pollution including contamination of

water, soil and unsanitary utensils.[4] Poor personal hygiene and management among food handlers play a key role in the occurrence of foodborne diseases. This is most likely related to insufficient levels of knowledge, attitudes, and performance in food hygiene and safety.[5, 6]

It is widely understood that home environment and family practices are related to foodborne diseases. Therefore, women play an important role in the processes of food preparation, processing, and storage.[7, 8] On the other hand, studies have shown that many food handlers, including housewives, do not have sufficient knowledge and proper practices regarding food hygiene and safety.[6, 9, 10] An international study showed that the level of food safety knowledge among the Iranian community was lower than the average of developing countries.[11]

The above facts emphasize the necessity of food safety training for all those involved in the processes of food production and distribution throughout the community, including cooks, food vendors, and food handlers at home, as an important strategy in public health.[9, 12] Since women play a key role in the health of family members as well as in promotion of knowledge and healthy practices in children, empowering them in food hygiene and safety is of particular importance.[7, 13]

Evidence to show what frameworks and methodologies are effective in community-based food safety education in the context of developing countries is limited.[7, 14] There are many important contributing factors in food safety education including local language and dialects, cultural beliefs, local foods, and food preparation methods, which reduce the risk of food-borne diseases.[15] The process of teaching and learning will be more effective when new knowledge and skills are realistic, relevant, and immediately applicable.[16] World Health Organization has introduced some features as key elements for the effectiveness of health education, such as identifying audience behavior and characteristics, providing opportunities for audience participation in the process of learning and change, using community assets and resources, and trying to improve social norms and long-term changes.[17, 18]

According to social cognitive theory, the unique interaction between behavioral factors (such as patterns of food intake, participation in food preparation, and purchase), individual factors (such as taste preferences, attitudes, beliefs, self-efficacy, health concerns, people's skills, etc.), and environmental factors (such as access to healthy food at home, parents' behavior, peers' behavior and support for healthy eating) leads to a change in the people's behavior.[19] The main constructs of social cognitive theory that have been used in many studies include observational learning, outcome expectancy, self-efficiency to pursue behavior and self-confidence in overcoming barriers during activity and achieving the result.[20]

Teaching and learning through peers is one of the important implications of social cognitive theory. This method has a significant impact not only on information transfer, but also on changing attitudes.[19] Peer education improves the people's self-efficacy for preventive behaviors.[21] The finding of some studies has supported the positive role of health volunteers in social empowerment programs.[22] Some issues, such as social, personal, and family changes, and educational and organizational shortages, have been identified as a recent challenge in employing volunteers in community health promotion and social development programing.[23]

In sum, despite the shreds of evidence that support the role of volunteer-led programs for education in society, there are some different and controversial pieces of evidence. In recent years, social changes including urbanization and increasing use of electronic communication technologies necessitate the identification of appropriate fields and methods for employing volunteers.[24]

The key question of the current research was whether a volunteer-led food safety training program is effective in improving food safety-related behaviors and their determinants among community women. In other words, are community health volunteers effective in teaching food safety to women in their local communities? To answer this question in a scientific way, this study was designed and implemented with the aim of determining the effect of the volunteer-led training program based on social cognitive theory on women's food safety-related behaviors.

Methods

This study was a single-blinded randomized controlled trial (participant blinded) designed based on social cognitive theory which was conducted in Marvdasht, the second largest city in southern Iran, in 2015. There are three comprehensive health service centers in Marovdasht city. Each of these has four health service sub-centers under its coverage.

Women living in Marvdasht city and health volunteers affiliated with urban health service sub-centers of this city formed the study population. Considering healthy volunteers and using the statistics of a similar study[22] including beta=0.8, alpha=0.05, standard deviation=4, and average difference equal to 3.5, we estimated a sample size of 21 volunteers in each of the study groups. In order to maintain a sufficient sample size in the case of a drop in participants, 30 volunteers were considered for each group.

In the sampling process, those health sub-centers in which the health volunteer program was actively running were identified and selected since they had at least 10 active volunteers. Then, they were randomly

assigned to experimental (n=4) and control groups (n=4). To prevent the leakage of information between the participants in the groups, allocation was done at the cluster level. In each sub-center, 7-8 eligible volunteers were selected randomly. In the next step, a list of women served by each volunteer was compiled, and 10 women per volunteer were selected using systematic random method. Non-eligible persons were replaced by eligible ones from the lists. At the beginning, 31 volunteers entered each study group. However, at the end of the study, two of them were excluded from the study. Initially, 264 women were included in the experimental group and 258 women in the control group. However, at the end of the study, their number decreased to 260 and 242 in experimental and control groups, respectively. Consort diagram of the study is displayed in Figure 1.

The inclusion criteria for volunteers were finishing at least junior high school, having a personal desire to attend all sessions and fill out the questionnaire, and participating in 80% of the sessions held by the trainers. The inclusion criteria for women were being 20-50 years old, having basic literacy skills, attending all sessions, and filling out the questionnaire. The exclusion criteria for both women and volunteers were being absent more than one session during the course, cancellation of participation in the study, lack of attendance in the pre-test, post-test, or both.

The current study followed the declaration of Helsinki and Good Clinical Practice Guidelines and was approved by the Ethics Committee of Shiraz University of Medical Sciences (IR.SUMS.REC.1394.145); it was also registered at Iranian Registry of Clinical Trials (ID number: IRCT201608016261N13). Before the study, the participants were informed about the study process and purpose, and written informed consent was obtained from those who were eligible to participate in the study.

Data were collected by a self-administered questionnaire prepared according to scientific texts by the research team. The questionnaire included two sections. The first section contained demographic data (age, level of literacy, and income level), and the second section contained a questionnaire for measuring the constructs of the study through which the participants' knowledge about food safety was evaluated by 16 questions such as the minimum amount of time needed to wash hands before handling foods, the most definite sign of food spoilage, the most suitable place to store unused cans, and the best way to dry your

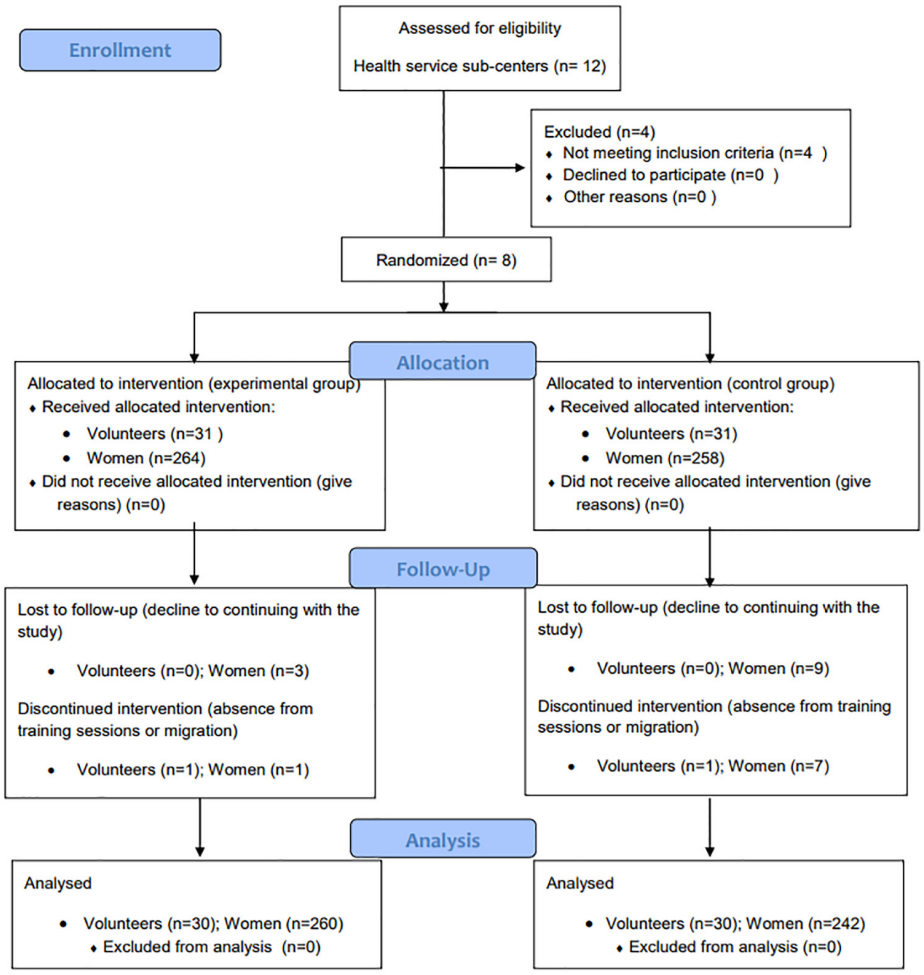

Figure 1: Follow-up diagram of the study process from the beginning to the end of the study

hands after washing your hands when preparing and serving foo. Score 1 was for correct answers and 0 for wrong answers. Outcome expectancy was measured using 13 questions (for example, the interval between the time of purchasing foods such as meat and milk and their transfer to the refrigerator do not affect their corruption; the use of separate cutting boards for preparing meat and vegetable foods has no effect on food spoilage; the use of gloves when preparing and cooking food prevents food contamination; and to defrost, placing frozen meat at kitchen temperature does not increase the chance of spoilage of the meat). The scores ranged from 15 to 65. Self-efficacy was measured using 19 questions (for example, I can keep and store foodstuff according to the information contained in their packaging; it is very easy for me to prepare and cook food in a safe and hygienic way; it is difficult for me to wash vegetables properly and hygienically; I can reheat leftover food in a way that does not cause poisoning; and I have the ability to choose and prepare healthy food). The scores ranged from 19 to 135. A five-point Likert scale ranging from 1 to 5 (1 for completely disagree and 5 for completely agree) was used to answer the items of self-efficacy and outcome expectations questions. To measure behavior, 19 questions were used (for example, I wash my hands while preparing foods; I check the refrigerator temperature daily; I wash the vegetables in a correct and hygienic way; and when storing raw and cooked food, I put it on separate floors in the refrigerator). The scores ranged from 19 to 135. The score for each question ranged from 1 to 5 (1 for never, 5 for always). The validity of the research tool was confirmed by a panel of experts (n=10). To assess the validity of the questionnaire, we calculated the CVI and CVR, which were 0.8 and 0.5, respectively; this indicated the validity of the questionnaire. The reliability was measured by conducting a pilot study with a sample (n=30) of women in the research community and calculating the Cronbach's alpha coefficient. The Cronbach's alpha coefficients for knowledge, outcome expectancy, and self-efficacy were 0.76, 0.81, and 0.82, respectively; having detected and eliminated four redundant items of the Outcome Expectation Questionnaire, the researchers calculated its Cronbach's Alpha as 0.81.

The study data were collected from the group of health volunteers at the baseline and then one week after the end of the intervention. We collected the study data from women at baseline (pre-test), before the intervention, and at follow-up (post-test) about one month after completing the training sessions. At the end of the study, educational packages were given to women and health volunteers in the control group.

The educational intervention in this study included two stages. In the first phase, health volunteers in the intervention group were trained through a four-session food safety course. Each session lasted approximately 90 to 120 minutes. In the first session, the basics of food hygiene and safety, including basic concepts and its importance in population health, were taught using interactive lectures and question and answer methods. The participants' experiences of foodborne diseases were shared. Then, the roles of women and health volunteers in the local community in preventing these diseases were explained.

During the second session, a sample of common foodborne diseases including their symptoms, signs, and ways of transmission were introduced using the lecture method along with related images. Five keys to safer food were taught using a related manual published by World Health Organization[25] as a training framework in the third and fourth sessions. Interactive lecture and demonstration along with an educational booklet were used as teaching-learning strategies in this session (Table 1). In the second step, trained health volunteers taught the content of food safety in the intervention group over a period of one month. Participants in the control group, including volunteers and women, did not receive this training. Rather, they experienced the usual programs of the health centers.

Statistical Analyses

Data were analyzed using SPSS software version 22. The Kolmogorov–Smirnov test was used to verify normal data distribution. Data were analyzed using Chi-Square test, and the two groups were compared using ANCOVA with age, educational level, and sections with significant difference between the groups at baseline as covariates. We compared the baseline values with those after the intervention within the groups through paired t-test (for continuous parametric variables) and Wilcoxon signed-rank test (for continuous, nonparametric variables). The significant level was set at $P<0.05$.

Results

According to the results, 2volunteers and 20 women were

Table 1: The blueprint of food safety training program

Session	Topics	Teaching-learning methods
First	An introduction to foodborne diseases	Interactive lecturing and sharing participants' experiences
Second	Common foodborne diseases	Lecture method
Third	Five keys to safer food	Interactive lecture and demonstration
Forth	Five keys to safer food (continued)	Interactive lecture and demonstration

excluded due to the absence of class sessions and lack of literacy. Finally, the sample size of volunteers in the control and experimental groups was 30. The sample size of women in the experimental and control groups was 242 and 260, respectively. As to selection of women, a list of households who were under coverage was prepared and selected using non-replacement sampling (In sampling without replacement, the two sample values are not independent). Practically, this means that what we got for the first one affects what we can get for the second one).

The mean age of women and volunteers was 35.35±7.45 and 33.85±7.25, respectively. 80% of volunteers in the experimental group and 60% of them in the control group were under diploma. 40.77% of women in the experimental group and 60.37% of them in the control group were under diploma (Table 2).

A significant difference was observed in the educational level between women in the experimental and control groups. The mean age of women and health volunteers in the experimental and control groups was also significantly different.

Comparison of the mean scores of the study constructs among health volunteers is shown in Table 2. A significant increase was seen in the knowledge level and outcome expectancy in the experimental group; however, its reduction in the control group was not significant. Besides, changes in the knowledge score were significant between the two groups (Table 3). In terms of self-efficacy, no significant changes were seen within the two groups, while the difference between the experimental and control groups was significant (Table 3). As to food safety behavior, a significant reduction and increase were seen in the experimental and control groups, respectively. In addition, the difference between the two groups was significant (Table 3).

Table 3 shows comparison of the mean scores of the study constructs among women. Knowledge levels and outcome expectancy score increased significantly in the experimental group compared to the baseline, while changes in the control group were not significant.

Furthermore, changes between the two groups were significant for both knowledge level and outcome expectancy score (Table 4). A significant increase was seen within groups in comparison to the baseline, and changes between the two groups were significant for self-efficacy score (Table 4). Although a significant difference was shown in the experimental group and between the two groups, the increase in the control group was not significant (Table 4).

Table 2: Comparison of demographic characteristics of the participants at baseline

Group		Women		Health Volunteers	
		Control	Experimental	Control	Experimental
Education	Under Diploma N (%)	148 (61.1)	106 (40.8)	18 (60)	24 (80)
	Diploma & associate diploma N (%)	82 (33.9)	108 (41.5)	8 (26.7)	6 (20)
	Bachelor & *Higher* N (%)	12 (5)	46 (17.7)	4 (13.3)	0
P value*		<0.001		0.09	
Age (years)	Mean±SD	37±6.58	33.8±7.87	30.73±6.77	36.91±6.41
P value**		<0.001		p<0.001	

Continuous data with normal distribution are expressed as means±SDs or n (%). *Qualitative variables were examined with Chi-Square. **Quantitative variables were tested with independent t-test. P<0.05 was considered as a significant level.

Table 3: Comparison of the mean scores of the study constructs among the experimental and control groups of health volunteers before and after the intervention

Constructs		Mean±SD (Experimental Group (n=30))	Mean±SD (Control Group (n=30))	P value**
Knowledge	Pre-test	8.9±2.11	9.36±2.02	0.38
	Post-test$^{\Psi}$	12.63±2.28	7.83±2.64	<0.001
	P value*	<0.001	0.45	
Self- efficacy	Pre-test	4.28±0.36	3.69±0.37	<0.001
	Post-test$^{\Psi}$	4±0.39	3.22±0.37	<0.001
	P value*	0.06	0.3	
Outcome expectancy	Pre-test	3.96±0.31	3.91±0.46	0.67
	Post-test$^{\Psi}$	4.06±0.45	2.63±0.37	<0.001
	P value*	<0.001	0.6	
Food safety behavior	Pre-test	4.31±0.32	3.81±0.43	<0.001
	Post-test$^{\Psi}$	4.10±0.38	3.94±0.43	<0.001
	P value*	<0.001	0.01	

Continuous data with normal distribution are expressed as means±SD. **Comparisons between the two conditions were performed by ANCOVA with age, educational level, and baseline values as the covariate. *Comparison of the data at baseline and after the intervention within the groups were done by paired t-test. P<0.05 was considered as a significant level. $^{\Psi}$Means±SD of measured parameters after 4 weeks' intervention.

Table 4: Comparison of the mean scores of the study constructs among women between the experimental and control groups before and after the intervention

Constructs		Mean±SD (Experimental Group (n=260))	Mean±SD (Control Group (n=242))	P value**
Knowledge	Pre-test	8.77±2.69	8.18±2.15	0.007
	Post-test[€]	12.63±2.28	7.83±2.64	<0.001
	P value*	<0.001	0.12	
Self- efficacy	Pre-test	3.48±0.32	3.07±0.50	<0.001
	Post-test[€]	4±0.39	3.22±0.37	<0.001
	P value*	<0.001	<0.001	
Outcome expectancy	Pre-test	2.69±0.34	2.65±0.33	0.17
	Post-test[€]	4.06±0.45	2.63±0.37	<0.001
	P value*	<0.001	0.58	
Food safety behavior	Pre-test	4.04±0.43	3.90±0.48	0.001
	Post-test[€]	4.10±0.38	3.94±0.43	0.001
	P value*	0.03	0.33	

Continuous data with normal distribution are expressed as means±SD. **Comparisons between the two conditions were performed by ANCOVA with age, educational level and baseline values as the covariate. *Comparison of the data at baseline and after intervention within the groups were done by paired t-test. P<0.05 was considered as a significant level. [€] Means±SD of measured parameters 4 weeks after post-test 1.

Discussion

This study showed that educational intervention was effective in improving the level of knowledge of health volunteers. On the other hand, the increasing the level of knowledge of women in the experimental group confirms the successful performance of volunteers in food safety education. In fact, we can be hopeful about the volunteers' ability to play a role in this regard and their capability of further participation if they are empowered at a higher level. Acquisition of knowledge is the first step in empowering people to play a role in improving their own health.[16]

This study showed that the designed educational intervention improved the knowledge of health volunteers in the field of food safety. In addition, in our study, increasing the level of knowledge of women in the experimental group confirms the successful performance of volunteers in food safety education. Thus, our results indicate the effectiveness of training women by volunteers and raising their knowledge level.

This finding is in line with the results of other studies which evaluated the effects of the education of health volunteers in disaster relief,[26] healthy lifestyle,[27] and AIDS prevention.[28] Furthermore, the findings of the research on menopausal health education by Kaveh et al. showed that educational intervention was effective in improving the level of knowledge of volunteers.[22] Nóbrega et al. indicated that in food safety training for female workers to improve the level of health and food safety, the use of different training methods such as audio-visual resources and teamwork increased the workers' knowledge.[29]

These findings indicate the effectiveness of the educational intervention in the empowerment of volunteers. This is in the same line with the findings of other studies which were conducted on the effectiveness of volunteers' education in rural women's level of knowledge and attitudes,[30] and menopausal health education by health volunteers.[22] The reasons for the increase of knowledge in this study can be designing the educational programs in four sessions through lectures, questions and answers, pamphlets, and observational teaching, expressing the experiences of individuals in a simple and friendly atmosphere, and educator's familiarity with the culture and customs of the area which had a pivotal role in increasing the women's knowledge.

In the self-efficacy section, the decrease within groups of volunteers was not significant; however, the changes between the two groups of volunteers were significant. In women, the changes within the groups were significant after the study. Comparing the control and experimental groups revealed that the increase in self-efficacy was significant in the subjects. The study of Rasouli et al. showed that none of the closed training methods and workshops had any effect on self-efficacy in diabetic patients.[31] Another study investigated the effect of an osteoporosis prevention program on three variables of knowledge, health beliefs, and self-efficacy on 31 female students. The findings indicated that the educational program improved the knowledge and health beliefs about preventing osteoporosis but did not improve the self-efficacy of individuals.[32] It is probably due to the small number of meetings. The study of Azizan et al. showed that educational interventions caused improvement in self-efficacy of sport in the elderly.[33] The other study also demonstrates the profitable effect of training of empowerment program in patients.[34]

In the food safety behavior section, a significant decrease was shown in the experimental group in healthy volunteers, and the changes between the two control and experimental groups were significant. In women, there was not any significant difference

within the experimental group after the study; however, the changes between the groups were significant. In this regard, it has been shown that education can improve knowledge and behavior, but promotion of knowledge alone cannot improve the behavior.[35] Additionally, Piaseu et al. investigated the effect of knowledge, attitude, and self-efficacy of Thai young women on exercise and calcium intake before and after the intervention in osteoporosis prevention training. Results showed that exercise knowledge and calcium intake were considered as strong factors in women's self-efficacy for healthy lifestyle behaviors.[36] In the research on the lifestyles of health volunteers, Zendehtalab et al. concluded that the lifestyle of health volunteers was considered as undesirable (below average).[37] Yarrow et al. in a study of students on the effects of food safety education on their attitudes, beliefs, knowledge, and self-report behavior on 59 students concluded that educational interventions led to improved food safety behaviors.[38] Mayer et al. in their study concluded that food safety training using social media tools had a positive effect on health behavior scores, but the difference was not significant.[39]

The scores of outcome expectations and self-efficacy constructs in women improved after the intervention. This finding is in line with those of other studies which were conducted on the consumption of fruits and vegetables in the dormitory of female students,[40] the correlation of fruits and vegetable consumption with social cognitive theory of primary school students,[41] and the prevention of osteoporosis by peers and health personnel.[23]

As the findings of the behavioral scores of the pre-test and post-test in both intervention and control groups showed that education based on social cognitive theory was effective in increasing the knowledge of the target group, but it did not change the behavior. This finding is in line with those of other studies which investigated the effect of educational intervention on decreasing the risk of AIDS in non-medical students,[42] and the effect of education on the prevention of osteoporosis.[43] One of the reasons for lack of change in the behavior of individuals in this study is that it did not assess the consequences of educational intervention in the long term (3 to 6 months later), such as the persistence of learning and changing lifestyle. Moreover, in a study on the predictors of nutritional behaviors based on social cognitive theory in pregnant women, it was determined that the constructs of outcome expectations, outcome value, awareness, and self-regulation were the best predictors of proper nutritional behavior among pregnant mothers under the study, and there was a significant relationship between knowledge and the behavior about nutrition and between self-regulation and nutritional behavior.[44] Khani Moghadam et al. in their study concluded that although the participation of health volunteers increased the average knowledge and assessment of the behavioral outcomes of pregnant women, there was no significant difference in behavioral intention change and acceptance of natural delivery instead of cesarean section,[45] which may be due to the small number of meeting and small duration of the study. It seems that this study was the first conducted in Iran in which it addressed the role of health volunteers in the field of food safety education in the community. In this study, the intervention was theory-based, and it was measured based on social theory constructs, and it measured the outcomes based on the individuals' level of knowledge and the level of their behavior. The use of the theory of behavior change, as the theoretical framework for designing, teaching, and measuring outcomes, has been another strength of the present study. In addition, the subject of instruction was highly welcomed by the trainees. The use of active and transactional approaches to learning, implemented in the workshop, will increase the effectiveness of the curriculum.

As with many other studies, this study had its own limitations, including the lack of time and opportunity to measure the sustainability of the effect of the educational intervention (3 to 6 months later). Moreover, since data collection was done through self-report, participants in this study might have been influenced by time, environment, and a large number of questions, and they might have expressed responses appropriate for that particular time or situation, or avoided expressing their true feelings and behaviors which raises the possibility of providing unrealistic responses.

Conclusion

The findings of this study showed that education might be effective in increasing the knowledge and practice of health volunteers in the field of food safety education in women and has led to an increase in the knowledge level of that group, so that after receiving sufficient training, health volunteers will be able to play a pivotal role in teaching the basic principles of food safety to women in society. Although educational programs have a positive impact on the increase of knowledge, these effects are often temporary. Therefore, training programs need to be followed continuously, which should be accompanied by adequate planning, prioritization, monitoring, support, and feedback. Thus, this study implies the ability of health volunteers to use them in line with the goals of promoting social self-efficacy and outcome expectation constructs. However, this did not lead to any change in the individuals' attitudes and behavior. Therefore, it is suggested that the potential of health volunteers should be exclusively used to promote the level of knowledge and follow-up of health care issues that have not been referred

to health centers. It is recommended that in future, studies with a larger sample size and on a larger scale should be conducted to find more accurate and reliable findings.

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