



Original Article

Design and Validation of Knowledge, Attitude and Practice Questionnaire for Breast Cancer: An Exploratory and Confirmatory Factor Analysis

Pouryousef S¹, Yeganeh S^{2*}, Rouhandeh R¹, Pirzadeh Z³, Keshavarzi S³, Bahmani T⁴

1. Faculty of Paramedical, Gerash University of Medical Sciences, Gerash, Iran
2. Faculty of Nursing, Gerash University of Medical Sciences, Gerash, Iran
3. Student Research Committee, Gerash University of Medical Sciences, Gerash, Iran
4. Faculty of Nursing, Fasa University of Medical Sciences, Fasa, Iran

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Abstract

Background & Objective: The early identification of risk factors by screenings methods, as low-cost diagnostic tests with high survival rates, has always been of paramount importance for cancer diagnostics, especially in breast cancer. Since knowledge, attitude, and practice studies offer a desirable way to examine the status and make predictions, this study aims to design a valid and reliable instrument to assess breast cancer risk factors, symptoms, and screening methods.

Materials & Methods: The Waltz method was used to develop the questionnaire. The exploratory factor analysis with a sample size of 390 and the confirmatory factor analysis were carried out using Amos software and SPSS 22, respectively. The reliability of the instrument was also assessed on 30 women over a one-month interval using the Cronbach's alpha and test-retest method.

Results: The preliminary 87-item was finally developed into three sections: attitude (14 items and 2 factors with CVI=0.92, CVR= 0.72 and α = 0.76,) knowledge (16 items and 5 factors with CVI= 0.99, CVR= 0.85 and alpha 0.87) and practice checklist (8 items and CVI = 0.94 and CVR =1).

Conclusion: The results suggested desirable psychometric properties of the questionnaire and its strength and validity in evaluating knowledge, attitude, and practice for identifying factors influencing breast cancer.

Keywords: Knowledge, Questionnaire, Breast Cancer, Function, Attitude

Introduction

Today, the side effects, survival rate, and psychological-socioeconomic causes of cancer are known to anyone. Also, the early identification of risk factors by screenings methods, as low-cost diagnostic test with high survival rates, has been highly regarded in cancer diagnostics, especially for breast cancer (1-3). Breast cancer is the second leading type of cancer among women worldwide (2). The mortality rate of breast cancer in developing countries has risen by more than 50% from 2002 to 2020(4). In Iran,

the situation is somehow different, as breast cancer is ranked first among cancers with a high prevalence rate of 33.21 per 100,000 people. Also, the age of breast cancer development in Iran is 10 years younger than in western countries. However, although breast cancer is one of the most preventable types of cancers, in Iran 30% of patients are diagnosed in the advanced stages of cancer due to late referral to medical centers (5, 6).

Many factors can affect the identification and screening of breast cancer, including knowledge, age, education, culture, attitude, and employment. The effect of screening knowledge on early detection of breast cancer is known to anyone so that more than 90 percent of breast

*Corresponding Author: Yeganeh Sedigheh, Faculty of Nursing, Gerash University of Medical Sciences, Gerash, Iran.
Email: s-yeganeh@gerums.ac.ir
<https://orcid.org/0000-0001-8243-0589>

cancers are initially self-reported, though cultural and attitudinal issues should not be neglected. Cultural factors can prevent people from performing self-exams and screening despite their awareness of the importance of screening (7). One way to gain more knowledge about the society and the attitude of people is KAP¹ studies. These studies represent a well-known approach that provides a great opportunity for the researcher to understand obstacles and facilitating factors, and to create a path that is expected of the community(8). However, an integral part of KAP studies is a questionnaire used to raise public awareness, fill the knowledge gap, and persuade people to use screening methods. Questionnaires are only effective when their validity and reliability have been confirmed in the target language and culture(9). In Iran, several studies have investigated women's knowledge and attitude towards breast cancer like Naghibi (10) and Eyvanbagha (11), and various questionnaires have been developed for this purpose (9). However, each questionnaire just covers some of breast cancer-related issues and there is no comprehensive questionnaire that explores all facets of this disease. For this reason, we decided to design a questionnaire that assesses the knowledge, attitude, and practice of women over 20 years of age to identify risk factors, symptoms, and screening methods of breast cancer. Moreover, we seek to highlight the importance of early detection of breast cancer and factors influencing its identification according to the culture of Iranian women.

Materials & Methods

This cross-sectional study is based on a research project conducted in the Faculty of Nursing, Gerash University of Medical Sciences to develop knowledge, attitude and practice survey to identify risk factors, symptoms, and methods of breast cancer screening. This research was approved by the Ethics Committee of the University (ethics code No. 009 and design No. 2018.1029). The participants consisted of literate women over 20 years of age referring to the South Fars Cancer Research and Treatment in Gerash.

Four steps proposed by Waltzed (2010) (12) were used to design and develop the questionnaire:

Step 1: To gain deeper insights into shortcomings, concepts, and the scientific design of articles, we reviewed papers and references about breast cancer.

Step 2: Items were designed based on reference books and open-ended questions asked from 5 women in the target group (women over 20 years old). The items of knowledge questionnaire were scored on a 3-point Likert scale (True=3 / False=1 / No idea=2) and attitude questionnaire on a 5-point Likert scale (completely agree=5, agree=4, no idea=3, disagree=2 and completely disagree=1). Also, the performance was assessed by a multiple-choice checklist in which participants could mark more than one option and consisted of mammography, BSE², and CBE³.

Step 3: The face validity, content validity and construct validity of the questionnaire were evaluated.

Face validity in both qualitative (necessity and relevance) and quantitative sections was assessed based on the importance of items using a 5-point Likert scale (from not important to highly important) with an impact score of over 1.5. Ten women aged more than 20 years with different literacy levels answered the questions after receiving instructions. In the next section, the questionnaire was handed down to 10 specialists including an MSc in Community Health Nursing, an MSc in Medical Surgery Nursing, an MSc in Special Nursing, an MSc in Pediatric Nursing, an MSc in Midwifery, a PhD in Infertility and Cancer Surgery Specialty to measure CVI⁴ and CVR⁵. The CVR with 3 items and a score of above 0.62 (according to Lawshe's table (13) was used to measure the necessity and content validity index and the CVI with 4 items and a score of above 0.79 was used to assess the relationship for content validity. The practice questionnaire covered three domains: self-examination, clinical examinations, and mammography.

¹ Knowledge, attitude, and practice

² Breast Self-Examination

³ Clinical Breast Examination

⁴ Content validity index

⁵ Content validity ratio

Screening, timing, and reasons for non-screening are some of the factors to be considered. Due to the nature of the checklist, factor analysis was not required for the performance questionnaire and only its validity was checked.

Exploratory (EFA) and confirmatory factor analysis (CFA) were used to assess the construct validity of the knowledge and attitude questionnaire. To investigate the feasibility of EFA, the Kaiser-Meyer-Olkin (KMO) test (Nunnally and Everett's sample size with a minimum of one item to ten samples (390 sample size) (14) was used to assess the sample size adequacy. The homoscedasticity of data was tested by Bartlett's test. The EFA requires variables between 0 and 1, and in this study, a factor loading of above 0.5 was confirmed. Then, factors were extracted using principal component analysis (PCA) and Varimax rotation. Finally, CFA was conducted using a comparative fit index (CFI), the Goodness of Fit Index (GFI), root mean square error (RMSE) and goodness of fit

index. The CFA was performed using AMOS software in SPSS 22.

Step 4: Correlation coefficients of items were calculated by Cronbach's alpha and the component stability was assessed using the test-re-test method. At this stage, 30 women completed the questionnaire before the study and one month after the study.

Results

The primary 87 items (32 items on attitude, 47 items on knowledge, and 8 items on practice) were designed in Steps 1 and 2. The face validity of all items had an impact factor of above 1.5. After applying CVR and CVI sections to 87 items, 13 items related to attitudes and 18 items related to knowledge were deleted, and the performance remained with 8 items. Finally, the validity of this section was estimated at CVR = 0.72 and CVI = 0.92 for attitude questionnaire (19 items), at CVI = 0.91 and CVR = 0.74 for knowledge questionnaire (29 items) and at CVI=0.94 and CVR=1 for practice (8 items).

EFA was used to assess the structure of items designed. Tables (1) show the loadings and

Table 1. EFA of Attitude questionnaire. For the sake of simplicity, factor loadings of less than 0.50 have not been shown in this table

Item	1*	2 [∞]
1 If I find a painless mass in my breast, I'll suspect breast cancer.	-0.545	
2 If I have cancer in one breast, I'll worry about developing cancer in another.	-0.626	
3 I think breast cancer is a serious disease because it could be fatal.	0.719	
4 If I get breast cancer, I may not be able to get pregnant.	0.642	
5 I think breast cancer is more dangerous than other types of cancers.	0.567	
6 Breast cancer can interfere with my family relationships	0.568	
7 If my family has breast cancer, the risk of breast cancer will be even greater for me.	-0.568	
8 I do not do monthly breast self-exams because I'm afraid of breast cancer.		0.655
9 I do not do monthly breast self-exams because I fear this may produce a mass in my breast.		0.672
10 I do not do monthly breast self-exams because it is inconvenient for me.		0.790
11 I do not do monthly breast self-exams because I do not believe in such tests.		0.631
12 I do not do monthly BSE because I cannot detect abnormal and suspicious cases in my breast.		0.748
13 I do not do monthly breast self-exams because I forget to do it regularly.		0.733
14 I do not do monthly breast self-exams because I have no problem with my breast.		0.638
Special value	2/740	4/693
% Variance	14/420	24/699

* Factor 1: Breast cancer risk attitude

∞ Factor 2: Attitude to Breast Self-Exam

rotating factors extracted from the PCA and the varimax method for the attitude questionnaire. For simplicity, factor loadings less than 0.50

identifying breast cancer symptoms with 4 items, breast cancer screening methods with 5 items) were kept (Table2, Chart 2).

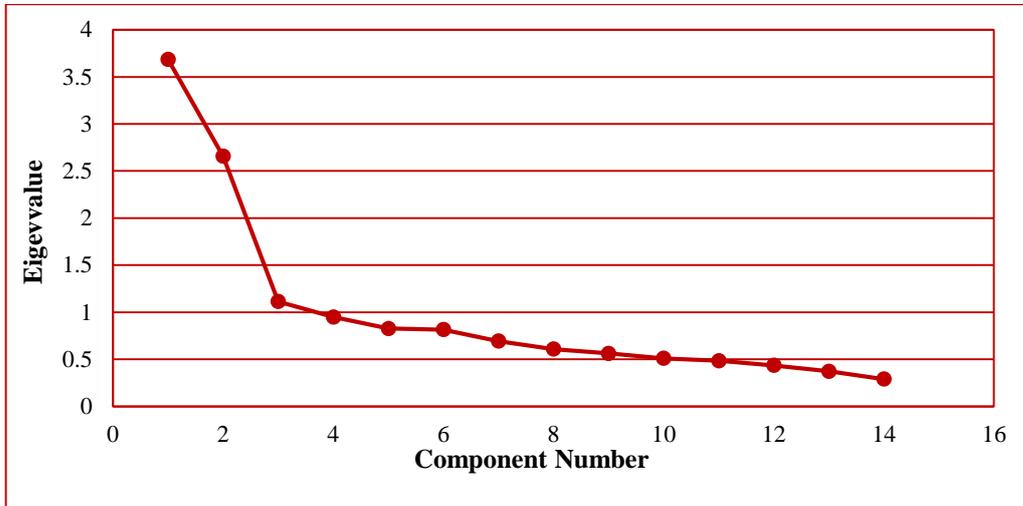


Chart 1. Scree plot for each (EFA) of the attitude questionnaire

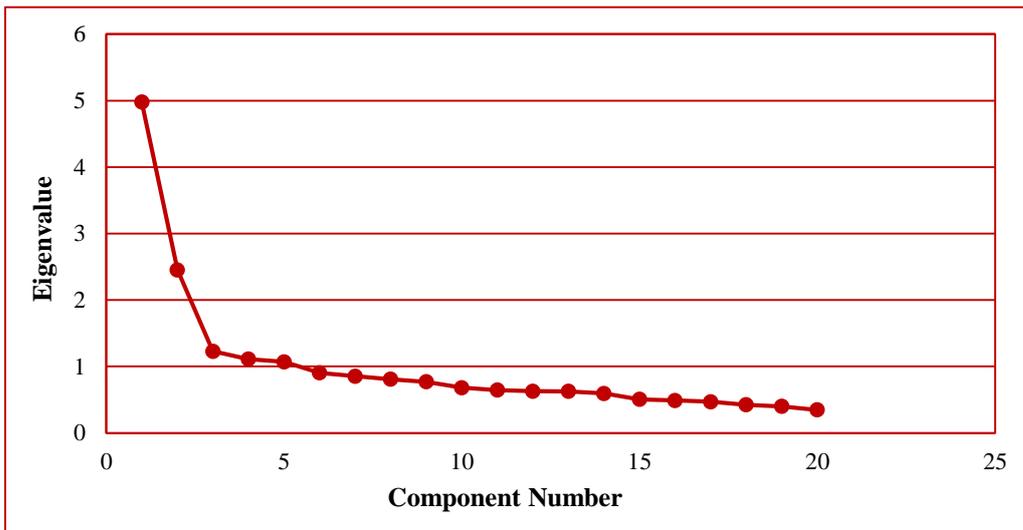


Chart 2. Scree plot for the EFA of knowledge questionnaire

have not been depicted in this table. KMO values were 0.799 for attitude and 0.870 for knowledge. Also, the result of Bartlett's test for attitude (2610.967) and knowledge (2829.112) suggested that both variables were significant at a level of less than 0.01. After performing EFA, 5 items were omitted from the attitude section and two factors with 14 items (breast cancer risk and breast self-examination each with 7 items) were identified (Table1, Chart 1). Also, of 29 items related to knowledge, 9 items were omitted and 5 factors with 20 items (identifying breast cancer risk factors with 5 items, identifying modifiable risk factors with 3 items, identifying risk factors for individual and family history with 3 items,

In the attitude diagram, 3 factors have an eigenvalue of above one, meaning that 14 items in the attitude scale could be reduced to 3 factors. However, given the similarity of items and attempt to abridge the questionnaire, we decided to include 2 factors.

(Table 3,4) show the factor structure of the attitude and knowledge questionnaire based on (CFA). According to the results, the CFA pattern verifies the existence of 2 factors in the attitude questionnaire (items 1, 2 and 7 were removed from the first factor) (Figure 1) and 5 factors in the knowledge questionnaire (items 5,8,11,15,17 were removed). (Figure 2). As shown in the table above and Figures 3 and 4, the factor loadings

Table 2. EFA of knowledge questionnaire. For the sake of simplicity, factor loadings less than 0.50 have not been shown in this table

		Items	Factor load
1	*Factor 1 Eigenvalue value=6.334 % of Variance=21.843	Women who started menstruating) younger than age 12 run a higher risk of breast cancer later in life.	0.558
2		A history of drug treatment for infertility is one of the risk factors for breast cancer.	0.748
3		Lack of full-term pregnancy is one of the risk factors for breast cancer.	0.698
4		The first childbearing over age 30 is one of the risk factors for breast cancer.	0.736
5		Taking oral contraceptives increases the risk of developing breast cancer.	0.517
6	■Factor 2 Eigenvalue value=1.236 % of Variance=4.263	Obesity or body mass index (BMI) above 30 is one of the risk factors for breast cancer.	0.603
7		Irregular or inactive physical activity is one of the risk factors for breast cancer.	0.646
8		Tobacco use (hookah, smoking) is one of the risk factors for breast cancer.	0.735
9	∞Factor 3 Eigenvalue value=1.208 % of Variance=4.165	A family history of breast cancer is one of the risk factors for breast cancer.	0.735
10		A family history of other types of cancers (e.g. colon, cervical or ovarian cancer) is a risk factor for breast cancer.	0.651
11		A personal history of other cancers is one of the risk factors for breast cancer.	0.642
12	#Factor 4 Eigenvalue value=2.836 % of Variance=9.779	Nipple changes including drowsiness, prolonged inflammation, and blood discharge are warning signs of breast cancer.	0.658
13		Cancerous masses felt by touching are usually insensitive, motionless and rigid with irregular edges.	0.594
14		Symptoms of breast cancer progression include skin cracks, nipple cracks, and skin sores on the breasts.	0.673
15		Breast self-exam should be done monthly after the age of 20.	0.614
16	@Factor 5 Eigenvalue value=1.312 % of Variance=4.523	Mammography (breast imaging) identifies small abnormal masses that can be a sign of breast cancer.	0.604
17		Mammography is performed by X-rays and takes about 15 min.	0.642
18		Mammography enables early detection of breast cancer.	0.700
19		An annual assessment by your doctor can help early detection of breast cancer.	0.738
20		Breast self-exam plays an important role in screening for breast cancer.	0.534

* identifying breast cancer risk factors ■ identifying modifiable risk factors ∞ identifying risk factors for individual and family history # identifying breast cancer symptoms @breast cancer screening methods

Table 3. CFI results based on fitness indices

Questionnaire	PLOSE	RMSEA	AGFI	CFI	TLI	IFI	GFI	CMIN/DF	CMIN	NFI
Attitude	0.121	0.060	0.921	0.954	0.938	0.954	0.951	2.425	99.441	0.925
knowledge	0.943	0.039	0.936	0.963	0.953	0.964	0.956	1.593	149.737	0.908

Table 4. The most desirable item for the model fit indices

Fit index	Description	Acceptable range
CMIN/DF	Minimum discrepancy function by degrees of freedom divided	well<3 acceptable<5
GFI	Goodness-of-fit index	0.90>
IFI	Incremental fit index	0.90>
TLI	Tucker-Lewis index	0.90>
CFI	Comparative fit index	0.90>
AGFI	Adjusted goodness-of-fit index	0.80>
RMSEA	Root mean square error of approximation	well<0/08 average 0.08-0.1 weak>0.1
PLOSE	For close fit of the population RMSEA	0.05>

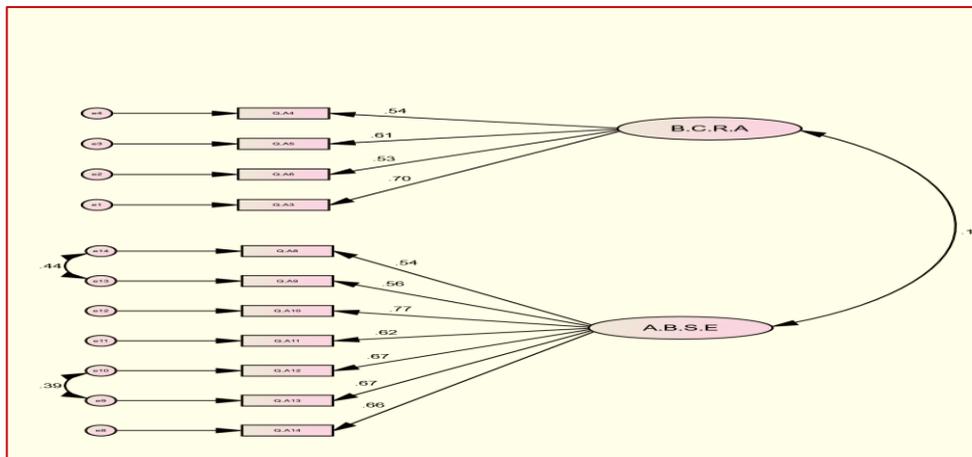


Figure 1. The final model of (CFA) for attitude and standardized results after removing poor items and drawing covariances. In the attitude section, items 1,2,7 was removed.

B.C.R.A: Breast cancer risk attitude A.B.S.E: Attitude towards breast self-exam
Q.A: attitude questionnaire

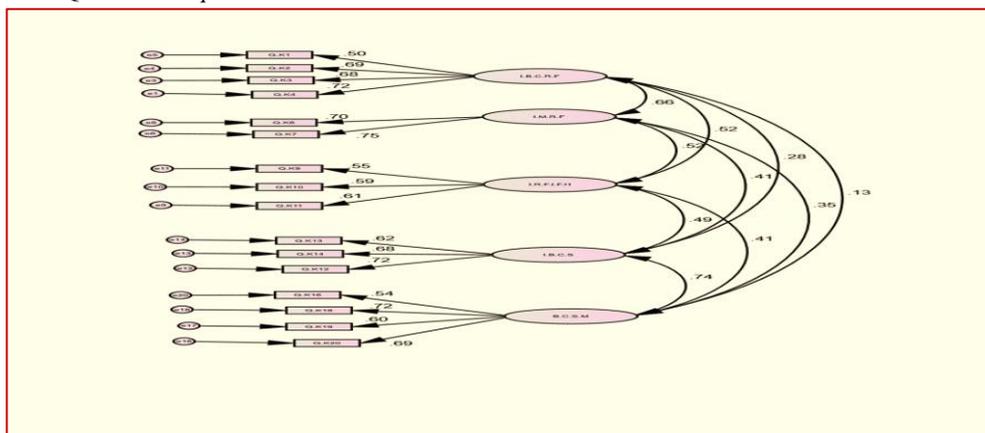


Figure 2. The final model of CFA for knowledge and standardized results after removing poor items and drawing covariances. In the knowledge section, items 5,8,15,17 was removed.

Q.K: knowledge questionnaire
I.B.C.R.F: identifying breast cancer risk factors
I.M.R.F: identifying modifiable risk factors
I.R.F.I.F.H: identifying risk factors for individual and family history
I.B.C.S: identifying breast cancer symptoms
B.C.S.M: breast cancer screening methods

were considered at a significant level of 0.01. In the factor analysis, a minimum factor load of 0.50 was considered.

The following table shows acceptable thresholds for the most common fit indices in the model. Therefore, to determine the goodness of fit for the model, the results of fit indices were compared with the criteria presented in this table.

As shown in the table that lists the results of fit indices, the values of CMIN/DF and RMSEA indices for attitude and knowledge are within the acceptable range (see Table 4). Other indices are also within the acceptable range.

Reliability was assessed by Cronbach's alpha. In the attitude and knowledge sections, Cronbach's alpha was $\alpha = 0.76$ and 0.87 , respectively. Also, the test-re-test was used to evaluate the stability of the components. There was no significant difference between the two groups before and after the test. However, the correlation coefficient of the two groups was significant (attitude: $IC = 0.74$ and $p \leq 0.001$ and knowledge: $IC = 0.87$ and $p \leq 0.000$), which reflects the high reliability of the measuring tool.

To calculate the soft scale distance in the attitude questionnaire, a range of 11 to 55 was considered for scores. Scores between 33-55 suggested a positive attitude and scores between 11-32 indicated a negative attitude. In the knowledge questionnaire, scores were in the range of 16 to 48 (scores of 40-48 indicate good knowledge, scores of 39-32 indicate moderate knowledge and scores of 16-31 denotes poor knowledge). In the practice questionnaire, first a screening was performed on a Yes-No basis (BSE, CBE, and mammography). If responses were positive, subjects would answer the question (what time did you do these tests?) using four options where each individual's response was reported as a percentage. If the breast self-exam had not been performed, they could select more than one option to explain the reasons (9, 15, 16).

Final questionnaire:

- ✓ 11 items on attitude and $CVI = 0.92$, $CVR = 0.72$ and $\alpha = 0.76$. In the attitude questionnaire, negative items include 4,6,8,9,10,11,12,13,14.
- ✓ 16 items about knowledge with $CVI = 0.99$, $CVR = 0.85$ and $\alpha = 0.87$
- ✓ 8 items for the practice checklist with $CVI = 0.94$ and $CVR = 1$.

Discussion

Developing the knowledge, attitude and practice questionnaire in Iran is of paramount importance due to the high prevalence of breast cancer. This questionnaire was designed based on the Waltz method according to the Iranian culture by covering a wide range of women with different ages and levels of education. Finally, the knowledge questionnaire (with 16 items), attitude questionnaire (with 11 items) and practice checklist (with 8 items) were developed. A 3-point Likert scale (True / False / Don not Know) was used in the knowledge questionnaire, which is consistent with the scales used by Andegiorgish 2018 (1) and Paknejad 2019 (15). The knowledge questionnaire also covers 5 domains selected from 390 samples according to the EFA analysis. Most of the studies in Iran and other countries have assessed knowledge using a researcher-made questionnaire and have sufficed to measure CVI and CVR (10, 17) Moreover, the researchers have not processed items for a larger community and scale domains have been determined based on personal judgement (18). However, in the present questionnaire, CFA and EFA have been used, which is consistent with the study of Wachira et al. (2017), who utilized 7 factors (9). It seems that the reasons for including these items in the knowledge questionnaire are identical to the screening items in the national health system. The importance of women's visits to health centers underscores the significance of awareness(19). In the knowledge questionnaire, two items of alcohol and tobacco, which are considerably associated with breast cancer(1) had a low score in the EFA and CFA, which is aligned with the study of Paknejad et al. (15). It can be attributed to the fact that consuming alcohol is prohibited in the Iranian society. Gerash is a region where hookah is traditionally used by many women. Hence, it is suggested that future studies include these two items in their questionnaires. Also, the use of OCP pills and their effect on cancers were not examined in this questionnaire, which is inconsistent with studies of Al-deyel (2019) and Akour (2019) (20, 21). This is probably due to the old age of most of the participants, and which reduces the use of pills(22).

The attitude questionnaire was also scored on a 5-point Likert scale according to Eyvanbagha (2015) (11) and Ogochukwu's (2018) (23) study.

It is, however, at odds with the study of Toan (2019) in which the attitude questionnaire was answered on a Yes-No basis (7) and the studies of Aluh DO (2019) (24) and Sharifzadeh (2019) (25). Attitude questionnaire was completed with 11 items and two criteria (breast cancer risk attitude and breast self-exam attitude). In these two factors, the high probability of deaths associated with breast cancer (.719), and difficulty of self-exam (.790) had the highest factor loadings. The questionnaire used by Nasser Alomair et al. (2020) also surveyed attitudes toward breast cancer. In keeping with our study, they reported a lack of treatment and the importance of self-exam (26). Nergiz-Eroglu U 2015(27) suggested that positive attitudes towards screening helped promote breast self-exam, stressing the importance of these items in this questionnaire to assess breast cancer risk factors and autoimmunity.

In practice section, based on the guidelines set by the Ministry of Health and the compulsion to perform breast cancer self-exam and clinical evaluation by a physician, midwife and mammography, the reasons for screening and non-screening were determined. Rastad H. 2013 (28) and Khanjani N., 2012 (29) only explored screening and non-screening by participants without examining their reasons. Also, the Japanese guidelines are primarily focused on new techniques and basic diagnosis behaviors such as breast self-examination have not been considered. Moreover, most of the items are related to the treatment staff (30). In the study of Ighodaro (2016), they have been described as questions about how to perform self-exam (31).

Conclusions

According to the results, the designed questionnaire has desirable psychometric properties and validity to measure knowledge, attitude and practice to identify factors affecting screening for breast cancer. Also, this questionnaire could be useful for various researchers in Iran, as it is compatible with the Iranian culture, easy to understand and tailored to the demands of different groups.

Acknowledgments

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questionnaire. This research was approved by the Ethics Committee of the University (ethics code No. 009 and design No. 2018.1029).

Conflict of Interests

The authors declare no conflict of interest.

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مقاله پژوهشی

طراحی و روانسنجی پرسشنامه آگاهی، نگرش و عملکرد از سرطان پستان: تحلیل عاملی اکتشافی و تأییدی

سجاد پوریوسف^۱، صدیقه یگانه^{۲*}، روح الله روهنده^۱، زهرا پیرزاده^۳، ساناز کشاورزی^۳، طیبه بهمنی^۴

۱. دانشکده پیراپزشکی، دانشکده علوم پزشکی گراش، گراش، ایران

۲. دانشکده پرستاری، دانشکده علوم پزشکی گراش، گراش، ایران

۳. کمیته تحقیقات دانشجویی، دانشکده علوم پزشکی گراش، گراش، ایران

۴. دانشکده پرستاری، دانشگاه علوم پزشکی فسا، فسا، ایران

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چکیده

زمینه و هدف: شناسایی زود هنگام عوامل خطر و غربالگری به عنوان روش های تشخیصی کم هزینه با درصد بالای بقای فرد، جایگاه ویژه ای در میان تست های تشخیصی در سرطان ها به ویژه در سرطان پستان دارد. از آنجایی که مطالعات آگاهی، نگرش و عملکرد یکی از بهترین نوع مطالعه جهت تعیین سطح افراد و پیش بینی وضعیت موجود می باشد، این مطالعه با هدف طراحی و روایی ابزاری برای بررسی ریسک فاکتورها، علایم و غربالگری سرطان پستان انجام گرفت.

مواد و روش ها: برای طراحی پرسش نامه از روش والتز استفاده گردید. جهت فاکتور آنالیز از ۳۹۰ نمونه و آنالیز تاییدی با برنامه آموس و spss ورژن ۲۲ انجام گرفت. پایایی ابزار نیز توسط ۳۰ نفر از زنان واجد شرایط مطالعه با فاصله زمانی یک ماه و توسط آلفای کرونباخ و test-retest انجام گردید.

نتایج: ۸۷ گویه پرسش نامه اولیه، در نهایت به سه دسته تقسیم گردید: ۱۴ گویه و ۲ فاکتور در قسمت نگرش با $CVR=0.92$ ، $CVI=0.72$ ، $\alpha=0.76$ و در قسمت آگاهی با ۱۶ گویه و ۵ فاکتور $CVR=0.85$ ، $CVI=0.99$ ، $\alpha=0.87$ و چک لیست عملکرد با ۸ آیتیم و $CVR=0.94$ ، $CVI=0.94$ و $CVI=0.94$.

نتیجه گیری: نتایج حاکی از ویژگیهای روانشناختی مطلوب پرسشنامه و قدرت و روایی آن در سنجش دانش، نگرش و عملکرد در شناسایی عوامل مؤثر بر سرطان پستان است.

کلمات کلیدی: آگاهی، پرسشنامه، سرطان سینه، عملکرد، نگرش

*نویسنده مسئول: صدیقه یگانه، دانشکده پرستاری، دانشکده علوم پزشکی گراش، گراش، ایران.

Email: s-yeganeh@gerums.ac.ir
https://orcid.org/0000-0001-8243-0589