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**DESIGN AND DETERMINE THE VALIDITY AND THE RELIABILITY OF
BRUCELLOSIS EDUCATION QUESTIONNAIRE BASED ON HEALTH BELIEF MODEL**
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Abstract

Brucellosis can resulting in long period of convalescence, incapacitation in humans, and abortions in livestock, reduce production and productivity in livestock breeding which consequently created many problems for the country. One of the most important ways to control disease is health education for involved groups. Each education tools must be weighed in terms of validity and reliability based on the established standards. The aim of present study included to evaluate content validity and reliability of the questionnaire which made by researcher based on HBM training for brucellosis control. The applied indicators in presents study were qualitative and quantitative validity, content validity ratio (CVR) and content validity index (CVI). Intra-class correlation coefficient (ICC) and Cronbach's alpha coefficient were used for analyzing of reliability in SPSS-21 software. According to the calculated item impact score, three questions received less than 1.5 score. Except two questions, other questions were received equal or greater than 0.75 points for content validity ratio. Intra-class correlation coefficient for the total scale was 0.923 and for different parts of questionnaires obtained in the range of 0.9 to 0.944. Cronbach's alpha of questionnaire indicated the reliability of 0.882 which for different parts of the questionnaire were ranged about 0.762 to 0.948. The applied method in present study can be considered as a valid and reliable tool for using in education and used to assess the level of awareness, knowledge and performance program to prevent brucellosis. In addition, the results indicated that statistical indicators is useful for determining the validity and reliability of questionnaire.

Keywords: Validity, Reliability, Questionnaires, Health Belief Model, Brucellosis

Introduction

Brucellosis is one of the zoonosis disease, which the disease factor transmitted to human directly through contact or indirectly by using contaminated livestock's product. This disease also identified with other names such as Raging fever, Mediterranean fever and Brucellosis (1). This disease affected both gender in any ages. Brucellosis is an infected contagious disease, which have known as thousands, faces disease. Treating of this disease may last for several month, for this reason it considered as a chronic disease (2). Although controlling Brucellosis program have implemented in most of the world's country, but because of creating resistance in animals, the disease is still exist in most of the countries and caused the humans and animals infection (1, 2). Annually a hundred thousand cases of this disease reported from Europe's Mediterranean country, north and east of Africa, Middle East, north of Asia, central Asia and south America. Due to the length of recovery period in human, disability in human, abortions in livestock, reducing the production and productivity in livestock, and considering the economic load of Brucellosis, this disease have a great importance (3). Brucellosis due to its infection capability and economic load, could have considered as a bioterrorism factor (4). In a few numbers of countries the disease number reach zero, however among the residents who travel to the countries, which the Brucellosis is endemic in them, still some cases have observed (5-7). Developing the traditional livestock, lack of creating efficient Veterinary system and using traditional foodstuffs caused the fact that Brucellosis considered as a serious risk for health in developing countries particularly Iran (3, 4). Insecurity in region and neighborhoods countries and livestock smuggling caused the fact Brucellosis have an increasing trend in recent years in border province of the country. The first important factor in reducing and removing the Brucellosis is controlling the disease in livestock. If controlling the livestock still is not possible, by creating proper educational program with health system, preventing the prevalence of the disease in human is possible (8). The specialist believed that the effectiveness of health educational program is mostly depend on using theories and health educational models, therefore choosing a pattern for health education is the first step in educational programing process (9). One of the models that could used in individuals level for explaining the health behavioral changes is Health Belief Model (10). This pattern considered behavior as a function of knowledge and attitude and according to its component pushing people to have healthy behavior in a way that could increase the sensitivity and perceived intensity of individuals. For infecting by Brucellosis and according to the barriers and perceived benefits, it guides the individuals to the preventive behavior. In other words, the health benefit models are a pattern of society,

which mostly have preventive role, and the base of this pattern is individual motivation for action (11). Health belief model as an individual's health behavioral pattern have create in 1950 by Hokbam and Rosen stack in America and then for increasing its efficiency have modified by Baker & Mayman in 19740 (11, 12). This pattern have used by different specialist in various behavioral fields for designing and evaluating the intervention which were effective in behavioral changes. Based on this model, as long as these factors not educate for the individual respectively and the individuals not affected with them the preventive health behavior have not applied by the person (13). These factors include perceived sensitivity: understanding and believing the fact that the person have exposed to brucellosis. The perceived intensity: perceived and believing the fact that brucellosis is a serious problem and this health problem could cause serious adverse effect on human health or death. Perceived barriers: physical barriers, psychological or financial etc. which are against health behavioral of person and prevent its adaption (10-13). Perceived benefits: a person's belief and thought in adherence or observing health suggestion, which is effective in preventing brucellosis or reducing its intensity and disease adverse effect. For evaluating the effective level of these factors in preventive educational program of this brucellosis an educational questionnaire have prepared based on the health belief model. Questionnaire or any other educational tools before applying should have based on the necessary evaluation standard, validity and reliability (14-16). For evaluating a validity of the tools specialist persons who are expert in this field and subject have used. The reliability means that the results of using an evaluation tool after a period in a certain group of individuals, to what extend the results are consistent with the first result. According to the importance brucellosis disease and proper use of health belief model for doing the educational program the aim of this study is validity and reliability evaluation content of a questionnaire for brucellosis based on the health belief model in order to use in educational programs.

Material and Methods

In this study, first by reviewing the related studies a questionnaire with 58 questions in various part have prepared and designed with researchers. The questionnaire contains six demographic question (personal information that related to brucellosis in family), eight question about awareness surveying. Also it have five question about perceived sensitivity, six question about perceived barriers, four question about perceived benefits, three question about perceived performance, four question about subjective norm, five question about norm beliefs, five questions about the attitude of behavioral results and seven question about the attitude of behavioral changes in terms of brucellosis. For scoring the questions the five choices Likert scale have used which include (strongly agree), (agree), (do not have

any idea), (disagree) and (strongly disagree) with the score of 5, 4, 3, 2, 1 respectively. Then for each of the evaluated fields in the questionnaire, the validity and reliability of the content have done. For evaluating the validity two qualitative and quantitative method have used. The qualitative validity determination in a specialist member group with the presence of six-health specialist, including two epidemiologist, two public health, one hygiene educator, and one environmental health have used for recognizing proceeding, the appropriateness and inappropriateness of the questionnaire, ambiguities and shortcomings of the phrases and sentences in the questionnaire. In fact their opinion for changing the questions structure after the group opinions verification have used in the questionnaire. The quantitative validity determination by using the calculation of item impact scores have done for each question. For evaluation, the validity, the target group samples opinion or the research's participants have used. For this study first for each of the 60 questions of the questionnaire, a Likert range with five different score have considered in strongly important (5score), important (4 score), averagely important (3 score), a little important (2 score) and not important (1 score). Then the questionnaire for validity determination have given to 20 persons of the second level students of first period in high schools, After completing the questionnaires by target groups the validity have calculated by using item impact score method:

$$(\text{Impact score}=\text{Frequency} \times \text{Importance})$$

In qualitative content validity evaluation, four person of the epidemiology expert and public health expert have asked to after accurate studying of the questionnaire, present their opinion in a writing form in order to modify it. In qualitative validity evaluation, the factors, which should considered, include observance of the grammar questions, the importance of questions, using proper words for each questions, the importance of questions, proper arrangement and suitable placement of the questions and the time of questions completing. After collecting the expert opinion, the necessary changes have done in the questionnaire and then for the assurance of choosing the best content and for qualitative validity evaluation of the content, the content validity ratio have used. For assurance of a suitable designing questionnaires questions, the content validity index have used.

For determining the content validity ratio the questionnaire have given to eight person of the health expert, in epidemiology field (two person), public health (four person), environmental health (two person) and they have asked to answer each questions in the form of (it is necessary), it is useful but not necessary) and (it is not necessary). For each answers the content validity index have calculated based on the $CVR = \left(n_e - \frac{N}{2} \right) / \left(\frac{N}{2} \right)$

Which in this formula CVR is (content validity rate), n_e is number of the expert who used the necessary choices and N is the total number of the expert group. In fact, this index have calculated based on the adaption with the Lawshe table and the number of more than 0.75 were acceptable (17).

Evaluation of the content validity index CVI have done based on the content validity index of Waltz &Bausell. For determining this index, again the questionnaire have given to the mentioned experts and they have asked to give their opinion about three simple, relevance and clarity criterions of each questions based on the four scores Likert scale range. The experts determine the simple item by 1(it is not simple), 2 (almost simple), 3 (it is simple) and 4 (totally simple). They determine the relevance of each item by using 1 (not relevance), 2 (almost relevance), 3 (relevance) and 4 (totally relevance). The clarity of items determined by 1 (it is not clear), 2 (almost clear), 3 (it is clear) and 4 (totally clear). The CVI have calculated by dividing the total score of agreement for each item which have three and four score (the highest score) on the total number of voters. In this study by using CVI formula and accepting items with higher number than 0.79, the content validity index have calculated (18).

After evaluating the validity, for surveying the reliability of the questionnaire, the retest-test have used which is an indicator for the repeatable capability of an index. This test method is represent the consistency of the evaluation results of a quality in a sample but in two different time, which for measuring the consistency level the statistical method have used. For this reason the final version of the questionnaire with validity evaluation have given to 45 person of the first period high schools student. Then three weeks after that, they have asked to complete the questionnaires again. Moreover, the results of each test have analyzed by determining the interclasses correlation coefficient and Cronbachs alpha coefficient for confirming the questionnaires reliability in SPSS-21 software. According to the fact that, there is a normal standard deviation between repeated data of a test in two-interval time, in terms of statistic, this significant difference should not exist between these two.

For determining the level and variances between the results of a test and its repeated, the ICC interclass correlation coefficient have used (19). The ICC index calculated the evaluation of the answers after and before the test, variances between individuals in terms of answer to a question, and the variances between the primary and second answer to a question by a person and finally showed total number between zero-1 (20). This index have obtained between -1-+1 and as it tending to +1 it showed the appropriate correlation between the questionnaire's questions. In addition, it is a good sign for the questions reliability, generally the numbers of higher than 0.7 is determined as a proper coefficient for the reliability (21).

Results

After determining the qualitative validity of a questionnaire by the experts group, the questionnaire was distributed among the target group students of the study and each item's effective situation was measured based on the Likert scale. For the acceptance of each item, the effective score of it should not be less than 1.5 and the questions, which have less score than it has, are not acceptable in terms of validity and should be reviewed by the expert group in terms of placement in the questionnaire. The results of determining the effect of items showed that three questions reached the score of less than 1.5, therefore these questions were reviewed and evaluated again in a six individual group and two questions of it were removed and one of them was modified.

After evaluating the results for CVR based on the Lawshe table it was revealed that all the questions except two of them have equal or higher score than 0.75. These results showed that the existing questions in the questionnaire were selected properly and showed the applicability of the questions, total relation with the brucellosis disease and necessary educational approaches. The results of the content validity index showed that except for four questions the other questions reached the score of higher than 0.79 and according to the standards, this index for replacing in the questionnaire was determined properly. From four mentioned questions, three scores reached 0.71, 0.73 and 0.76 scores respectively which according to the closeness of it with related standards, it was reviewed and modified by the group members and after reaching higher score than 0.79 it would be placed in the questionnaire. The content validity index score for one of the questions calculated 0.58, which this question after education was recognized unacceptable by the group and removed from the questionnaire, at the end for the whole questionnaire and its different part the CVR and CVI were calculated by separation (table 2).

The target group, which was studied for content validity determination, included 45 persons of the first period of the high schools students, which live in the villages of the Divan Dareh city, and demographic properties of the group were presented in table 1. The target group's average age was 14 years with the standard deviation of two years and 57.8% of it was formed by boys and 42.2% of it was formed by girls. Only 17.8% of the total group received the basic education about brucellosis by the health workers. In addition, brucellosis was observed in 13.3% of the families. All the group members (100%) completely in both periods of test and other tests answered the questions of the questionnaire completely. The required time for answering the question along with the interview was on average 27 minutes (the range of 21-39 minutes) (table 1). The results showed that the ICC for the whole questionnaire was 0.923 and for the different part of the questionnaire was between 0.9-0.944 (table 2). Based on the results of this study the evaluated

questionnaire based on the index have a proper structural correlation. The target group have enough perceived of the questions and evaluated the correlation between the questions properly which showed the validity of the questionnaire. For determining the validity of the questionnaire, the cronbachs alpha test have used. Calculation of the cronbachs alpha for various part of the questionnaire were a number between 0.762-0.968, which this fact showed the validity of the questionnaire (table2). The cronbachs alpha coefficient for whole the questionnaire have calculated 0.882.

Table-1: Demographic characteristics of the participating target group in the content validity research.

Variables		Mean (S.D)	Median	N	%	Min-Max
Age		14(2)	14	46		11-15
Sex	Male			26	57.8	
	Female			19	42.2	
Literacy level		8(1)				7-9
Is there educational experience for brucellosis?	Yes	8			17.8	
	No	37			82.3	
History of Brucellosis disease in the family	Yes	6			13.3	
	No	39			86.7	

Table-2: ICC and Cronbach's alpha coefficients for different parts of the ultimate questions.

Fields of questionnaire	Number of questions	The content validity index CVI	The content ratio validity index CVR	The ICC coefficient	The Cronbach's alpha coefficient
Knowledge	6	0.96	0.93	0.944	0.941
Perceived susceptibility	5	0.85	0.83	0.912	0.886
Perceived severity	5	0.93	0.87	0.932	0.85
Perceived barriers	6	0.95	0.96	0.934	0.882
Perceived benefits	4	0.93	0.92	0.936	0.92
Practice	3	0.93	0.94	0.90	0.936
Soft subjective	4	0.86	0.87	0.942	0.762
Softness beliefs	5	0.85	0.83	0.924	0.798
The attitude on consequence of the behavior	5	0.93	0.95	0.942	0.864
The attitude on the behavior	7	0.9	0.92	0.924	0.948
The entire Questionnaire	50	0.91	0.90	0.923	0.882

Discussion

Giving importance and attention to the education of preventing all disease such as brucellosis have considered the major process in health system. In order to reach a standard for presenting a proper education always the scientific approaches should use. In this questionnaire for knowledge, attitude and practice evaluation of the students about the brucellosis, based on the health belief model have evaluated by determining the item impact, content validity rate, content validity index, interclasses correlation coefficient and cronbachs alpha. The results showed that this tool obtained the necessary application and it could use as applicable tool in a determining and evaluating the knowledge, attitude, performance, barriers and benefits of the target groups program in the case of implementing the proper educational program for preventing the infection of the brucellosis. In a study which have done by Inge et al. in Netherland which was about evaluating the knowledge, attitude of the disease in sufferers, for evaluating the questionnaires validity, the structural validity and comparing it with guidelines have used . By retest-test and ICC calculation, the cronbachs alpha reliability of the questionnaire have evaluated, which for this, first the Somatic Pre-Occupation and Coping questionnaire have translated to Dutch and Based on the health standard it have localized in Netherland. The results structural correlation level by cronbachs alpha coefficient was (0.79-0.94) and the level of the ICC coefficient was 0.72-0.91. Using this questionnaire, which have proper validity for using in health system of Netherland, evaluated suitable (22). For conducting the present study, the target group of the students in the first period of high schools has considered which from the reason of choosing this group we could mentioned the accessibility of this level in most of the villages, proper literacy level, and their ability in translating the data. In a study, which has done by Moghadam et al. about determining the knowledge, attitude, and practice of dairy farmers about brucellosis by a tool, they evaluated the literacy level relation with receiving education and knowledge. In Moghadam et al. study a questionnaire with 33 questions have used which 16 questions were related to knowledge, 12 questions were related to attitude and 5 questions related to practice and the calculation have done by a Likert scale. The validity of the questionnaire have confirmed by the university's master and it reliability have obtained 0.75 by cronbachs alpha. The study have showed that the knowledge level in literate people have a significant relation in comparison with illiterate people. In addition, Shokravi et al. study with the title of evaluating the educational program effect on preventive behavior of brucellosis by using a case-control group, the results showed that the knowledge, attitude, practice, and preventive behavioral level in target groups before and after implementing the study have a significant difference with each other (23). By using this questionnaire before and after implementing,

the educational program the effectiveness and efficiency of the educational method could discover. Also using this tool in various regions determined the effect of education level in preventing the brucellosis. In the present study, it have revealed that although brucellosis disease have identified as an endemic disease but the students' knowledge about brucellosis disease have not in proper level which this fact caused preventive behaviors and in fact caused the increased of the disease load. The result of this research is consistent with Vafaie et al. study about the university's students of Kashan medical science university. In this study a questionnaire have used which totally the average knowledge level of 407 person of the students was 5.07 score from 10 score. Which for medical and paramedical students it was less than the necessary standard. This study has showed that the educational and informative preventive program against disease in the universities of the country needs some changes (24). The results of the present study showed the use of statistical index in determining the questionnaires validity and reliability. Of the limitation of the questionnaire we could pointed at the cross-sectional property of this study, and using one target group in a particular geographical point which other studies in various part of the country particularly with high prevalence of brucellosis should have done.

Conclusion

Brucellosis is one of the zoonosis disease, which annually have a heavy expense for health and treatment system of the country. Educating the preventive method of this disease in rural region is the best and most practical fighting approach with this disease. In this study by using the statistical methods, the validity and reliability of the questionnaire based on the health belief model have evaluated which could use by health experts in health and treatment centers for proper education and increasing the knowledge level. In fact, it would help to reduce the load of this disease in the country. By designing and conducting this study a necessary step for focusing on brucellosis disease in Iran specially Kurdistan provenance have taken in order to by more attention to it could reduce and eradicate the disease.

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