

TRANSCULTURAL ADAPTATION AND VALIDATION OF THE TURKISH VERSION OF THE BREAST CANCER AWARENESS MEASURE (BCAM) QUESTIONNAIRE

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ABSTRACT

Purpose: To analyze the validity and reliability of the Turkish version of the Breast Cancer Awareness Measure (BCAM-Tr).

Material and Methods: This was cross-cultural adaptation and validation study. The study sample consisted of a total of 552 women who volunteered to participate in the study between December 2020 and November 2021. Data were collected using a descriptive characteristics form and the BCAM-Tr. The validity of the BCAM-Tr was tested with language validity, content validity, construct validity (first-level Confirmatory Factor Analysis and comparison of known groups) analyses. Reliability was evaluated by conducting test-retest analysis and internal consistency.

Results: The BCAM-Tr showed good test-retest reliability (Intraclass Correlation Coefficient=0.89) and internal consistency (Cronbach's alpha=0.89). Cohen's kappa coefficients indicated moderate to excellent agreement (0.55-0.96). Confirmatory factor analysis confirmed a two-factor structure. Health professionals had higher correct response rates than women in the general population ($p=0.0001$), indicating good construct validity.

Conclusion: The BCAM-Tr was shown to be valid and reliable for assessing breast cancer awareness in Turkish women.

Keywords: Awareness, breast cancer, psychometrics, validity and reliability

INTRODUCTION

Breast cancer is the most common type of cancer among women globally and in Turkey (1,2). According to GLOBOCAN 2020 data, the age-standardized world incidence rate was 47.8 per 100,000 (1). Similarly, the age-standardized incidence rate of breast cancer for women in Turkey was determined to be 47.7 per 100,000 (2). Changes in sociocultural environments and lifestyle brought about by developing economies and the growing proportion of women in the industrial workforce have

affected the prevalence of breast cancer risk factors. Postponing childbirth, having fewer children, heavier body weight, and physical inactivity have resulted in increased breast cancer morbidity (3). As there is no definitive method of prevention, early diagnosis is crucial. This can be facilitated by informing women about breast cancer and increasing awareness through education and screening programs (4). In addition to being the leading cancer among women in our country, its rising incidence and falling age at onset further increase the importance of breast

Table 1. Descriptive characteristics of the participants (n=552)

Variable	Mean±SD	Min-Max
Age (years)	40.41±11.78	20-82
	n	(%)
Marital status		
Married	429	77.7
Single	123	22.3
Education level		
Pre-elementary-Elementary school	125	22.7
Middle school- High school	146	26.4
University- Postgraduate	281	50.9
Occupation		
Homemaker	189	34.2
Health care worker	139	25.2
Retired	21	3.8
Employee, blue collar	70	12.7
Employee, government	63	1.14
Tradesperson/Private sector	70	12.7
Diagnosed with breast cancer		
Yes	10	1.8
No	542	98.2
Has a friend/relative with breast cancer		
Yes	78	14.1
No	474	85.9
SD: Standard deviation	552	100.0

cancer awareness (5). Previous studies have shown that informing and increasing women's awareness about early diagnosis can impact their screening and health-promoting behaviors (4,6). Therefore, breast cancer awareness must be further developed among women.

The use of validated measurement tools is recommended to accurately and completely measure a characteristic of interest (7). Valid and standardized assessment is important for monitoring cancer awareness, examining associated factors, understanding its consequences, and evaluating the effectiveness of awareness-raising interventions (8). In the literature there are few Turkish adaptation, validity, and reliability studies for measures of breast cancer awareness (9). The Breast Cancer Awareness Scale (BCAS) is a 29-item tool for which Altuntuğ et al. (9) performed the Turkish validity and reliability study, but this scale was found to have limited use at the international level (10,11). The low number of BCAM questions may cause it to be easier to use and more preferred than BCAS.

The Breast Cancer Awareness Measure (BCAM) was developed in 2010 by Cancer Research UK to assess breast cancer awareness. The scale consists of 13 items concerning breast cancer symptoms, age-related risk factors, and breast examination frequency (8). The BCAM is a valid and reliable tool that has been translated into several languages and used in many countries (12-17).

However, there is no study in the literature examining the psychometric properties of the Turkish BCAM. As the BCAM is frequently used in the international literature, developing a Turkish version will facilitate the identification of similarities and differences in breast cancer awareness between the Turkish population and other societies. In addition, the small number of items in the BCAM may be an advantage that enables the rapid assessment of breast cancer awareness. Determining levels of breast cancer awareness among women in Turkey may aid in the planning of interventional studies and comprehensive programs. This study aimed to develop a Turkish version of the BCAM and analyze its validity and

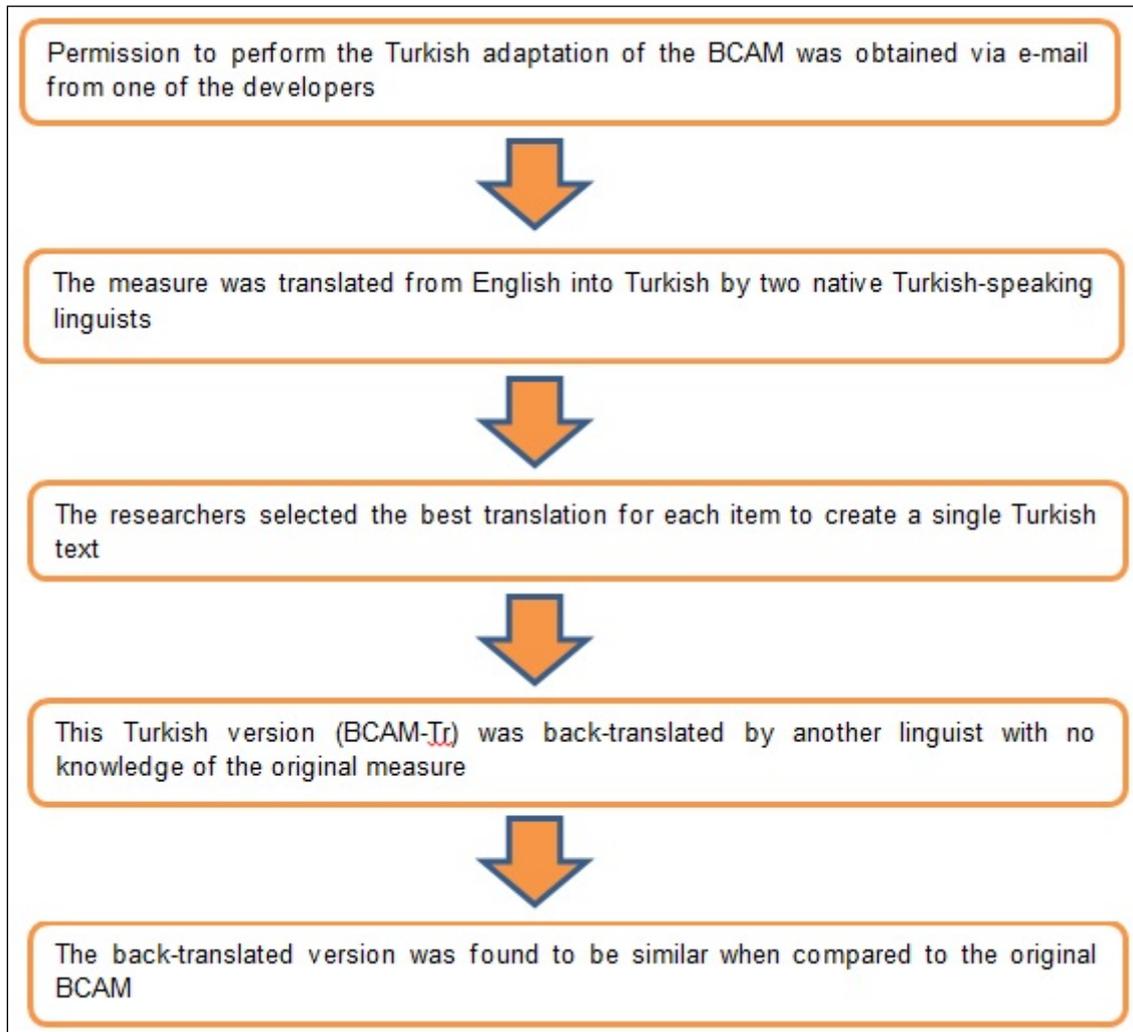


Figure 1. Language validity process

reliability for measuring breast cancer awareness in the Turkish population.

MATERIAL AND METHODS

Study Design and Sampling Method

This was a cross-cultural adaptation and validation study conducted with women in Kastamonu. The sampling criteria were as follows: being a woman, being 20 years of age or older, being able to understand and speak Turkish, and volunteering to participate in the study. Exclusion criteria were any hearing or speech problems that would interfere with data collection and any neurological or psychiatric disease that may affect cognitive perception. When calculating the sample size for scale development studies, it is emphasized that a sample smaller than 200 may not be sufficient to determine the psychometric structure, and a sample of at least 300

(ideally more than 500) should be included to demonstrate the factor structure of an instrument (7). Therefore, we planned to include at least 300 participants. We recruited participants by convenience sampling of women in a hospital (female health professionals and patient relatives), neighbors and relatives of the researchers, two different community bazaars, two different textile workshops, and a business center. The study sample consisted of a total of 552 women who volunteered to participate in the study between December 2020 and November 2021.

Data Collection Tools

Data were collected using a descriptive characteristics form and the BCAM. Data collection was done through Google Forms, with face-to-face interviews performed for some participants (those

Table 2. Fit indices*¹⁹ from First-Level Confirmatory Factor Analysis of BCAM-Tr

Fit indices	Perfect values	Acceptable values	BCAM-TR
Chi-square/df	$0 \leq \chi^2/df \leq 3$	$3 \leq \chi^2/df \leq 5$	4.72
RMSEA	$0.0 \leq RMSEA \leq 0.05$	$0.06 \leq RMSEA \leq 1.0$	0.078
CFI	$0.95 \leq CFI$	$0.85 \leq CFI$	0.90
IFI	$0.95 \leq IFI$	$0.85 \leq IFI$	0.90
NNFI	$0.95 \leq NFI$	$0.80 \leq NFI$	0.90
NFI	$0.95 \leq NFI$	$0.80 \leq NFI$	0.91

*References

who were older, did not have a smartphone, or were health care professionals). It was collected face to face from 107 women and 445 women by Google Forms. Test-retest data were collected only face-to-face.

Participant Descriptive Characteristics Form

This form consisted of 6 questions regarding the participant’s age, marital status, educational level, occupation, and personal and family history of breast cancer (8,14).

Breast Cancer Awareness Measure (BCAM)

The BCAM, developed in 2010 by researchers at Cancer Research UK, measures breast cancer awareness related to the symptoms of breast cancer (11 items), breast examination frequency (1 item), and age-related risk of breast cancer (1 item) (8). The respondent receives 1 point if they can correctly identify at least 5 signs of breast cancer, 1 point if they select the oldest woman for the age-related risk item, and 1 point if they report performing breast examination once a month. Incorrect answers receive 0 points. The total score is between 0 and 3 and there is no cut-off point (8). BCAM measured psychometric properties in 1035 women participating in the NHS Breast Screening Programme: acceptability was assessed using a feedback questionnaire (n = 292); sensitivity to change (n = 576) and test-retest reliability (n = 167) after an intervention that increased breast cancer awareness. Acceptability was assessed in 292 women aged 67–73 in the NHS Breast Screening Programme in South East London. Sensitivity to change of the BCAM was assessed in 576 women aged 67–73 participating and to test the extent to which the measure was repeatable, we recruited 167 women aged 50 and above in two breast screening units in South East London (8).

The BCAM has been reported to be a valid and strong scale appropriate for researching breast cancer awareness in the general population and evaluating the effect of interventional studies. The BCAM has high readability and analyses indicated that most items had moderate to good test-retest reliability. In addition, in the analysis of construct validity, a comparison of cancer specialists and the general female population showed that the cancer specialists had significantly higher awareness (50% vs. 6%, p=0.001) and the construct validity was reported to be good (8).

Data Analysis

The data analysis was performed using IBM SPSS Statistics for Windows, version 22.0 (Armonk, NY: IBM Corp) and confirmatory factor analysis (CFA) was done with LISREL 8.7 software. The participants’ descriptive characteristics were summarized using number, percentage, mean, and standard deviation values. The validity of the Turkish version (BCAM-Tr) was tested with language validity, content validity, construct validity (first-level CFA and comparison of known groups) analyses. In the comparison of known groups, chi-square analysis was used to compare the responses of health care professionals and women from the general population. Reliability was evaluated by conducting test-retest analysis and internal consistency was evaluated by calculating Cronbach’s alpha coefficient. Cohen’s kappa and intraclass correlation coefficient (ICC) were calculated in the test-retest analysis.

Ethical Considerations

Written permission to adapt the BCAM-Tr to Turkish was obtained via e-mail from Lindsay Forbes, one of the developers of the original BCAM. Approval to conduct the study was obtained from the ethics committee of Cankiri Karatekin University (approval

Table 3. Comparison of correct response rates to the BCAM-Tr Items in health professionals and women in the general population (n=552)

Knowledge of breast cancer symptoms (yes)	General Women (n=413)		Health Professionals (n=139)			
	n	%	n	%	X ²	p
Do you think a lump or thickening in your breast could be a sign of breast cancer?	320	77.5	127	91.4	13.01	0.0001*
Do you think a lump or thickening under your armpit could be a sign of breast cancer?	307	74.3	128	92.1	19.6	0.0001*
Do you think bleeding or discharge from your nipple could be a sign of breast cancer?	249	60.3	120	86.3	31.8	0.0001*
Do you think the pulling in of your nipple could be a sign of breast cancer?	204	49.4	113	81.3	43.2	0.0001*
Do you think a change in the position of your nipple could be a sign of breast cancer?	196	47.5	114	82.0	50.4	0.0001*
Do you think a rash on or around your nipple could be a sign of breast cancer?	185	44.8	108	77.7	45.2	0.0001*
Do you think redness of your breast skin could be a sign of breast cancer?	144	34.9	101	72.7	60.1	0.0001*
Do you think a change in the size of your breast or nipple could be a sign of breast cancer?	198	47.9	116	83.5	53.4	0.0001*
Do you think a change in the shape of your breast or nipple could be a sign of breast cancer?	209	50.6	120	86.3	55.1	0.0001*
Do you think pain in one of your breasts or armpit could be a sign of breast cancer?	268	64.9	125	89.9	31.7	0.0001*
Do you think dimpling of the breast skin could be a sign of breast cancer?	252	61.0	128	92.1	46.8	0.0001*
How often do you check your breasts? At least once a month	98	23.7	49	35.3	7.06	0.008*
Who is most likely to develop breast cancer? A 70 year old woman	4	1.0	2	1.4	-	0.645

X²: Chi-square; *p<0.05

date/number: 08.12.2020/378) and the administration of the hospital in which participants were recruited.

RESULTS

The women participating in the study ranged in age from 20 to 80 years, with a mean age of 40.41 years. Of the participants, 44.9% were university graduates, 77.4% were married, 34.2% were housewives, 1.8% were previously diagnosed with cancer, and 14.1% had a friend/relative previously diagnosed with breast cancer (Table 1).

Validity

Language Validity

Written permission to perform the Turkish adaptation of the BCAM was obtained via e-mail from Lindsay

Forbes, one of the developers. The measure was translated from English into Turkish first by the researchers, then by two native Turkish-speaking linguists fluent in both languages and familiar with both cultures. From these different versions, the researchers selected the best translation for each item to create a single Turkish text. This Turkish version (BCAM-Tr) was back-translated by another linguist with good knowledge of both languages and cultures and no knowledge of the original measure. The back-translated version was found to be similar when compared to the original BCAM (Figure 1).

Content Validity

The content validity of the BCAM-Tr was assessed by expert panel review by six nursing faculty members.

Table 4. Test-retest Reliability of the BCAM-Tr (n=50)

	ICC	95% CI for ICC	p
BCAM-Tr Total breast cancer symptoms score	0.89	0.85 - 0.95	0.0001*
Kappa statistic			p
Knowledge of breast cancer symptoms (yes/no)			
Do you think a lump or thickening in your breast could be a sign of breast cancer?	0.55		0.0001*
Do you think a lump or thickening under your armpit could be a sign of breast cancer?	0.75		0.0001*
Do you think bleeding or discharge from your nipple could be a sign of breast cancer?	0.74		0.0001*
Do you think the pulling in of your nipple could be a sign of breast cancer?	0.77		0.0001*
Do you think a change in the position of your nipple could be a sign of breast cancer?	0.72		0.0001*
Do you think a rash on or around your nipple could be a sign of breast cancer?	0.62		0.0001*
Do you think redness of your breast skin could be a sign of breast cancer?	0.68		0.0001*
Do you think a change in the size of your breast or nipple could be a sign of breast cancer?	0.74		0.0001*
Do you think a change in the shape of your breast or nipple could be a sign of breast cancer?	0.77		0.0001*
Do you think pain in one of your breasts or armpit could be a sign of breast cancer?	0.60		0.0001*
Do you think dimpling of the breast skin could be a sign of breast cancer?	0.73		0.0001*
How often do you check your breasts?	0.89		0.0001*
Who is most likely to develop breast cancer?	0.96		0.0001*

ICC: Intraclass correlation coefficient, CI: Confidence interval; Kappa: Cohen's kappa coefficient, *p<0.05

The content validity index (CVI) were calculated by two methods; the item (I-CVI) was calculated as 1.00 for each item and the scale (S-CVI) was calculated as 1.00 for the whole scale.

This Turkish version (BCAM-Tr) was modified as needed based on the expert consensus and a pilot study was conducted with 10 people. Participants were asked to report if they had difficulty understanding any words or sentences in the BCAM-Tr. The participants stated that the items were understandable and they had no problems.

Construct Validity

Confirmatory Factor Analysis (CFA)

CFA is a method used directly in scale adaptation studies (18), for this reason Explanatory Factor Analysis was not performed. First-level CFA to determine the validity of the BCAM-Tr verified a two-

factor structure (breast lump subdimension and changes in shape and pain subdimension). As a result of the first-level CFA, fit statistics and fit indices were found to be: chi-square/df=4.72, root mean square error of approximation (RMSEA)=0.078, comparative fit index (CFI)=0.90, incremental fit index (IFI)=0.90, non-normed fit index (NNFI)=0.90, and normed fit index (NFI)=0.91 (Table 2). In addition, regression coefficients and t values obtained for the 11 items were significant (>1.92) and the model was confirmed.

Comparison of Known Groups

We compared the breast cancer awareness of health care professionals and women in the general population and observed that health care professionals correctly answered the items about symptoms and breast examination frequency

significantly more often than general women ($p < 0.05$). There was no significant difference between the groups in the frequency of correct answers to the item about age-related risk of breast cancer ($p > 0.05$; Table 3).

Reliability

Test-Retest Analysis

It is recommended to take at least 30 people for test-retest (19,20). For this reason the consistency of BCAM-Tr results over time was evaluated by comparing 50 women's initial test results with a retest performed 2 weeks later. 50 women were selected such as health workers and relatives, whom the researcher could easily reach and data were collected face-to-face. The ICC for total symptom score was 0.89 (95% confidence interval [CI] = 0.85-0.95; $p < 0.05$). Kappa values ranged from 0.55 to 0.96 and were statistically significant ($p < 0.05$; Table 4).

Internal Consistency

The Cronbach's alpha for the BCAM-Tr was found to be 0.89. Cronbach alpha values for the breast lump subdimension and changes in breast shape and pain subdimension were 0.83 and 0.77, respectively. Cronbach alpha coefficient did not change when the item was deleted.

DISCUSSION

The BCAM-Tr was found to be a valid and reliable tool to assess the breast cancer awareness of women in Turkey.

Validity

All items in the BCAM-Tr were evaluated for language and content validity by a panel of six experts who had doctorate degrees in nursing and worked with breast cancer patients. The experts evaluated whether the items were appropriate for evaluating breast cancer awareness in the Turkish culture. The only notable change made in the BCAM-Tr was that the last item of the scale, "Who is most likely to develop breast cancer in the next year?" was simplified to "Who is most likely to develop breast cancer?" to avoid confusion. Agreement among the experts was evaluated using CVI values. An I-CVI value over 0.78 and S-CVI over 0.80 is recommended (21). The I-CVI and S-CVI values in our study were well above these thresholds, indicating expert consensus.

CFA and comparison of known groups were used to evaluate construct validity. CFA is used in scale

development and validity analysis or to verify a predetermined structure (22). Similar to our study, Heidari and Feizi (14) obtained two BCAM subdimensions (breast lump and changes in breast shape and pain) as a result of CFA. We also used fit indices to determine whether the BCAM-Tr conformed to the theoretical structure being tested (23). In the BCAM validity and reliability study conducted by Heidari and Feizi (14) in Iran, fit indices were: $\chi^2/df = 2.9$, RMSEA = 0.046, CFI = 0.984, and TLI = 0.978. For the Chinese version of the scale, values were reported as $\chi^2/df = 1.86$, CFI = 0.94, and RMSEA = 0.06 (15). In our study, fit indices were as follows: $\chi^2/df = 4.72$, RMSEA = 0.078, CFI = 0.90, IFI = 0.90, NNFI = 0.90, and NFI = 0.91. A χ^2/df value below 5 and RMSEA below 0.08 indicates good fit, CFI, IFI, NFI, and NNFI 0.90 and higher indicates good fit (19,24,25). We also determined in this study that the BCAM-Tr showed good fit.

In the comparison of known groups, we compared the correct response rates among health care professionals and general women. We determined that health care professionals answered correctly at a significantly higher rate than general women, which suggests the BCAM-Tr has good construct validity. It was also demonstrated in other studies that health care professionals had higher breast cancer awareness (8,14). Only in the age-related risk factor item was there no significant difference between health care professionals and general women. This result is similar to that reported by Linsell et al. (8) and Heidari and Feizi (14). For this item, it is clear that both health care professionals and general women have low correct response rates. We attribute this to a lack of knowledge.

Reliability

The time invariance of the BCAM-Tr was evaluated with test-retest analysis and its internal consistency was evaluated using Cronbach's alpha. In the present study, 50 women were retested after 2 weeks. Cohen's kappa coefficient and ICC were calculated to assess test-retest reliability. A Cohen's kappa of 0.21-0.40 is interpreted as fair agreement, 0.41-0.60 as moderate agreement, 0.61-0.80 as substantial agreement, and 0.81-1.00 as excellent agreement (26). Linsell et al. (8) reported kappa coefficients of 0.28-0.70, indicating fair to substantial agreement, while Heidari and Feizi (14) reported values ranging between 0.42 and 0.75, showing moderate to significant agreement. In the present study, there was

moderate to excellent agreement between the BCAM-Tr test and retest.

ICC values are calculated to objectively evaluate the difference between the two measurements and determine the reliability of the measurement tool. ICC values between 0.5 and 0.75 indicate moderate reliability, values between 0.75 and 0.9 indicate good reliability, and values greater than 0.90 indicate excellent reliability (27). For the BCAM, values of 0.84 and 0.79 respectively were reported in studies by Heidari and Feizi (14) and Htay et al (16). In our study, the ICC value was found to be 0.89, which is relatively higher than in other studies. This result showed that the BCAM-Tr exhibits invariance over time and confirmed retest reliability.

Cronbach's alpha coefficient of reliability is used to evaluate internal consistency. A tool is considered fairly reliable at Cronbach's alpha values of 0.60-0.79 and highly reliable if values are in the 0.8-1 range (28). In our study, the Cronbach alpha value of the scale was determined to be 0.89, indicating high reliability. The reliability of the BCAM was found to be quite high in several different countries, with similar Cronbach's alpha values reported for the Persian (0.88), Chinese (0.90), and Malay (0.83) versions (14-16). The Cronbach's alpha values for the breast lump subdimension and changes in breast shape and pain subdimension were also found to be high. In the study by Heidari and Feizi (14), Cronbach's alpha values for the BCAM subdimensions also demonstrated high reliability. In line with these results, we can say that the BCAM-Tr also has high internal consistency.

The results show that BCAM-Tr was a valid and reliable measure tool. When the scale items of BCAM-Tr were examined, it was seen that the number of correct answers in the studies conducted on the question "Knowledge of breast cancer symptoms" was similar to our study (14,16,17). The number of correct answers to the question "Who is most likely to develop breast cancer" was found to be low, similar to our study (14,16,17). Similar to our study, the rate of correct answers to the question "How often do you check your breasts" was found to be higher in healthcare professionals compared to women in the general population (14,17). We can say that the data collected by the use of BCAM-Tr adapted to different languages and cultures can be generalized and allow the investigation of similarities and differences between the societies where the measurement is made.

Limitations of the Study

This study has some limitations. The original questionnaire was only validated in older women (67-73 years), whereas we developed the BCAM-Tr with wider population of women over 20 years of age. In addition, this study was carried out in one city in western Black Sea region of Turkey and the representativeness of the sample to all Turkish women or other Turkish-speaking countries is not known. Another limitation of this research is the collection of online data due to the covid 19 pandemic.

CONCLUSION

This study demonstrates that the BCAM-Tr is a valid and reliable measure of breast cancer awareness suitable for use in breast cancer awareness research in the general population and to evaluate the impact of interventional studies to raise awareness. Used in large-scale screenings, the BCAM-Tr may enable the rapid evaluation of women's awareness levels and early diagnosis interventions, thereby guiding the development of health promotion policies. Adapting this tool to many different languages and cultures can contribute to the international literature by allowing the investigation of similarities and differences between societies. Considering the changes that may arise as a result of technological advances and sociocultural development, it may be advisable to repeat the validity/reliability studies of this scale after a period of time, especially in different populations.

Recommendations

With the rising trend in new cases of breast cancer, it is essential to evaluate and raise awareness of breast cancer in the community. Nurses are in a key position to address fears, increase awareness and knowledge, correct misperceptions, and encourage positive attitudes about breast cancer. Nurses, who spend the most time with patients and have protective, educational, and counseling roles, can contribute to the improvement of nursing care by evaluating women's breast cancer awareness. In addition, by improving breast cancer awareness in women, nurses can increase rates of early diagnosis and help reduce the incidence and mortality of breast cancer.

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