The effect of health ambassadors’ training based on social cognitive theory on brucellosis preventive behaviors in rural areas: Randomized controlled trial

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Abstract

**Background:** Brucellosis is still a serious public health threat and an endemic disease in Iran. Despite eradication programs, it is a major challenging issue for human health. This study examined the effect of health ambassadors’ training based on social cognitive theory on brucellosis preventive behaviors in rural areas.

**Methods:** This study was conducted as a randomized controlled trial. The intervention program was performed in two steps. Step 1: Training of health ambassadors by the researcher and Step 2: Training of village residents by health ambassadors. 120 residents of rural areas of Mashhad were selected from two villages using two-stage random sampling and were assigned to two intervention and control groups.

**Results:** The mean age of the participants in the intervention group was 33.9±9.07 years. There was a statistically significant difference between the mean scores of constructs of knowledge, outcome expectations, outcome value, self-efficacy, self-efficacy in overcoming obstacles, self-regulation, emotional adjustment, and behavior measurement after the intervention compared to before intervention (p <0.0001).

**Conclusion:** The results indicated that training programs based on SCT can be effective in improving brucellosis preventive behaviors. The training interventions that are designed to educate health ambassadors and villagers using social cognitive theory with a focus on individual, cognitive, environmental, and behavioral factors can improve behaviors that prevent brucellosis.

**Trial registration:**

This trial has been registered by the title of “The effect of health ambassadors’ training based on social cognitive theory on brucellosis preventive behaviors in rural areas: a randomized control trial” in the Iranian Registry of Clinical Trials (IRCT) with code “IRCT202202204053935N1”, https://www.irct.ir/trial/47529. The registration date is May 18, 2022.

**Background**

Brucellosis is one of the most common human-animal diseases. Despite eradication programs, this disease remains an endemic ailment in different parts of the world, especially in the Mediterranean region [1, 2]. Malaria is a multi-organ disease that manifests itself in severe and acute cases as a febrile (sudden or gradual) illness. This disease, if not diagnosed and treated in a timely and appropriate manner, progresses to a chronic and debilitating disease with severe and sometimes fatal complications [3]. According to the World Health Organization, about 500,000 new cases of brucellosis are reported to the organization each year, which seems to underestimate the actual number of patients with the disease, as for each case of disease with clinical symptoms, there are 12 asymptomatic cases. According to a report by the Ministry of Health and Medical Education, the incidence of brucellosis in Iran is 30 cases per 100 thousand people [4]. Furthermore, the data in the integrated health information system (SINA), the
incidence of brucellosis was 34 cases per 100 thousand people in Khorasan Razavi province in 2017, which increased to 47 cases per 100 thousand people in 2019 and 63.7 cases per 100 thousand people in 2020.

Brucellosis is a major public health problem that has not been effectively controlled, and humans are usually infected through the consumption of dairy products such as raw milk, unpasteurized cheese, and through direct contact with the skin and mucous membranes or biological materials of infected animals. Various studies have shown that non-observance of personal hygiene, consumption of milk and meat products of infected animals as well as non-separation of the places where animals are kept from animal breeders’ residence can be the most important factors in the prevalence of brucellosis [5].

Various studies have suggested that behavioral factors and misconceptions are very important in the development of brucellosis. Evidence suggests that the disease can be prevented in humans by providing the necessary training and sensitizing people at risk. Various studies have highlighted the importance of training in preventing high-risk behaviors and reducing brucellosis [6].

Given the increasing number of brucellosis cases in Iran, especially Khorasan Razavi province in recent years, the present study aimed to examine the effect of health ambassadors’ training based on social cognitive theory on brucellosis preventive behaviors in rural areas of Mashhad.

Method

Study design and sample

This interventional study was conducted as a randomized controlled. This study was design to examine the effectiveness of health ambassadors training’ based on social cognitive theory on brucellosis preventive behaviors among 120 residents of rural areas under the auspices of Mashhad University of Medical Sciences in 2020. The data in this study were collected using a researcher-made questionnaire. The inclusion criteria were having informed consent, having minimum literacy to read and write, living in a village, having active family records, and continuous participation in the training program. The participants were selected using two-stage random sampling. In the first stage, one of the health centers in Mashhad was randomly selected. In the next stage, of 32 rural health centers in Mashhad County, which were similar in terms of cultural, economic, and social context, 2 health centers were randomly selected. Then, one health center was selected as the intervention group and the other as the control group. The sample size in the control and intervention group was 60 people who were selected using random sampling. Then, 7 persons with higher education, interested in education, and a higher level of social relations were selected as health ambassadors to educate the villagers.

Intervention

The intervention program in this study was performed in two steps.
Step 1: Training of health ambassadors by the researcher: In this step, after the selection of the health ambassadors and the completion of the consent form by them, the objectives of the study and its procedure were explained to them. The intervention program was held via two 45-minute face-to-face sessions using lectures and questions and answers and 9 online sessions with instructions on brucellosis provided by the researcher.

Step 2: Training of village residents by health ambassadors: In this step, to collect the pre-test data, the questionnaires were distributed by the health ambassadors among villagers and collected after they were completed. The participants in the intervention group attended six 20-minute face-to-face sessions in the form of questions and answers about brucellosis. The sessions were conducted by the health ambassadors. In the first face-to-face session, brucellosis training pamphlets and flyers were distributed among the participants in the intervention group. However, no training was provided for the participants in the control group at the time of conducting this research project. The post-test was performed for the participants in both groups immediately after the last intervention session. The instructions provided in the training program focused on general information about brucellosis, its importance, and symptoms, the distribution of brucellosis in Iran and the world, ways to control and prevent the disease, symptoms in humans and animals, the development of brucellosis in animals, ways of transmitting the disease from animals to humans, ways to prevent and treat brucellosis in animals, measures to prevent brucellosis in humans, preventive measures to maintain environmental health and animal health. The instructions were prepared based on pre-test results, the constructs of social cognitive theory, and the Systematic Comprehensive Health Education and Promotion Model (SHEP Model) proposed by the Ministry of Health.

The instrument used to collect the data was a researcher-made questionnaire that consisted of three parts. The first part measured villagers’ demographic characteristics using 7 items on their age, sex, education, occupation, marital status, monthly income status, and family housing. The second part of the questionnaire assessed the constructs of social cognitive theory using 47 items: awareness (7 items), outcome expectations (5 items), outcome value (6 items), situational awareness (5 items), environmental perception (6 items), self-efficacy (4 items), self-efficacy in overcoming obstacles (4 items), self-regulation (6 items), emotional adjustment (4 items), and behavior measurement (8 items). The items were developed on a 5-point Likert scale from (strongly agree, agree, undecided, disagree, strongly disagree) (very much, much, little, no so much, and never).

The third part of the questionnaire contained 8 items that measured the behavior of village residents regarding the prevention of brucellosis. The items were scored on a Likert scale from strongly disagree (1) to strongly agree (5). To measure the content validity of the questionnaire, it was reviewed by 10 experts in health education and promotion. The content validity index (CVI) of the questionnaire was 0.92 and its content validity ratio (CVR) was 78%. The test-retest method was used to assess the reliability of the questionnaire. For this purpose, the questionnaire was completed for 30 participants and after 15 days the questionnaire was re-administered to them, and Cronbach's alpha coefficient for all constructs was estimated to be about 0.9.
Data Analysis

The results of this study were analyzed using SPSS version 16 (IBM Corp., Armonk, NY, USA) using the chi-square, Mann-Whitney U, and Fisher’s exact tests.

Results

In this study, the participation rate was 100%. The participants in this study were 120 residents of a village in Mashhad and were placed into the control and intervention groups. The mean age of the participants in the intervention group was 33.9 ± 90.97 and that of the participants in the control group was 36.9 ± 45.35 years. Moreover, 82% of the participants were women. In addition, 93% of them had a diploma and lower education, and 7% had higher education. The data also revealed that 87% of the participants were married and 7% were single. Furthermore, 78% of them were housewives. Table 1 shows the distribution of the demographic variables for the participants in the two control and intervention groups. As can be seen, there was no significant difference between the two groups in terms of the variables in question before the intervention.

Table 2 shows the intragroup and intergroup comparison of the participants before and after the training intervention. As can be seen, there was no significant difference between the intervention and control groups before the intervention in terms of knowledge, outcome expectations, outcome value, self-efficacy, self-efficacy in overcoming obstacles, emotional adjustment, and behavior measurement. However, after the intervention, there was a significant difference between the intervention and control groups. There was no significant difference in terms of self-regulation and behavior before and after the intervention in the control group. In contrast, a significant difference was observed in the intervention group. Furthermore, there were no significant differences in the changes in the scores of environmental perception and situational awareness in the intervention and control groups before and after the training intervention.

Figure 1 shows the changes in the constructs of social cognitive theory before and after the intervention. The data indicated that the mean scores of the constructs of the social cognitive theory were significantly different for the participants in the intervention group compared to the control group.

Discussion

The total burden of brucellosis remains widespread [7]. This infection has been eradicated in developed countries, but due to the endemic nature of this disease in Iran, the need for educational programs to adopt preventive behaviors is felt. Considering more animal husbandry in the village and the prevalence of Malt fever, this intervention study was adopted. The results of this study showed that the mean scores of knowledge, outcome expectations, outcome value, self-efficacy, self-efficacy in overcoming obstacles, self-regulation, emotional adjustment, measuring behavior increased significantly after the intervention.
for the participants in the intervention group compared to before the intervention, but the changes the mentioned variables were not significant for the control group.

The results this study indicated that the mean score of knowledge after the training intervention in the intervention group increased significantly compared to the control group. These findings were in line with the results of previous [4, 8, 9]. If people do not have the knowledge and information about behaviors that affect their health, they will not know the reasons for their behavior change and it will be difficult for them to adapt to the new behavior. Knowledge of risks and benefits associated with health-related behaviors is a prerequisite for behavior change. Therefore, the most important way to prevent brucellosis is to increase people's knowledge and awareness, which can be done through the development of educational programs using mass media such as radio, television, and also the personnel of health centers.

Outcome expectations are one of the constructs of the social cognitive theory that was examined in this study. The results showed that outcome expectations were not significantly different between the two groups before the intervention. However, outcome expectations increased significantly for the participants in the intervention group after the intervention. These findings confirmed the effect of the intervention on change in the belief of rural residents in achieving the possible consequences of adopting preventive behavior of brucellosis. The results in the present study showed that the more positive the predictions of individuals about the possible consequences of performing brucellosis prevention behaviors, the more likely they are to perform those behaviors as indicated by previous studies [10–12].

The present study also showed that the mean score of outcome value after the training intervention increased significantly for the participants in the intervention group compared to the control group, confirming the effectiveness of the intervention in the participants' valuation of brucellosis preventive behaviors because people tend to engage in behaviors that are satisfying and valuable to them [13, 14]. Emphasis on health aspects seems to enhance the value of the outcome. Outcome expectation variables and outcome value in Bashirian [15] et al.'s study related to students' fruit and vegetable consumption and Aqdasi [16] et al.'s study on nutritional behaviors in children's weight change after educational intervention had a significant increase, which was in line with the findings of our study.

The results of the present study indicated that situational awareness of the participants in the intervention group did not increase after the training intervention compared to the control group. This confirms that the training intervention did not have a positive effect on improving the understanding of environmental and social conditions of rural residents and their engagement in brucellosis prevention behavior in the intervention group. It seems that this construct is less effective in contributing to the prevention of brucellosis [17–19].

The findings of this study indicated that environmental perception after the training intervention did not increase significantly in the intervention group compared to the control group because the construct of the environmental assessment does not seem to be effective in preventing brucellosis as indicated by Ghasemi Ghale et al. [4]. This finding was not in line with the results reported [20, 21].
Self-efficacy is one of the constructs of the social cognitive theory that can play an important role in changing behavior. In the present study, the mean score of self-efficacy increased significantly after the training intervention for the participants in the intervention group compared to the control group as suggested by the previous studies in the literature\(^\text{12, 22–24}\). Another construct of the social cognitive theory that was examined in this study is self-efficacy in overcoming obstacles. The findings of this study indicated that after the training intervention, the participants in the intervention group reported higher levels of self-efficacy in overcoming obstacles compared to the control group. This finding highlights the effect of training in removing barriers that prevent the improvement of self-efficacy in overcoming barriers and ultimately the adoption and continuation of brucellosis prevention behaviors. The evidence from the literature also supports this finding [23, 24]. Self-efficacy for overcoming obstacles is a person's belief in overcoming obstacles while performing a behavior. If there is no obstacle to overcome in performing the behavior, personal change will be easy. Some of the personal barriers prevent behavior and form an integral part of self-efficacy evaluations. Self-efficacy beliefs can be measured against existing challenges in successful action.

The findings of this study confirmed that the level of self-regulation improved significantly after the training intervention in the intervention group compared to the control group as confirmed by other studies [16, 25, 26]. In fact, self-regulation is a technique that can be used to identify and overcome obstacles that may prevent a person from performing a behavior. In this case, the person gets motivation to continue the program by seeing the result of the change and the fact that he was responsible for the change.

The evaluation of the mean scores of emotional adjustment in this study showed that the mean score of emotional adjustment improved significantly after the training intervention for the participants in the intervention group compared to the control group [15, 25, 27]. Holding educational programs has reduced people's stress.

The main focus of this study was on empowering people to prevent brucellosis using a training program developed based on social cognitive theory. This training program induced a significant difference in brucellosis prevention behaviors by increasing knowledge, self-efficacy, self-efficacy in overcoming obstacles, and self-regulation. These findings were in line with the results reported in the literature [3, 14, 28, 29]. It is necessary to have intervention training programs to correct behaviors undesirable design and implementation.

Following the findings of the present study, it can be argued that despite the negative effects of using online social networks such as reducing book reading and eliminating face-to-face conversations, these networks can be used as a platform for teaching and learning. Furthermore, the capabilities of health ambassadors can be used in health education as an effective step in promoting community health.

Limitations
The present study was conducted at the time of the COVID-19 pandemic in Iran. Thus, there were restrictions on holding face-to-face training sessions. Besides, the COVID-19 outbreak made people afraid and unwilling to participate in the research project.

**Conclusion**

Following the findings of the present study, the variables of knowledge, outcome expectations, outcome value, and self-regulation are important determinants of village residents' behavior. The results of the present study showed that training interventions that are designed and implemented to educate health ambassadors and villagers using social cognitive theory with a focus on individual, cognitive, environmental, and behavioral factors can improve behaviors that prevent brucellosis.

**Declarations**

**Competing interests**

The authors declared that there is no conflict of interest.

**Authors' contributions**

Conceptualization: MM, MD. Data curation: MM, MD. Formal analysis: TKH, MD. Funding acquisition: MD. Methodology: MD, MM, TKH. Project administration: MM. Visualization: MD, MM. Writing original draft: TKH. Writing - review & editing: MD, MM, TKH.

**Funding**

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**Availability of data and materials**

Data and materials of this study are available from the corresponding author upon reasonable request.

**Ethics approval and consent to participate**

The present trial was approved by the Ethics Committee of Gonabad University of Medical Sciences (Ethics committee reference number: IR.GMU.REC.1400.075. The investigators declare the trial has received ethical approval from the appropriate ethical committee. Signed informed consent will be completed by all participants, prior to randomization.

**References**


Tables

<table>
<thead>
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<th>Variable</th>
<th>Category</th>
<th>Groups</th>
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<td>Control</td>
<td>Intervention</td>
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<td>Age</td>
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<td>33.90 ± 9.97</td>
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Table II: Comparing the constructs of social cognitive theory before and after the intervention
<table>
<thead>
<tr>
<th>Construct</th>
<th>Stage</th>
<th>Intervention group</th>
<th>Control group</th>
<th>Mean difference (CI: 95%)</th>
<th>P-value</th>
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<td>Awareness</td>
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<td>17.38 (18.65–16.1)</td>
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<td>Post-intervention</td>
<td>20.96 (20.87–21.04)</td>
<td>17.80 (17.09–18.50)</td>
<td>3.16 (2.46–3.85)</td>
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<td>Outcome expectations</td>
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<td>21.58 (20.66–22.49)</td>
<td>20.20 (18.21–86.53)</td>
<td>1.38 (-0.04–2.80)</td>
<td>0.057</td>
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<td>24.82 (24.25–53.10)</td>
<td>20.48 (19.21–21.74)</td>
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<td>Value</td>
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<td>27.40 (26.28–52.27)</td>
<td>27.42 (26.28–55.28)</td>
<td>-0.02 (-1.1–31.27)</td>
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<td>Post-intervention</td>
<td>29.92 (29.30–79.04)</td>
<td>27.36 (26.50–28.21)</td>
<td>2.56 (1.3–69.42)</td>
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<td>Situational awareness</td>
<td>Pre-intervention</td>
<td>13.96 (12.15–65.26)</td>
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<td>13.20 (11.14–43.96)</td>
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<td>17.18 (14.19–99.36)</td>
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<td>Construct</td>
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<td>Control group</td>
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<td>27.88 (26.28–88.87)</td>
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<td>Post-intervention</td>
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<td>35.76 (34.36–56.95)</td>
<td>3.36 (2.4–07.65)</td>
<td>&lt; 0.001</td>
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**Figures**
Figure 1

Comparing the constructs of social cognitive theory before and after the intervention

Supplementary Files

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- LettertoEditorAimsandScopestatement.docx