Preventive Behaviors of Malta Fever in Country Women: A Family-Based Empowerment Model

**ABSTRACT**

**Aims** Brucellosis (Malta fever) is one of the most common zoonosis diseases. The role of the family in preventive behaviors against brucellosis is important, so this study was conducted to determine the relationship between preventative behaviors of brucellosis and family-based empowerment models in women in families with brucellosis patients in Iran.

**Instrument & Methods** 200 people participated in this descriptive study through the multi-stage cluster method. Data were collected through demographic questionnaires, awareness, attitude, self-efficacy, and self-esteem and behavior. Data were analyzed using SPSS software and independent T-tests, one-way analysis of variance, and Pearson and Spearman correlation and regression.

**Findings** 96 (48%) participants had a history of brucellosis, 174 (87%) had a history of contact with livestock, 131 (65.5%) had a history of consumption of unpasteurized dairy products \((r=-0.218, p=0.003)\). Based on the independent t-test, a significant relationship was observed between pasteurized dairy consumption and housekeeping with preventive behavior \((p=0.039)\) \((p=0.455)\). Variance analysis test showed a significant relationship between the level of education and preventive behavior \((p=0.002)\). According to the linear regression model, the relationship between self-efficacy and behavior was significant \((p<0.001)\), and self-efficacy had more predictive power than other constructs.

**Conclusions** In countrywomen, self-efficacy plays an important role in predicting behavior. In order to promote preventive behaviors against brucellosis, people's self-efficacy should be improved.

**Keywords** Brucellosis; Preventive behavior; Self-efficacy; Empowerment
Introduction

Brucellosis tends to become chronic and can easily become a chronic type and impose many problems on the patient due to relapse and failure of treatment [4]. Brucellosis is known as a thousand-face disease due to its long-lasting effects [5]. The prevalence of brucellosis varies widely from country to country. The disease is endemic in many Eastern Mediterranean regions, including Iran, and Iran is ranked fourth in the world in terms of disease incidence [6]. According to the Ministry of Health report in 2016, the prevalence of brucellosis is high in Khorasan Razavi, South Khorasan, East Azerbaijan, etc. [7]. In Torbat-e-Jam city, located in Khorasan Razavi province, the incidence of brucellosis has been increasing, and the pollution in recent years is many times more than the national rate (38.2% of a thousand people; 958 patients in Torbat-e Jam and 220 patients in Balajam region in 2018) [7]. In Iran, brucellosis is considered a major health problem; because, in many areas, livestock is a source of income and employment. The economic consequences of destroying the affected animals are very high, and due to the chronic and recurrent physical and mental disabilities, it incurs many medical expenses for the country's medical organizations [8]. In the last two decades, the number of families caring for the chronically ill has been growing. The illness of a family member changes the whole family's lifestyle and upsets the balance of the family [9]. Families are the most valuable and vulnerable resource for chronic patients, and they play an essential role in supporting their patients [10]. Training the family members about disease control and its prevention can be very helpful. There is a strong link between family and members' health status, and individuals (especially in chronic diseases) are dependent on their family members, and the family affects even their attitudes [11]. Risky behaviors are the most important factor in endangering the health of society. The combination of high-risk behaviors leads to risky lifestyles [12]. In the case of brucellosis, high-risk behaviors, including inappropriate behaviors such as consumption of unpasteurized dairy products, lack of personal protective equipment such as masks and gloves when working in the barn and warehouse, and contact with livestock secretions of infected animals, which are completely related to insufficient knowledge and awareness of people, their self-efficacy status and attitude [5]. Preventing high-risk behavior depends on increasing the level of awareness and improving the level of attitudes and beliefs, and a prerequisite for disease prevention is to understand the reasons for the formation of high-risk behavior in individuals [13]. Training can be one of the most effective and cost-effective primary prevention approaches. Training depends on its effectiveness and changing or creating health behaviors [14]. The most effective educational programs, based on theory-based approaches that are rooted in patterns of behavior change. These templates are useful for application designers; because they suggest special aspects for training interventions [15]. One of the models used to change health behaviors in patients is the family-centered empowerment model. Health educators emphasize empowerment measures as a major practical way to improve the health of patients and their families [16]. Family empowerment means helping the family to make a power of change. So to help the family to succeed, they must be guided to change the lives of each member of their family [17]. The main purpose of the family-based empowerment model is to empower the family system (patient and other family members) to improve the level of health [18]. The family-based empowerment model has been designed in three motivational and psychological dimensions (self-confidence, self-control, and self-efficacy) based on the characteristics such as knowledge, attitude, and perceived threat, emphasizing the role of the individual and other family members [19]. In this model, perceived threat means understanding the complications and problems caused by a particular disease or health condition, the probability of infection or the level of risk to the patient, and preventive behaviors as appropriate reactions. Self-efficacy means a person’s confidence in being able to perform self-care tasks optimally [20]. Finally, self-esteem encompasses beliefs about oneself an individual's subjective evaluation of their worth [21] (Figure 1).

![Family-Centered Empowerment Model](image)

Various studies, including a cross-sectional study on cognitive factors related to preventive behaviors of brucellosis in patients (application of the empowerment model) by Babazadeh et al. [22], confirmed the importance of identifying the factors influencing preventive behaviors. Given the importance of brucellosis and the role of families and caregivers of patients, and the importance of identifying the factors affecting preventive (or high-risk) behaviors, it is necessary to...
identify the most effective factors involved in forming these behaviors. Therefore, this study aimed to determine the predictive factors of preventive (high-risk) behaviors among rural women based on the family-based empowerment model.

Instrument & Methods

This descriptive study was carried out between 200 women from households with at least one brucellosis patient in January and February 2017 in the Balajam area of Torbat-e-Jam city. Out of 269 people, 200 people were selected by multi-stage cluster sampling method; in such a way that each of the villages of this region was considered a cluster, and eight villages were randomly selected. Then 25 households were randomly selected. Women who lived in the disease centers were included in the study at least six months ago. People who did not consent to participate in the study were removed. The three-part questionnaire of demographic information, awareness, self-efficacy, attitude, and behavior (researcher-made) and Rosenberg self-esteem were used to collect the necessary data. In order to validate the content of the researcher-made part of the questionnaire, a team of experts, including six health educators, two epidemiologists, and two physicians, assessed the questions in terms of appropriateness, relevance, necessity, and usefulness. After applying experts' opinions, one statement was excluded from the domain of awareness and two statements from the domain of attitude (due to the low content validity ratio), and a self-efficacy statement (due to the low content validity ratio and index). The questionnaire was completed experimentally by 15 women (these individuals were not among the 200 main participants and were excluded from the main study). The final questionnaire included demographic information (age, marital status, occupation of subjects and their spouses, education of subjects and their spouse, size of home, income of spouse, and household size (total population divided by the number of households= number of members of each household) history of brucellosis in family members, history of brucellosis in individuals, history of contact with livestock and history of consumption of unpasteurized dairy products); model constructs (awareness, self-efficacy, attitude, and self-esteem) and behavior measurement. Knowledge about brucellosis was measured through 15 questions such as "raw and undercooked meat can be effective in transmitting malt fever" with three options of true (3 scores), no idea (2 scores), false (1 score). Its reliability coefficient was 0.75. The attitude was measured through 12 questions: "I believe that livestock vaccination is important to prevent brucellosis in humans" with three options: I agree, disagree, and have no idea with the points of 3, 2, and 1, respectively. The reliability coefficient of this area was equal to 0.93, and obtaining a higher score shows a positive attitude. Caregivers self-efficacy questionnaire included seven questions such as "If I get sick, I can take my medication properly" through 3 options of agree, no idea, and disagree by the points of 3, 2, and 1, respectively, and its reliability coefficient was 0.97. Finally, self-esteem by caregivers of brucellosis patients was measured by the Rosenberg self-esteem scale. The self-esteem questionnaire included ten questions such as "I feel that I am a valuable person at least equal to others" through the two options of agree and disagree with scores of 2 and 1, respectively. The reliability and validity of this questionnaire have been measured in many studies, including the Rajabi study, which has an internal consistency coefficient of 0.84.[23] Preventive measures against brucellosis with 17 questions such as "I use a mask and gloves when working in the stable and cleaning animals" was measured by the Likert scale with a score of 1 to 5 from never to always, and its reliability coefficient was 0.99.

The study was approved by the Research Ethics Committee of Mashhad University of Medical Sciences. Ethical considerations in this study include obtaining the informed consent of participants, the confidentiality of participants' information, a full explanation of research objectives for participants, and reservation of exclusion rights for participants. The subjects filled out the questionnaires by the self-report method. In cases where the person was not literate enough, the health workers asked questions from the participants. General linear regression was used to determine the effect of knowledge, attitude, self-efficacy, self-esteem, and some demographic variables on behavior.

Findings

This study was carried out between 200 women affected by brucellosis. The mean age of participants was 39.20 12 12.52. Of the total participants, 188 (94%) were married, 192 (96%) were housekeepers, 81 (40.5%) had primary education, and 188 (94%) had incomes below one million Tomans. In addition, 96 (48%), 174 (87%), 131 (65.5%), and 156 (78%) of the subjects had a history of brucellosis, contact with livestock, unpasteurized dairy consumption, and the history of brucellosis in family members, respectively (Table 1). The results of the mean scores of the questionnaire answered by the subjects have been shown in Table 2.

The correlation test showed a significant (inversely) relationship between age and behavior, and the relationship between awareness and behavior was not significant (r=0.144, p=0.055). However, self-efficacy was significantly related to behavior (p<0.001), and other variables were not significantly related to behavior (Table 3).
Table 2) The relationship between age, family size, and the dimension of family-centered empowerment model with preventive behaviors of brucellosis in women

| Variables | Correlation coefficient | Confidence interval | p-value |
|-----------|-------------------------|---------------------|--------|
| Age       | -0.218**               | (-0.35, -0.08)     | 0.003  |
| Family size | 0.062**               | (-0.08, 0.21)     | 0.393  |
| Knowledge | 0.144*                 | (-0.003, 0.285)   | 0.055  |
| Attitude  | 0.139*                 | (-0.008, 0.278)   | 0.064  |
| Self-efficacy | 0.506**               | (0.39, 0.62)     | <0.001 |
| Self-confidence | -0.086**             | (-0.23, 0.05)    | 0.328  |

*Pearson; **Spearman; ***Bootstrap confidence interval

There was a significant inverse relationship between home infrastructure (less than 120 square meters) and preventive behavior (p=0.006), so that in houses with a smaller area, the average score of preventive behavior was higher. Consumption of pasteurized dairy products and preventive behavior showed a significant relationship (p=0.039). The mean score of preventive behavior was higher in people who consumed pasteurized dairy products. There was no significant relationship between income below one million Tomans and preventive behavior (p=0.064); there was also a significant relationship between housekeeping occupation and preventive behavior (p=0.045). Indeed homemakers had higher mean scores of preventive behavior (Table 4).

Table 4) The Mean±SD of brucellosis prevention behaviors in women at different levels of explanatory variables

| Variables                          | Number | Mean±SD | t-value | p-value |
|-----------------------------------|--------|---------|---------|---------|
| **Family history of brucellosis** |        |         |         |         |
| Yes                               | 156    | 55.28±13.16 | -0.954 | 0.341  |
| No                                | 44     | 57.52±13.35 | 0.925  | 0.393  |
| **Home built up area**            |        |         |         |         |
| <120 meters                       | 103    | 58.16±13.52 | 2.79   | 0.006  |
| >120 meters                       | 86     | 52.87±12.26 |        |        |
| **Women history of brucellosis**  |        |         |         |         |
| Yes                               | 96     | 57.44±12.43 | 1.68   | 0.094  |
| No                                | 104    | 54.22±13.74 |        |        |
| **Livestock contact history**     |        |         |         |         |
| Yes                               | 26     | 70.47±15.05 | -1.74  | 0.082  |
| No                                | 26     | 65.16±12.87 |        |        |
| **History of unpasteurized dairy**|       |         |         |         |
| Yes                               | 131    | 54.3±13.19  | -2.07  | 0.039  |
| No                                | 69     | 58.51±12.87 |         |        |
| **Marital status**                |        |         |         |         |
| Married                           | 188    | 55.97±13.25 | 0.925  | 0.356  |
| Divorce/widow                     | 12     | 52.18±12.25 | 2.01   | 0.045  |
| **Employment status**             |        |         |         |         |
| Housewife                         | 192    | 56.16±13.20 | 4.66   | 0.004  |
| Others                            | 9      | 46.62±6.79  |         |        |
| **Income status (Tomans)**        |        |         |         |         |
| Less than 1 million               | 188    | 55.31±13.04 | -1.86  | 0.064  |
| 1-3 million                       | 12     | 62.90±14.27 |         |        |
| **Spouse’s Income status (Tomans)**|      |         |         |         |
| Less than 1 million               | 132    | 56.04±13.53 | 0.96   | 0.923  |
| 1-3 million                       | 68     | 55.83±12.70 |         |        |

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Analysis of variance test showed a significant relationship between education level and preventive behavior (p=0.002); so that the average score of preventive behavior in people with a diploma and higher education was much higher. In addition, a significant difference was observed between the mean of the behavior of illiterate people and people with the Literate of reading and writing with people with a diploma and higher education (p<0.05; table 4).

According to the linear regression model, only the relationship between self-efficacy construct and behavior was significant, and self-efficacy had more predictive power than other structures (p<0.001; Table 5).

Table 5) The simultaneous relationship of structures on preventive behaviors of brucellosis using multiple regression model in rural women

| Variables          | Regression coefficient | Standard regression coefficient | Test statistics | p-value |
|--------------------|------------------------|-------------------------------|-----------------|--------|
| Knowledge          | -0.036                 | -0.012                        | -0.162          | 0.871  |
| Attitude           | 0.226                  | 0.073                         | 0.995           | 0.341  |
| Self-efficacy      | 2.75                   | 0.508                         | 7.208           | 0.001  |
| Self-confidence    | -0.535                 | -0.076                        | -0.084          | 0.280  |

Coefficient of determination=0.273

Discussion

This study aimed to determine the preventive behaviors of brucellosis in rural households with brucellosis patients based on the family-based empowerment models. Nearly half of the participants had a history of brucellosis, and a high percentage of people had a history of contact with livestock. Contact with livestock is one of the most important risk factors for brucellosis, consistent with the results of a study by Sudjani et al. [24]. In addition, more than half of the participants had a history of consuming unpasteurized dairy products. Consumption of unpasteurized dairy products has been identified in most studies as a major risk factor for the disease, and the results of the study by Soodjani et al. [24] are consistent with these results.

The majority of participants had a history of brucellosis in family members, which was quite expected given the inclusion criteria in this study. Also, family members usually behave similarly in the same circumstances because of similarity of attitudes. Therefore, it is quite normal for members of a family to become a disease. The mean score of preventive behavior of brucellosis in women was not high, and due to their low level of knowledge, attitude, self-esteem, and self-efficacy, this was expected, and various studies such as Babazadeh et al. [22] have confirmed these results.

The results of this study showed a significant but inverse relationship between age and behavior. Younger people were more likely to follow preventive behaviors, and this is consistent with the study of Babazadeh et al. [22] and Bath-Jordan and Chang [25] and is inconsistent with the study of Choi et al. [26] because the target groups of the studies are different and in the mentioned study, the target group is the patients.

Although the relationship between consciousness and behavior was direct, it was not significant. In other words, knowledge and awareness do not necessarily lead to preventative behavior. This result is in accordance with the study of Tabog et al. [27] but it is not in accordance with the study of Arts et al. [18]. In these studies, preventive behavior has increased in line with the increase of awareness. In this case, this result can be attributed to the difference in the samples. In addition, other factors have a synergistic effect with awareness and lead to desirable behavior. For example, self-efficacy showed a significant relationship with preventive behavior, and those who showed the most behavior change had higher self-efficacy to perform the behavior. Many studies such as Babazadeh et al. [22], Babaei et al. [29] have confirmed this relationship.

There was a significant relationship between home infrastructure and preventive behavior, so that the more infrastructure, the more preventive behavior. This issue can be attributed to the impossibility of keeping livestock at home and therefore no contact with livestock and observing desirable preventive behaviors. Consumption of pasteurized dairy products was significantly associated with preventive behaviors. Those who care about their health avoid many of the risk factors for brucellosis. The consumption of unpasteurized dairy products is one of the most important risk factors for brucellosis. These results are in accordance with the study of Abdul Wahab et al. [30]. There was an inverse significance between income and preventive behavior. The higher the income of individuals, the lower the rate of preventive behaviors. People’s high income is usually related to their busy schedule, and
In this study, self-efficacy can be effective in making less important preventive behaviors. The results of the present study are consistent with the study of Babazadeh et al. [22]. There was also a significant relationship between housekeeping and preventive behavior, and the rate of preventive behavior was higher in housewives. However, most participants were housewives, and it is practically impossible to compare with other occupations. Some studies have shown the opposite results. Indeed, occupation as a risk factor depends entirely on the relationship between livestock and animal husbandry. In rural communities where animal husbandry activities are mostly performed by housewives, these people are more exposed to common diseases between humans and animals, including brucellosis. Soodjani et al. [24] showed that the highest frequency of the disease is related to homemakers, which means that preventive behaviors are not observed in the subjects. Analysis of variance test showed a significant relationship between education level and preventive behavior. So that the average score of preventive behavior in people with a diploma and higher education was much higher. There was a significant difference between the mean behavior of illiterate and literate people in reading and writing with people with the diploma and higher education. The relationship between education and knowledge of individuals and its effect on behavior has been observed in many studies, including Babazadeh et al. [22] and Babaei et al. [29]. Furthermore, the relationship between self-efficacy structure and behavior was significant, and this relationship has been studied and confirmed in many studies, including Shirazizadeh et al. [31]. According to the results, self-efficacy had more predictive power than other structures, and this result is in accordance with the results of the study of Babaei et al. [29]. The results of this study showed that self-efficacy is the only predictor of preventive behavior of malt fever. Studies have shown that self-efficacy has a strong effect on health behaviors, and self-efficacy increases ability, competence, and adequacy. It is the strongest and most powerful structure and tool in preventing behavior change and increasing mastery of self-efficacy behavior [31]. In studies, self-efficacy has been one of the most important factors influencing behavior. For example, in the study of Babazadeh et al. in determining the effect of educational intervention based on the family-centered empowerment model in correcting high-risk behaviors in patients with brucellosis, self-efficacy has been reported as one of the most important factors in predictability [20]. The strengths of this study are the use of the family-centered empowerment model; because family-centered care is a philosophy in which the importance of the family unit is recognized as the focus of all health care and leads to the empowerment of individuals and their families in disease management. The limitation of the present study was the collecting of responses and information by a self-reported method. Considering a significant relationship between preventative behavior and self-efficacy of women in families affected by brucellosis, it is suggested that in training interventions for caregivers of brucellosis patients, special attention be paid to education and income status to improve self-efficacy, care skills, and provision of the training.

Conclusion
In rural women, self-efficacy plays an important role in predicting behavior. Therefore, in order to promote prevention behaviors of malt fever, people’s self-efficacy should be improved.

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