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Effect of Breast Cancer Awareness Education in Adolescent Girls: A Quasi-Experimental Study

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Abstract

Background: Breast cancer is the most common cancer type among women worldwide. Increasing awareness of breast cancer during adolescence is likely to result in the acquisition of lifelong protective and preventive behaviors.

Aim: The aim of this study is to enhance breast cancer awareness among adolescent girls through a health education program based on the Health Belief Model (HBM).

Methods: This study utilized a single-group pretest-posttest design. The sample group consisted of 79 high school female adolescents. Educational interventions consisted of four teaching sessions, each lasting 60 minutes. Data were collected through the "Participants Information Form" and the "Breast Cancer Awareness Evaluation Form." The data were evaluated using paired sample t-tests and Chi-Square tests.

Results: The mean age of the adolescents was 16.0 ± 0.96 years. Significant changes in the level of knowledge regarding breast cancer symptoms and risk factors were observed after the education. Prior to the educational program, adolescents answered fewer than 50% of the 12 questions about risk factors correctly, whereas after the intervention, the correct answer rate for these questions reached at least 81.0%. Before the intervention, the correct answer rate for symptoms was at least 38.0%, which increased to 79.7% after the intervention. There was a statistically significant difference in the pre-test and post-test correct answer rates for all breast cancer symptoms ($P<0.05$).

Conclusion: Implementing a health education program based on the Health Belief Model (HBM) during adolescence to enhance breast cancer awareness and instill lifelong preventive health behaviors related to breast cancer is of significant importance.

Keywords: Adolescent, awareness, breast cancer, health belief model

Introduction

Breast cancer is the most prevalent cancer among women, with approximately 1.4 million cases reported worldwide annually, making it the second most common cancer globally.[1] The World Health Organization (WHO) reported that in 2020, 2.3 million women were diagnosed with breast cancer, leading to 685,000 fatalities. Despite advancements in healthcare, breast cancer remains a significant threat to women's lives. The Global Breast Cancer Initiative (GBCI) by the WHO aims to reduce breast cancer-related deaths by 2.5% annually, potentially preventing 2.5 million deaths globally between 2020 and 2040. Efforts under this initiative include community-based education, self-breast examination, clinical monitoring, and promoting healthy lifestyles.[2-5]

Breast cancer awareness involves enhancing health behaviors through education on early diagnosis, risk factors, symptoms, and treatment.[2,6] Early detection of breast cancer can increase the likelihood of positive outcomes, leading to improved survival rates and quality of life for women. Moreover, research indicates that women's awareness of the disease can substantially contribute to their health behaviors.[6,7] Various educational models and tools have been employed to increase awareness in studies conducted on this topic. In our study, we evaluated the effectiveness of an educational program developed based on the Health Belief Model (HBM). This model, frequently utilized in breast cancer education, has had its effectiveness validated. It encompasses dimensions such as perceived susceptibility, severity, benefits, barriers, and cues to action. According to this model, individuals need to be convinced of the disease's possible existence even

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in the absence of symptoms. When individuals perceive themselves at risk (perceived susceptibility), understand the potential severity of the disease (perceived severity), believe in the positive outcomes of preventive actions (perceived benefits), and possess the ability to perform these health behaviors (self-efficacy), they are more likely to engage in these behaviors.[8,9]

Adolescence is considered a critical period during which lifelong behaviors are established. Health behaviors acquired during adolescence continue throughout life. Therefore, adolescent girls represent an important target group for breast cancer education and development of awareness.[3,10] When examining studies conducted in Türkiye on this topic, it is observed that these studies primarily focus on women aged 18 and older, utilizing descriptive designs to depict the existing situation. The purpose of this study is to enhance breast cancer awareness among adolescent girls through an educational program based on the HBM. In this context, adolescents were educated on breast cancer risk factors, symptoms, self-breast examination techniques, the importance of early diagnosis, preventive measures, screening programs, and treatment options. This study emphasizes the importance of targeting adolescent girls during their formative years to cultivate breast cancer awareness and promote healthy behaviors that can have a lasting impact on their overall health and well-being.

Hypotheses of the Study

H_0: There is no difference between the pre-test and post-test breast cancer awareness levels of adolescents participating in the HBM-based educational program.

H_1: Adolescents participating in the HBM-based educational program will experience an increase in breast cancer awareness in the post-test compared to the pre-test.

Materials and Methods

Study Design

This study was conducted as a one-group, pretest-posttest design.

Sample and Setting

The study population consisted of 90 female adolescents in the 9th, 10th, and 11th grades at a high school in Aydın. Since the aim of the study was to reach the entire population, a specific sample selection method was not employed. The study sample included a total of 79 adolescents who voluntarily participated in all sessions and completed all questionnaires. The sample group consisted of high school female adolescents aged 14 to 17. All female adolescents in the institution were included in the study. The inclusion criteria for participation in the study are as follows: (i) being between 14 and 18 years old; (ii) providing verbal consent and having a parent provide written consent for participation in the study. The exclusion criteria from the study was not attending all four teaching sessions. This study was conducted in Aydın, Türkiye, between April and May 2023.

Data Collection Tools

Data were collected through the "Participants Information Form" and the "Breast Cancer Awareness Evaluation Form." All students completed the Participants Information Form only at the pre-test, while they completed the Breast Cancer Awareness Evaluation Form at both pre-test and post-test.

Participants Information Form

The researchers prepared a form consisting of 11 items to collect demographic information about the adolescents. Five questions regarding age, height, weight, number of siblings, and age of menarche were answered in writing, while the remaining six questions (grade, mother's education status, father's education status, menstruation status, menstruation periods, and presence of breast cancer in the family) were multiple-choice. This form was administered at a pre-test.

Breast Cancer Awareness Evaluation Form

This form consists of two sub-dimensions and 23 questions prepared by the researchers to assess adolescent knowledge of breast cancer symptoms (12 items) and risk factors (11 items). Based on the literature, responses to this form are in a "yes," "no," and "don't know" format. In evaluating the form, the percentage of adolescents who answered the questions correctly, incorrectly, or with "don't know" was calculated for both pre-test and post-test. The Cronbach's alpha value for the total survey was 0.86. The Cronbach's alpha value for the 11-item subscale measuring knowledge of breast cancer symptoms was 0.79, and for the 12-item subscale measuring knowledge of breast cancer risk factors, it was 0.80. This form was administered in both the pretest and posttest.

Pilot Study

A pilot study was conducted from April 3 to 6, 2023, to test the comprehensibility and clarity of the HBM-based educational program and survey forms. Ten adolescents participated in the pilot study. Following the pilot study, the educational program and measurement tools were reviewed by the researchers for comprehensibility and language accuracy and were deemed acceptable for data collection from the target group. The adolescents who participated in the pilot study were not included in the sample group.

HBM-Based Educational Program

The development of the educational program began with a comprehensive literature review. Based on the insights gained, a draft educational program was formulated. This draft was then reviewed by the researchers for content validity, utilizing insights from breast cancer research, and subsequently presented to five faculty members (two in pediatric nursing, one in surgical diseases nursing, one pediatrician, and one oncologist) for expert opinions. Based on the recommendations of these experts, the educational program was finalized. The program's content included the structure of the breast, signs and symptoms of breast cancer, risk factors, breast self-examination (BSE), the importance of early diagnosis, prevention methods, screening programs, and treatment options. Before the educational sessions, all adolescents were given survey forms for the pretest, which took approximately 20 minutes to complete. Following the pretest, the education was delivered. To enhance interaction between the adolescents and the educator, the education was conducted in separate sessions for each class, albeit on the same day, and led by the same researcher in each session. The educational intervention consisted of four teaching sessions, each lasting 60 minutes. These sessions employed a variety of teaching methods, including powerpoint presentations, video demonstrations (featuring breast self-examination and changes in the breast due to cancer), group discussions, breast examination on models, and question-and-answer sessions. In the final part of the education, all adolescents performed

breast examinations on model breasts, and booklet is provided to aid in retaining the information. The education program was theoretically based on the HBM (Figure 1).

Breast Cancer Information Booklet

Each participant was given a booklet to help retain knowledge at the end of education. This booklet included information about breast cancer symptoms, illustrated breast self-examination, screening tests, and changes in the breast due to cancer. The booklet was prepared by the researchers in line with the knowledge of the literature. Expert opinion was taken regarding the suitability of the content of the booklet.

Statistical Analysis

Data analyses were conducted using the Statistical Package for the Social Sciences (SPSS), version 28.0 (IBM SPSS 28, Armonk, New York, USA). The program was utilized to analyze the data. The sociodemographic characteristics of the adolescents were analyzed using descriptive statistical methods. To evaluate the intervention's effectiveness, differences between pre-test and post-test measurements were assessed using parametric tests, which were selected based on the normal distribution properties of the study data. Paired samples t-tests and Chi-Square tests were utilized for parametric testing. Cronbach's alpha reliability coefficients were calculated to evaluate the internal consistency reliability of the 'Breast Cancer Awareness Evaluation Form'. A significance level of $P<0.05$ was considered for all analyses.

Ethical Considerations

The study received approval from the Koç University Social Sciences Research Ethics Committee (Approval Number: 2021.355.IRB3.157, Date: 27. 09. 2021). Before commencing the study, discussions were held with the administrators of the institution where the research was to be conducted, and official permission was obtained. Following this, researchers informed the adolescents about the study and obtained verbal consent from those who agreed to participate. Written consent was then obtained from the parents of these adolescents. Information and consent forms were sent home with the adolescents for their parents to read and sign. The forms, once signed by the parents and returned, were collected by the researchers, and these adolescents were included in the study. Participation was entirely voluntary, and all responses were recorded

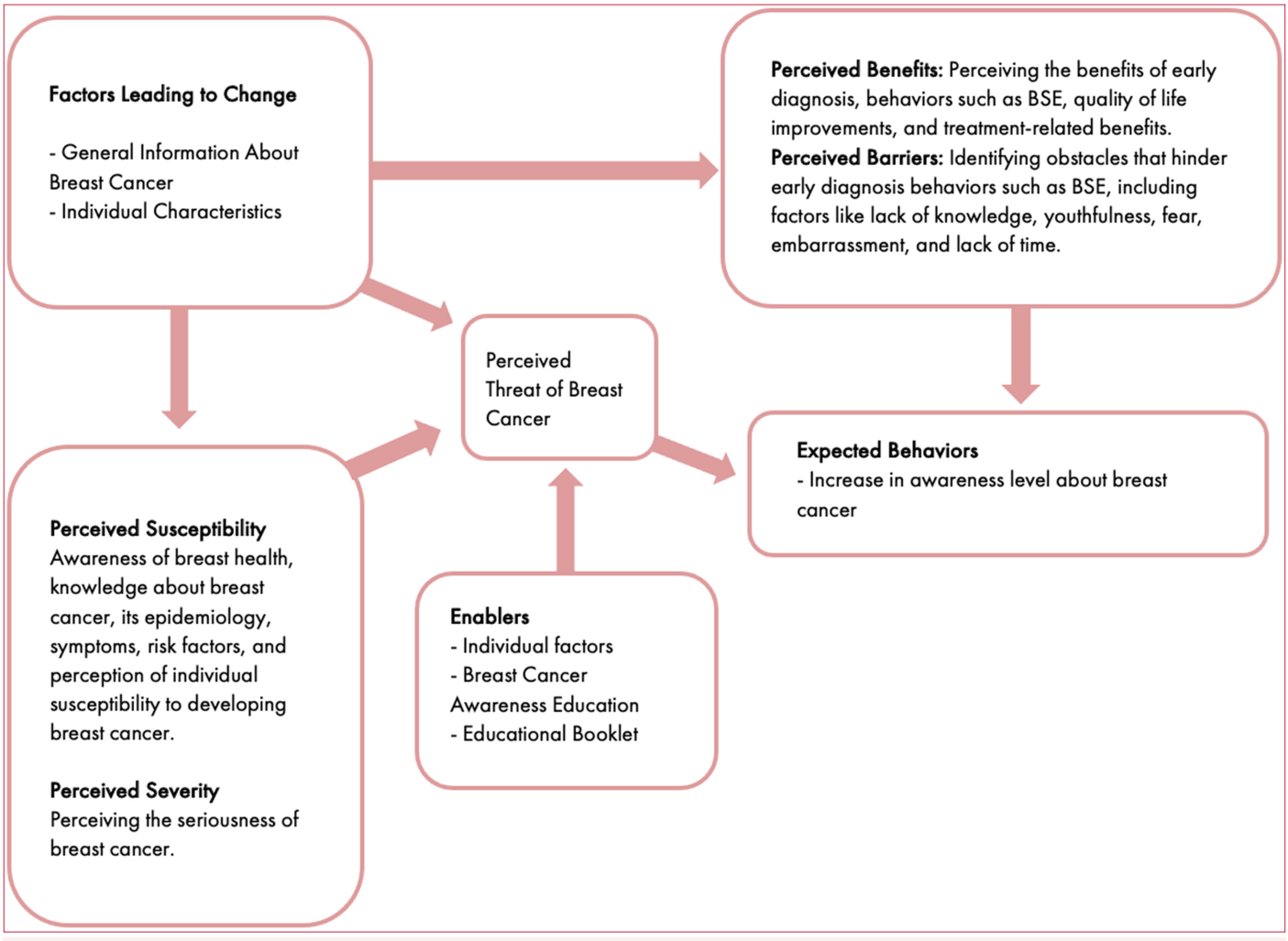

Figure 1. Conceptual framework of the breast cancer awareness education program based on the Health Belief Model.

anonymously. Moreover, the study adhered to the principles outlined in the Declaration of Helsinki.

Results

A total of 79 adolescent females participated in this study, with a mean age of 16.0 ± 0.96 years. The majority were 11th-grade students (51.9%), followed by 10th-grade (25.3%, n=20) and 9th-grade (22.8%, n=18). All adolescents had begun menstruating, and 10.1% (n=8) reported having a family member diagnosed with breast cancer (Table 1).

The results of this study showed that in the pre-test, 39.2% of adolescents correctly recognized that "redness of the breast skin is a symptom of breast cancer," which increased to 82.3% in the post-test (P=0.002). In the pre-test, 69.6% of adolescents correctly identified that "nipple discharge or bleeding is a symptom of breast cancer," while after the education, all adolescents answered this question correctly (P<0.001). Additionally, the item that received the lowest number of correct responses among the breast cancer symptoms was "breast nipple rash is a symptom of breast cancer." In the pre-test, only 38.0% of adolescents answered correctly, whereas in the post-test, 79.7% answered correctly (P<0.001). Overall, correct answers from adolescents regarding breast cancer symptoms significantly increased after the education (P<0.05) (Table 2).

Table 1. Socio-demographic Characteristics of the Participants (n=79)

Characteristics	Mean ± SD	Min-Max
Age (Year)	16.02 ± .96	14-17
Number of siblings	2.14 ± .88	0-4
Age of menarche	12.60 ± .95	10-15
	n	**%**
Grade		
9	18	22.8
10	20	25.3
11	41	51.9
Mother education status		
Primary school	7	8.9
Secondary school	5	6.2
High school	13	16.5
University	54	68.4
Father education status		
Primary school	5	6.3
Secondary school	2	2.5
High school	7	8.9
University	65	82.3
Menstruation status		
Yes	79	100.0
Menstrual periods		
Reguler	58	73.4
Irreguler	21	26.6
Presence of breast cancer in the family		
Yes	8	10.1
No	71	89.9

The majority of adolescents (84.8%) knew that "having a close relative with breast cancer" is a risk factor for breast cancer (Table 2). Before the education, a large majority of adolescents (88.6%) were aware that "a history of breast cancer in the family" is a risk factor for breast cancer, and the correct response rate increased to 92.4% after the education (P=0.625). Except for this breast cancer risk factor, the correct response rate for all items significantly increased after the education (Table 2).

Discussion

In this study, the HBM-based educational program significantly increased adolescents' knowledge about breast cancer. Previous studies have emphasized that identifying appropriate behaviors based on the HBM and raising awareness through educational interventions can lead to behavior change or the acquisition of new behaviors. For example, studies by Masoudiyekta et al[11] and Eskandari-Torbaghan et al[12] have demonstrated the effectiveness of HBM-based educational programs. These studies highlight the effectiveness of breast cancer education programs, thereby underscoring their necessity for all women.[13,14] Furthermore, education is considered the most important intervention for changing attitudes, and a change in attitude is highly likely to translate into behavioral changes.[15] The aim of education should be to increase awareness of breast cancer, which is the first step towards early diagnosis.[16,17] Raising this awareness at a young age can help make behaviors like self-examination and participation in screening programs permanent throughout adulthood. Therefore, it is crucial to impart this awareness to girls at the beginning of adolescence.[18] Additionally, enhancing awareness among this group will contribute to increased societal awareness. It is likely that adolescents will share what they have learned with their close circles, such as mothers and aunts, indirectly fostering awareness.[6,19] A study conducted in Mexico revealed that not only did women's awareness increase, but also, even four months after the intervention, their close circles had gained knowledge about breast cancer, indicating the transfer of information.[20]

In the literature, it has been demonstrated that adolescent girls have insufficient knowledge about breast cancer. For instance, a study conducted by Karayurt et al[21] revealed that 65% of adolescent girls were not aware of breast self-examination. Similarly, the study by Kyle et al[7] showed that 51.0% of female adolescents aged 11-18 were unaware of breast cancer. In this study, it was discovered that before the intervention, adolescents provided correct answers to less than 65% of the 11 questions regarding breast cancer symptoms and to less than 50.0% of the 12 questions related to breast cancer risk factors. Consistent with these results, several studies indicate that adolescents possess limited knowledge about breast cancer risk factors and symptoms.[4,22,23]

The results of this study demonstrate that the educational intervention significantly increased adolescent knowledge about breast cancer risk factors and symptoms, aligning with the results of studies

Table 2. Distribution of Correct Answers on Adolescent Pre-test and Post-test Breast Cancer Risk Factors and Symptoms

	Pre-test		Post-test		
Breast Cancer Risk Factors and Symptoms	n	%	n	%	*P*
BC symptoms					
Position change at the nipple	45	57.0	66	83.5	<0.001
Retraction or depression at the nipple	49	62.0	78	98.7	<0.001
Pain in one breast or underarm	54	68.4	77	97.5	<0.001
Contraction or dimpling of the breast skin	49	62.0	78	98.7	<0.001
Nipple discharge or bleeding	55	69.6	79	100.0	<0.001
A lump or thickening in the breast	52	65.8	77	97.5	<0.001
Nipple rash	30	38.0	63	79.7	<0.001
Breast skin redness	31	39.2	65	82.3	0.002
A lump or thickening under the armpit	49	62.0	77	97.5	<0.001
Changes in the size of the breast or nipple	40	50.6	72	91.1	<0.001
Changes in the shape of the breast or nipple	40	50.6	73	92.4	<0.001
BC risk factors					
A history of breast cancer	70	88.6	73	92.4	0.625
Using alcohol	41	51.9	78	98.7	<0.001
Smoking	54	68.4	79	100.0	<0.001
Being overweight	21	26.6	77	97.5	<0.001
Having a close relative with breast cancer	67	84.8	74	93.7	0.023
Advanced maternal age	19	24.1	71	89.9	<0.001
Nulliparity	10	12.7	69	87.3	<0.001
Early onset of menstruation	21	26.6	74	93.7	<0.001
Late onset of menopause	35	44.3	71	89.9	<0.001
Not breastfeeding	38	48.1	64	81.0	0.004
Presence of chronic diseases (such as asthma, diabetes)	18	22.8	50	63.3	<0.001
Not engaging in moderate-intensity physical activity for less than 30 minutes, less than 5 times a week	14	17.7	73	92.4	<0.001

Paired samples t test; BC: Breast cancer; *P*< 0.05 significance symptoms

conducted in other countries.[4,23-26] Similar to our results, the study by Al-Hosni et al[24] found that the educational program increased adolescents' knowledge about breast cancer risk factors and symptoms. In a study conducted in two high schools, the knowledge level of adolescents about breast cancer risk factors increased from 33% to 55%, and the knowledge level regarding these risk factors rose from 55.0% to 79.0%.[23] Mohamed et al[4] conducted a study with adolescents aged 16-19 years and found that knowledge about breast cancer clinical manifestations increased from 56.9% (poor) to 72.5% (good) after educational interventions. Additionally, before the intervention, 62.7% of adolescents had poor knowledge about breast cancer risk factors, which improved to 90.2% (fair and good) after the intervention.

The risk factor item with the highest percentage of correct answers before the intervention was the presence of breast cancer in close relatives. In our study, before the educational intervention, the majority of adolescent girls correctly identified this item, and after the intervention, the percentage increased to approximately 94%. Similarly, in a descriptive study by Karayurt et al,[21] it was determined that this genetically related risk factor was the most well-known among high school adolescents. Overall, it appears that adolescents are aware of the association between genetic factors affecting breast health and breast cancer.

While some risk factors for breast cancer are related to genetics, others are associated with an individual's lifestyle. The modifiable risk factors for breast cancer often relate to lifestyle habits, such as exercise, diet, alcohol consumption, and tobacco use. Increasing awareness levels among young individuals about lifestyle habits can lead to modifications in such behaviors. It is highly important

to enhance awareness among young people about breast cancer, provide practices for breast cancer prevention (such as self-breast examinations), and assist them in adopting health-promoting behaviors.[27] With increased awareness, lifestyle changes can potentially impact young women, encouraging them to avoid known risk factors.[28] This study revealed that the majority of adolescents had insufficient knowledge about risk factors such as being overweight and lack of physical activity before the intervention. Supporting our study results, Al-Hosni et al.[24] demonstrated that adolescents provided the least accurate responses to items related to lifestyle factors, particularly being overweight and lack of physical activity. Similarly, Sadoh et al[29] observed that the majority of adolescents were unaware of the associations between certain lifestyle behaviors, such as obesity, lack of physical activity, and excessive alcohol consumption, and an increased risk of breast cancer. These risk factors can be mitigated through health education targeted at adolescents. Therefore, school nurses play a crucial role in providing education on this topic to adolescents. By delivering appropriate education, adolescents' knowledge and awareness about breast cancer risk factors can increase, thereby potentially influencing their behaviors towards healthier choices.

Finally, with the widespread use of the internet and social media among youth today, they have access to a wealth of information. However, the information they acquire can sometimes be inaccurate or misleading. The direct provision of accurate information by healthcare professionals can enhance awareness among young individuals regarding breast cancer, leading to behavioral changes that contribute to healthier lives.

Limitations of the Study

This study has several limitations. Firstly, as the study was conducted with adolescent female students from a single institution, the findings' generalizability to all adolescent female students is limited. Secondly, the absence of a control group, due to the single-group pretest-posttest design of the study method, represents another limitation of this study.

Conclusion

The results of the study suggest that the HBM-based health education program is effective in increasing breast cancer awareness. Prioritizing awareness-raising as the initial step towards improving women's health is essential, and for this purpose, the preparation and implementation of HBM-based educational programs contribute to the development of preventive behaviors and early detection. Furthermore, increasing this awareness at the earliest possible age is crucial for establishing lasting behaviors into adulthood.

Ethics Committee Approval: Ethical permission was obtained from Koç University Social Sciences Research Ethics Committee (Date: 27.09.2021, Approval Number: 2021.355.IRB3.157). In addition, official permission was obtained from the institution where the research was conducted.

Informed Consent: Consent was obtained from the students who agreed to participate in the study.

Peer-review: Externally peer-reviewed.

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