

The level of awareness and attitude of residents over 18 years of age in the villages covered by the health and treatment center in two rural areas in Zanjan province regarding the ways of brucellosis transmission

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ABSTRACT

Introduction: Brucellosis is the most common zoonotic infection all over the world that can cause acute or chronic symptoms. The present study was aimed at determining the level of awareness and attitude of residents over 18 years of age in a number of villages in Zanjan province (Abhar and Khorramdarreh districts), where this information can provide correct information to the relevant officials in order to formulate control programs.

Materials and Methods: In this study, 350 samples were randomly selected from a number of rural areas of Zanjan province. The data collection tool was a researcher-made questionnaire to measure knowledge and attitude, and the data was analyzed using SPSS software version 18.0, and the average knowledge and attitude of the people was also reported.

Results: The average age of the participants in the study was 43 years. 32.3% of the participants were male and 67.7% were female. The average knowledge score of all participants was 49 ± 17.01 , which have demonstrated a significant relationship with occupation, owning livestock and history of livestock vaccination. In terms of occupation, employees (64 ± 17.73), people with animal husbandry and people who mentioned the history of animal vaccination, obtained higher scores, respectively (52.79 ± 17.62 ; 35.41 ± 17.62). The average percentage of positive attitude was found to be 24.5% and people who had a diploma and had a history of brucellosis exhibited a higher score in terms of attitude.

Conclusion: Study participants had low knowledge and attitude. It is suggested to consider educational programs to improve the level of knowledge and attitude of villagers about brucellosis.

Key words: investigation of awareness, attitude, brucellosis

INTRODUCTION

Brucellosis or undulant fever is the most common zoonotic infection that is transmitted to humans through direct or indirect contact with infected animals and their products. More than 500,000 new cases of the disease occur in the world annually, which have different distribution in different regions [1]. The cause of this disease is a gram-negative bacillus called *Brucella*, which is destroyed by pasteurization and boiling [2]. This disease is of great importance in most parts of the world, especially in developing countries, in terms of public health and its impact on the socio-economic status of society. In many developed countries, the control of this disease in animals has caused a significant reduction in its prevalence in human populations, but it is relatively common in developing countries, especially in the Mediterranean, Western Asia, and parts of Africa and America [3]. According to the report of the World Health Organization, 500,000 people are reported to be infected with Maltese fever every year, and even in developed countries, only 1 to 22 cases are reported [4].

The type and complications of Malt fever vary depending on the type of bacteria transmitted from the animal. *Brucella melitensis* is the most pathogenic species that causes the most severe symptoms, the most tissue damage and the most frequent localization in the organs, systems or tissues of the body. This is usually transmitted in connection with direct or indirect contact with infected sheep, goats or their products, which is the most common cause of human brucellosis in the world and Iran [5]. *Brucella suis* bacteria is capable of causing chronic inflammatory lesions in the reproductive organs, necrosis and abscess. *Brucella abortus*, which is usually the source of its infection in cattle, has minimal pathogenicity, but it is capable of producing tissue damage by forming abscesses, although it is much less than *B. melitensis* [6]. *Brucella canis*, the exclusive host of which is the dog, is rare, but causes clinical manifestations similar to other species [7]. This disease occurs in two types, acute and chronic, and has various clinical features that make it difficult to diagnose [8]. In general, the disease starts acutely with constant or regular fever and intermittent periods, especially profuse sweating at night, fatigue, anorexia, weight loss, headache, muscle pain, and general body pain appear, and these symptoms appear in acute, subacute, chronic, and local forms, depending on the type of *Brucella* and the severity of the disease [9]. Therefore, the aim of this study was to investigate the awareness and attitude of people in rural areas about this disease in Zanjan province, Iran.

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METHODS AND MATERIALS

This cross-sectional study was conducted among the residents over 18 years of age in the villages covered by the health center in Abhar city (Khorasanlo, Pirsqa, Kabudchashmeh, Dashblag, Kohzin) and the villages under the health center in Khorramdarreh city (Nasirabad, Alvand, Shuvir, Rahmatabad).

Sample size

The present study was conducted on 350 villagers over 18 years of age under the coverage of Abhar and Khormadreh health and treatment center using a researcher-made questionnaire.

Procedure

The data collection tool was a researcher-made questionnaire, the validity of the content of this questionnaire was confirmed by extensive use of texts and the opinions of experts, including 3 infectious disease experts, a pediatric infectious disease subspecialist, and a social medicine expert. The internal consistency of the questionnaire was evaluated using a pilot sample of 30 people and Cronbach's alpha. Also, the reliability of the questionnaire was evaluated using a test-retest.

Questionnaire questions were set in three sections of demographic information (including age, sex, education level, occupation, owning livestock and if having livestock, history of livestock vaccination, history of brucellosis and consumption of local dairy), items related to knowledge and attitude. There were 12 questions in the knowledge section.

After approving the proposal, we went to the research center of the university and received a letter to guide the thesis. A code was assigned to all cases and systematically according to the sample size and the number of available cases, people over 18 years of age were randomly included in the study. Then the prepared questionnaire

was provided to the participants voluntarily by inviting the selected person to the health center.

Data analysis

To check the difference in means, the normal distribution of the data and its compliance with the normal distribution were evaluated using the Kolmogorov-Smirnov test, and if this test was not significant, parametric tests were employed. To compare the mean scores among people with different age groups, one-way analysis of variance was used, and if significant, Tukey Test was used. Non-parametric tests were used if the data distribution did not follow the normal distribution. (Man Whitney for comparing two independent groups and Kruskal-Wallis test for multiple groups). A P value less than 0.05 considered statistically significant. Analyzes were done using SPSS statistical software version 18.

Ethical declaration

The trial is conducted in accordance with The Declaration of Helsinki, and regulations of ethics research committees of the University of Medical Sciences. The trial was approved by The Research Council of the Faculty of Medicine.

RESULT

This study was conducted on 350 residents of the villages of Abhar and Khorramdarreh health centers in order to investigate their knowledge and attitude about brucellosis transmission. The response rate of the participants in this study was 100% and the average age of the participants was 43 years. Among the participants, 237 were women and 113 were men. In terms of occupation, 199 people were housewives, followed by 51 farmers, 37 workers, 29 students, 18 livestock farmers, 13 employees, and 3 farmers and livestock farmers. In terms of age, 241 people were between 18 years and 40 years old, followed by 40 years to 60 years old (91 individuals), and over 60 years old (18 individuals). In

Tab. 1. The average scores of the study participants regarding their knowledge of the transmission methods of Malta fever

| Variable | Condition | SD ± Mean | p-value |
|---|---------------------|---------------|---------|
| gender | Man | 51.46 ± 19.02 | 0.064 |
| | Female | 47.86 ± 15.87 | |
| Age | 18 years-40 years | 48.49 ± 17.96 | 0.567 |
| | 40 years-60 years | 49.45 ± 13.96 | |
| | Above 60 years | 52.88 ± 17 | |
| education | illiterate | 44.61 ± 14.11 | 0.325 |
| | Elementary-guidance | 49.45 ± 16.91 | |
| | diploma | 50.18 ± 17.11 | |
| | university | 47.5 ± 20.94 | |
| Job | housewife | 47.46 ± 15.47 | *0.001 |
| | Farmer | 52.09 ± 18.72 | |
| | rancher | 53.33 ± 14.38 | |
| | Employee | 64 ± 17.73 | |
| | manual worker | 44.21 ± 18.01 | |
| | student | 50.75 ± 20.62 | |
| | Farmer and rancher | 68 ± 8 | |
| have livestock | Yes | 52.97 ± 17.62 | 0.001 |
| | no | 46.4 ± 16.10 | |
| Vaccination of livestock | Yes | 53.14 ± 17.07 | 0.001 |
| | no | 46.9 ± 16.62 | |
| history of infection | Yes | 49.09 ± 17.76 | 0.986 |
| | no | 49.02 ± 16.98 | |
| Consumption of unpasteurized dairy products | Yes | 49.87 ± 18.71 | 0.513 |
| | no | 48.56 ± 16.02 | |

terms of education, 39 people were illiterate, followed by primary and middle school education (168 individuals), diploma (119 individuals) and university education (24 people). Among all the participants in the study, 140 people had livestock, of which 118 had vaccinated their livestock. 22 people had a history of brucellosis and 124 people mentioned consumption of local and non-pasteurized dairy products. The results have demonstrated that the average knowledge scores of the participants in the study were 49 points out of 100 points.

Table 1 shows the average scores of the participants in the study regarding their knowledge of the transmission ways of undulant fever.

The results showed that gender, age, education level, history of brucellosis and non-pasteurized dairy consumption had no significant relationship with the knowledge level of the study participants. However, occupation, having domestic animals

and the history of livestock vaccination have shown a significant relationship with the level of knowledge of the participants in the study. Regarding the occupation, only the difference between housewives and employees was statistically significant in the POST HOC test.

The highest frequency of positive attitude was related to the estimation of the extent of the disease in rural areas (47.1%) and the lowest positive response was related to the full effect of drug treatment in improving the condition of patients (9.4%; Table 2).

The results of Table 3 only showed a significant relationship of attitude scores with education level ($p=0.044$) and history of disease ($p=0.019$). In relation to the level of education in POST HOC test, a significant difference was shown between people with a diploma and illiterate people, so that the average attitude scores of people with a diploma were higher than those with no education. ($p=0.026$).

Tab. 2. The percentage of the frequency of positive attitude of the participants in the study by attitude questions

| Questions | I agree | No idea | I disagree |
|---|-------------|------------|--------------|
| I don't care enough about the value of using local dairy to risk malt fever. | 83 (23.7%) | 41 (11.7%) | 226 (64.6%) |
| I consider myself vulnerable to this disease | 95 (27.1%) | 66 (9.18%) | 189 (54%) |
| According to what I have heard from others, enduring the pain and symptoms of Malt fever is unbearable for me | 77 (22%) | 52 (14.9%) | 221 (63.1%) |
| The prevalence of this disease seems to be high in the rural area where I live | 165 (47.1%) | 69 (19.7%) | 116 (33.2%) |
| Prevention of Malt fever is not very difficult and impractical | 65 (18.6%) | 51 (14.6%) | 234 (236.9%) |
| Even if malt fever disease has a high prevalence, it will not be less important than other diseases. | 63 (18%) | 64 (18.3%) | 223 (63.7%) |
| Insuring livestock will not impose unnecessary costs | 118 (33.7%) | 75 (21.4%) | 157 (44.9%) |
| With correct and complete medical treatment, malt fever can be completely cured | 33 (9.4%) | 44 (12.9%) | 78 (77.1%) |

Tab. 3. Average attitude scores according to sex, age, level of depression, occupation, owning livestock, vaccination status of livestock, history of brucellosis and consumption of non-pasteurized dairy products

| Variable | Condition | SD ± Mean | p-value |
|---|---------------------|--------------|---------|
| Gender | Man | 18.53 ± 3.22 | 0.506 |
| | Female | 18.75 ± 2.61 | |
| Age | 18 years-40 years | 18.7 ± 2.63 | 0.078 |
| | 40 years-60 years | 18.92 ± 3.11 | |
| | Above 60 years | 17.27 ± 3.65 | |
| Education | illiterate | 17.53 ± 3.47 | *0.044 |
| | Elementary-guidance | 18.69 ± 2.71 | |
| | diploma | 19 ± 2.66 | |
| Job | university | 18.91 ± 2.93 | 0.408 |
| | housewife | 18.66 ± 2.66 | |
| | Farmer | 18.36 ± 3.54 | |
| | rancher | 19.5 ± 3.25 | |
| | Employee | 19.53 ± 2.69 | |
| | manual worker | 18.24 ± 2.96 | |
| Have livestock | student | 18.75 ± 2.48 | 0.644 |
| | Farmer and rancher | 21 ± 1.73 | |
| Vaccination of livestock | Yes | 18.77 ± 2.83 | 0.416 |
| | no | 18.62 ± 2.82 | |
| History of infection | Yes | 18.85 ± 2.89 | 0.019* |
| | no | 18.59 ± 2.79 | |
| Consumption of unpasteurized dairy products | Yes | 18.77 ± 2.78 | 0.527 |
| | no | 17.31 ± 3.21 | |

Tab. 4. The frequency of the positive attitude of the participants in the study by sex, age, level of depression, occupation, owning animals, vaccination status of animals, history of infection and consumption of non-pasteurized dairy products

| Variable | Condition | Mean |
|---|---------------------|-------|
| gender | Man | 26.42 |
| | Female | 24.25 |
| Age | 18 years-40 years | 24.35 |
| | 40 years-60 years | 31.02 |
| | Above 60 years | 35.43 |
| education | illiterate | 31.41 |
| | Elementary-guidance | 24.83 |
| | diploma | 23.1 |
| | university | 24.47 |
| Job | housewife | 24.9 |
| | Farmer | 27.17 |
| | rancher | 62.5 |
| | Employee | 50 |
| | manual worker | 31 |
| | student | 24.1 |
| | Farmer and rancher | 33.3 |
| Have livestock | Yes | 23.75 |
| | no | 25.77 |
| Vaccination of livestock | Yes | 25.83 |
| | no | 25.5 |
| History of infection | Yes | 40.9 |
| | no | 22 |
| Consumption of unpasteurized dairy products | Yes | 23.5 |
| | no | 25.77 |

Table 4 shows the frequency of the positive attitude of the participants in the study by sex, age, education level, occupation, owning livestock, vaccination status of livestock, disease history and consumption of non-pasteurized dairy products. The results have demonstrated that the average positive answers were more than 50% only in livestock farmers (62%). The average percentage of positive answers in people who had a history of undulant fever ranked next.

DISCUSSION

Brucellosis causes great disability for both humans and animals. This disease is an important cause of economic damage and a public health problem in many developing countries [10]. The results of the present study showed that the average knowledge score of the participants in the study is 49 points out of 100 points. When the results of the study were analyzed in terms of individual questions, the results were as follows: In relation to animals that can transmit undulant fever to humans, almost two out of five participants answered all the options correctly. Regarding transmission through food products, less than 1% of the participants were able to answer all the options correctly. However, more than three fourths of the participants gave the correct answer to the possibility of transmission through closed enclosures. Although 90% of people had correct information about the existence of an effective vaccine in livestock, less than half of the participants were aware of the absence of an effective vaccine in humans. About the method of killing this bacteria through boiling, cooking and pasteurization, less than one percent of people answered correctly to all three options. Regarding the minimum time required to boil milk to kill the undulant fever agent, only one third of the people chose the correct answer.

The information of the participants in the study is significantly more about the effect of separating the sick animal from the herd than killing the infected animal as a prevention method of Malt

fever, where the rate of correct response to the effect of separating the sick animal was almost twice the effect of killing the infected animal. These results can indicate that the participants in the study do not have enough knowledge about the ways of disease transmission, when their average knowledge was slightly lower than 50 points.

The present study did not show a significant difference between the average scores according to age, gender and non-pasteurized dairy consumption. Further, the knowledge of the participants in the study was also evaluated according to their level of education, and the results showed that people with a diploma level of education had significantly higher average knowledge scores than illiterate people.

Overall, the results of this study have shown the trend of increasing knowledge from illiterate people to higher education levels. However, the scores of university students were slightly lower than those with diplomas. Increasing the level of health literacy in people who receive formal education during school (although sporadically) is not an unexpected result. The lack of a significant difference between the knowledge level of university students and people with a diploma level of education can be attributed to the academic fields of the people, and these academic fields are usually not related to health and public health. In addition, in order to access public media, education even at the middle school level can meet the minimum needs of readers and those who refer to these media.

The results of this study also showed no significant difference between the average knowledge scores of people with a history of undulant fever and those without a history, so that the average scores in these two groups were almost equal. These results are far from expected and can even be worrisome because it was expected that people would gain more knowledge due to illness and contact with health service providers. Although it can be expected that people with a history of previous infection had less

information about the transmission ways of brucellosis. However, receiving the necessary training could be effective in improving patients' knowledge of brucellosis transmission ways.

Considering the special and fundamental role of education in primary health care (which is even considered as one of the eight basic components of PHC), it was expected that effective education would be provided for sick patients. On the other hand, the issue of patients' participation in medical care is also one of the four components of clinical governance, where patients must actively participate in their treatment processes. One of the initial and effective steps for the participation of service recipients can be the education of patients, which seems that no effective measures have been taken in this field at the treatment level. Of course, insufficient attention to related explanations and educational tips on the part of patients is one of the common problems for doctors. In addition, in this study, the knowledge scores of the participants were also examined according to occupation. The results showed that the scores of employees were significantly higher than those of housewives. This can be due to the higher education of employees than non-employees.

Moreover, the results showed that livestock breeders had higher knowledge than those who did not have livestock. Although it can be expected that the majority of people who owned livestock had a lower level of education, the share of educated people or employees in the participants was not so high that it could have a deterrent contribution in this field. As a result, it can be expected that the role of obtaining information from different fields as well as the supervision of the custodian organizations in this regard has been more pronounced, leading to the improvement of the knowledge of these people. Also, the amount of knowledge in people with a history of livestock vaccination was higher than people who did not express such a history. It can be expected that people will be aware of the importance of animal vaccination and, the ways of disease transmission and its prevention, necessarily due to more knowledge. People with insufficient knowledge have the least cooperation with the vaccinators of veterinary offices.

The study of Lindahl et al. (2014) on 441 farmers in Tajikistan, in line with the results of the present study, showed that the knowledge of the study participants was weak. However, Lindahl's study participants had very little knowledge when 85% of participants had no knowledge of the disease. In addition, their study also evaluated the level of education as effective in the level of knowledge about brucellosis, so that people with a higher level of education also had a higher level of knowledge [11]. In 2015, a study was conducted on 420 farmers to determine the level of awareness about brucellosis in Pakistan, and the result showed that almost all farmers (97%) did not know about the ways of brucellosis transmission. While in our study, the awareness level of farmers was higher [12].

As mentioned, the present study showed that only nearly one-fifth of the people participating in the study had the necessary information regarding the possibility of disease transmission through animal products such as abortion products and childbirth secretions. These results are in line with the findings of Musallam in Jordan on rural herdsmen. However, a lower percentage of participants in the Musallam study (13% vs 19%) had this type of knowledge. This type of knowledge is very important especially for livestock farmers, especially in the population of the current study

where a large part of them are livestock farmers (about 40%), [13].

Also, a similar study was conducted in Abdanan by Esmaili and colleagues (2015) on 400 livestock farmers in two intervention and control groups, the result of which highlights the importance of education on people's awareness, attitude and performance [14].

The results of a study conducted in 2008 by Mazloumi Mahmood Abad and colleagues on high school students aged 14 to 19 years in Yazd regarding brucellosis and its effects clearly indicated that the knowledge of these students significantly improved after the intervention (12.40 vs 19.97), this shows that doctors play a significant role in controlling this endemic disease, e.g., health education programs. As mentioned above, the role of doctors in teaching the symptoms of this disease and the ways of its transmission and prevention is very prominent and important [15]. In line with the results of the present study, Obonyo et al. study evaluated the level of knowledge of villagers in Kenya as average. Considering the fact that Kenya is one of the low-income countries and our country is at least one of the middle-income countries, the comparability of the results of the present study with the study of Kenya may not be fair to some extent. However, it is possible that the type of questions asked and possibly the different difficulty factor in the two surveys were not ineffective in this regard [16].

Regarding the attitude of the participants in the study, the average positive answers were less than 25%, which shows that the participating villagers did not have a good attitude regarding this disease. Although a high knowledge cannot necessarily guarantee a proper attitude, however, in order to have a proper attitude, it is necessary for people to have the necessary knowledge in relation to that particular subject. As mentioned in the above lines, the participants in the study did not have proper knowledge, which could affect the inappropriate attitude in the present study. The effect of training on improving knowledge and attitude has been confirmed in previous studies. For instance, the results of a study conducted in 2008 by Mazloumi Mahmood Abad and colleagues on high school students aged 14 years to 19 years in Yazd regarding brucellosis and its effects, clearly indicated that the attitude and performance of students significantly increased (12/40 vs 19/97) after the training program by doctors. This issue expresses the importance of education in improving people's attitude. The result of the study by Esmaili et al. clearly revealed the effect of education in improving the attitude of the participants in the study. The result of the study by Lindahl and colleagues in Tajikistan about the attitude showed that 63% of the participants wanted to receive more information in this regard, while others believed that they did not need to have information.

The results of the present study also showed that the attitude of livestock farmers is significantly better than other groups regarding this disease. This can be related to more contacts of livestock farmers with experts in different fields from relevant organizations. In addition, this group is mostly looking for relevant information from public media and peers. Also, in the present study, people with a history of disease, despite the fact that their knowledge was not much different from people without a history of disease, these people had a better attitude. This can be related to the type of attitude questions that are related to the risk of contracting the disease and the vulnerability of the person

(attitude regarding vulnerability changes due to the disease). The value of using local dairy products, the painfulness of the treatment of the disease and the failure of the treatment are among the things that can dramatically change people's attitudes after contracting the disease. This study also showed that the average percentage of positive answers in most of the groups examined in this study was lower than 50% (except for livestock farmers, 62%).

The study of Obonyo, et al., in line with the present study, showed that more than 60% of the respondents consider brucellosis to be a serious disease. However, they had a low attitude (less than 50%) regarding the treatability of the disease, the importance of vaccination, and maintaining hygiene against aborted animals.

CONCLUSION

Considering the insufficient knowledge of the villagers regarding the ways of transmission of undulant fever, it is concluded that the employees working in the health care centers should provide more training for the villagers and especially the livestock farmers, e.g., animal vaccination, high-risk food products (non-pasteurized dairy products), ways to kill disease agent, the minimum time needed to boil milk and kill disease agent, necessary education about the importance and treatability of the disease, and prevention of the spread of undulant fever by isolation and extermination. Infected animals.

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