Evaluation of the effectiveness of testicular cancer and testicular self-examination training for patient care personnel: intervention study

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Abstract
Testicular cancer (TC) is the most common malignancy among men aged 15–35 years. Testicular self-examination (TSE) is an important tool for preventing late-stage TC diagnoses. This study aimed to assess health beliefs and knowledge related to TC and TSE and the effectiveness of TC and TSE training for patient care staff in a hospital. This was a prospective, randomized, controlled intervention study. The study included 96 patient care staff divided into two groups of 48 participants each: Group I, the interactive education group, and Group II, the pamphlet education group. The results demonstrated that TSE practice and TC knowledge significantly increased in both Group I and Group II. Significant differences were observed between the groups pre and post education. TSE and TC knowledge levels were higher for participants in Group I than those in Group II. There was a significant difference in the performance of TSEs between groups: the rates were 83.3% in Group I and 54.2% in Group II. Perceived confidence and perceived barriers increased significantly for both groups. Interactive education sessions should be used to train men at risk for TC to perform TSEs.

Introduction
Testicular cancer (TC) is one of the most common malignancies in males between the ages of 15 and 35 years [1–3]. Although the incidence has increased over the last 30 years in many European countries, TC remains a rare condition, accounting for only 1–1.5% of all tumors in men [1, 4, 5]. In the United States, approximately two to three new cases are diagnosed per 100 000 men per year. However, there are some notable differences between countries, races and socioeconomic groups [2]. In Japan, 1 new case per 100 000 men is diagnosed each year; in Scandinavian countries and the United Kingdom, there are closer to 7 new cases per 100 000 men each year [6]. In Turkey, the incidence rate is 1.3 per 100 000 [7].

TC occurs most commonly in White men (6.8 cases/100 000 men), followed by Hispanic (3.5 cases/100 000 men) and Black men (1.4 cases/100 000 men) [8]. The incidence rate of TC is twice as high in higher socioeconomic groups compared with lower socioeconomic groups [9, 10].

Although the etiology of TC remains unknown, it is believed to have both genetic and acquired components [11, 12]. The known risk factors for TC include cryptorchidism (undescended testicle) and a family history of TC. Therefore, early
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detection is important for successful treatment [6, 12, 13]. TC symptoms include heaviness in the scrotum and abnormal enlargement or swelling in either testicle. However, the most common presenting symptom is painless swelling of the testis [14]. More than 90% of men with TC present with scrotal symptoms [15]. Males who find a lump in its early stages frequently have a better prognosis, with 5-year survival rates >95% [11]. However, men usually delay seeking treatment for TC for an average of 16 weeks after symptoms develop because of the failure to recognize the significance of their symptoms, embarrassment, lack of time, fear of cancer and fear of death [2, 4, 16–18]. Therefore, regular testicular self-examination (TSE) has been recommended for early detection of TC by the American Cancer Society [19]. Furthermore, the European Association of Urology 2011 guidelines on TC recommend clinical examination of individuals who have clinical risk factors [20], and patient-oriented organizations also recommend routine self-examination [21, 22]. Conversely, the statement of the US Preventive Services Task Force (USPSTF) [23] identified no published randomized controlled trial on screening for TC and reaffirmed its previous recommendation against routine screening for TC in asymptomatic adolescent and adult males. The USPSTF based this alteration on the relative rarity of TC, the lack of evidence for the accuracy of clinical or self-examination, and highly assertive outcomes from treatment [23].

TSE is a simple technique that can be used by-at-risk males to regularly and systematically examine their testicles and ensure early detection of TC. It is recommended that at-risk men perform TSE at least once in every month [19–24]. Although TSE is easy to teach and does not considerably disturb daily routines, evidence indicates that most men do not regularly perform self-examinations. For example, a study of 191 young adult men who were recruited from a large industrial complex in the American Midwest found that 64% rarely or never performed TSEs [14]. In addition, a recent study reported that only 8.8% of respondents knew that men in the high-risk age group (adult men below 35) should perform TSE [4]. Past studies have reported TC/TSE awareness, self-efficacy and/or cues to action and their influence on TSE behavior [15, 25, 26].

The literature shows that males do not understand the severity of TC [5, 12], do not believe in the effectiveness of TSE [5, 12], cannot find enough time [27] and feel guilty or sinful when performing TSE [25]. These feelings contribute to the failure to perform TSE. The health belief model (HBM) is used as a framework for understanding patient knowledge, beliefs and attitudes toward TC and to develop training programs for TC and TSE. The HBM is a model that describes the relationship between beliefs and behaviors, determines what motivates individuals to take action, and describes the particular scenarios that support the adoption of health behaviors [23]. The HBM provides useful evidence that can be applied to design and deliver appropriate health education programs to nurses and to understand patients’ beliefs about TSE, TC and early diagnosis [18, 28–30]. However, there is a lack of studies using the HBM to examine and promote TSE behavior [26]. However, according to Cox et al.’s [31] recent interventional study, which used HBM constructs in its design, increased TSE behaviors were found among 267 adolescent cancer survivors.

The purpose of this study was to compare two HBM-based educational programs (pamphlets or an interactive education program with a PowerPoint presentation) and to determine which one most effectively increases the proportion of patient care personnel who practice monthly TSE. Both forms of education were viable for use with young adult men. The aims of this article were as follows: (i) to assess knowledge and health beliefs regarding TC and TSE among patient care personnel; (ii) to determine the proportion of patient care personnel who practice monthly TSE; (iii) to evaluate the effects of the interventions on knowledge and health beliefs regarding TC and TSE; and (iv) to measure the monthly performance of TSE in young adult men after each intervention.
Method

Participants
The study population consisted of 115 male patient care personnel who worked at Gulhane Military Medicine Academy, Ankara, Turkey. The participants were at least primary school graduates and without any health problems.

A total of 96 patient care personnel met the study criteria and were willing to participate. The patient care staff members are responsible for assisting other health care professionals in a clinical setting. This group was chosen because of their risk of TC and the ease of contacting them. To be eligible, the participants had to meet the following criteria: (i) they had not been diagnosed with TC, and (ii) they were between the ages of 20 and 40 and therefore represented a group at high risk for TC.

Procedure
This study included an intervention (pamphlet or interactive education materials) as well as pre- and post-test evaluations. This intervention is different from that used in other studies. The intervention provided information on how to properly perform TSEs, on the importance of TSEs and on two different TSE training methods. The HBM was developed to examine the impact of TSE and TC knowledge.

The participants were divided into two groups. Allocation to the two groups was randomized using envelopes with a sequence of numbers. The two groups of questionnaires were numbered before distributing them to the participants. There were 48 (50%) participants in the pamphlet education group (Group I) and 48 (50%) in the interactive education group (Group II). To protect privacy, each participant was assigned a unique code, which the participant created following instructions on the first page of the questionnaire. This code was used to match the participant’s initial responses to his follow-up questionnaire responses and for data entry. Group I received the educational pamphlets, and Group II participated in an interactive education session with a PowerPoint presentation. Figure 1 shows the research scheme. The participants were also asked to complete a questionnaire related to TC and TSE. Participation in the study was voluntary, and all questionnaires were anonymous. The educational pamphlets were created by the researchers. Ethical approval was obtained from the Gulhane Military Medicine Academy (GATA) Ethics Committee prior to recruitment.

Instruments
This research on knowledge and health beliefs related to TC and TSE was performed between October 2012 and May 2013 with a sample of patient care personnel who worked at GATA-related clinics. The data were collected using the questionnaires described below.

Two types of materials were used in this research: data collection forms and training materials. The data were collected using a questionnaire that was developed based on the literature [15, 18, 20, 25, 27]. The literature on TC and TSE was reviewed by researchers. The training materials consisted of interactive sessions and a pamphlet developed for our study that contained information on what TC is, the signs and symptoms of TC, risk factors, how to perform a TSE and the importance of TSE for early detection in screening. Additionally, interactive training was conducted with two groups of 24 people for 45 min on the same day to ensure active participation of the audience in the form of questions and answers, and a slide presentation was given by the researchers. Interactive presentations of cases of two Turkish patients who were diagnosed with TC at 24 and 30 years of age were provided. A 5-min video depicted how these patients unfortunately did not know how to perform a TSE. The presentation emphasized the importance of not being afraid of cancer and of performing TSEs.

We developed our training tools using HBM messages. Four experts studied the tool development phase. One of the experts was a clinician, and three of the experts were public health nurses; all of them had academic degrees. After the first development step was completed, the documents were reviewed by the educators and then revised. A urology specialist evaluated the content validity.

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of the training materials as suitable. The Dale-Chall Formula was used to determine that the readability was at a fifth grade level.

The dependent variables of the investigation were health beliefs and practices of TSE for the early detection of TC. The independent variable of the investigation was the education initiative administered to both groups. A history of testicular illness, a history of TC in the family, knowledge and frequency of TSE, marital status and education

Fig. 1. Flowchart of survey stages.
were considered control variables for the purposes of this investigation. The survey contained ~51 items and took ~20 min to complete. The questionnaire included 25 items related to demographics (age, education level and marital status), knowledge and the practice of TSE. The responses were in either yes/no or multiple-choice format. A total of 26 items were related to Champion’s Health Belief Model (CHBM) and were scored using a five-point Likert scale.

**CHBM scale**

The HBM was used in the exploration of this issue because the focus of the model and this study was preventive health care behaviors. The HBM was developed by a group of social psychologists employed by the US Public Health Service in the early 1950s. The original HBM comprised four concepts: perceived vulnerability or susceptibility, perceived personal harm caused by the condition (severity or seriousness), positive attributes associated with an action or behavior (benefit) and perceived negative aspects related to an action or behavior (barrier) [23]. The HBM now consists of six major subdimensions: perceived susceptibility, seriousness, perceived benefits, perceived costs (barriers), motivation and modifying factors [32]. Champion and Miller [29] included self-efficacy (confidence) in the performance of health maintenance or prevention behaviors as a subdimension of the HBM in her studies concerning breast cancer screening behaviors. The HBM Scale for Measuring Beliefs Related to Breast Cancer developed by Champion [33] was modified by Barnes [34] to measure the beliefs of active duty Air Force males regarding TC and TSE. The health beliefs scale for testicular cancer and TSE is based on the early diagnosis of TC.

According to the HBM, individuals must believe they are at risk and must be confident in their ability to use TSE to prevent TC or to reduce its severity. If individuals believe in the benefits of TSE, they will be able to overcome the barriers to taking action.

The validity and reliability of this scale were demonstrated by Gül et al. [18] in Turkey. The Turkish adaptation includes 26 questions that cover the following five subdimensions: perceived susceptibility (five questions), perceived severity (seven questions), perceived benefits of TSE (three questions), perceived barriers to TSE (five questions) and perceived self-efficacy (six questions). Gül et al. [18] found a Cronbach alpha reliability value of 0.91 for CHBM Scale. Cronbach’s alphas for these subscales ranged from 0.64 to 0.92, which supported their internal consistency. The study by Gül et al. [18] showed that this scale explained 70.7% of the total variance in the five factors. Accordingly, the scale largely explains beliefs about TSE. The responses are scored as follows: ‘strongly disagree’ = 1 point; ‘disagree’ = 2 points; ‘undecided’ = 3 points; ‘agree’ = 4 points; and ‘strongly agree’ = 5 points. Increasing scores indicate increasing sensitivity. For patients to perform a health behavior that is considered beneficial, it is necessary to decrease perceived barriers and increase the patient’s motivation and perceived self-efficacy [18, 33, 34]. The questions were given to 20 men in different groups who were not included in the study, and necessary corrections were made.

**Data analysis**

All questionnaires with complete data were entered into a database and analysed using SPSS version 15.0 (SPSS Inc., Chicago, IL). Frequencies, mean values and standard deviations were calculated. Categorical variables were compared using the chi-square test. The differences between groups were analysed using Student’s t-test for normally distributed variables and the Mann-Whitney U-test for non-normally distributed variables. P-values < 0.05 were considered statistically significant.

**Results**

**Demographic characteristics**

The mean age of the participants in Group I was 28.8 ± 4.7 years (range = 21–37), and the average age of the participants in Group II was
28.38 ± 4.33 years (range = 21–37) (Table I). In Group I, 35.4% of the participants (n = 17) were primary school graduates, whereas 52.1% of the participants in Group II were high-school graduates (Table I). In both groups, 52.1% (n = 25) of the participants were single. In Group I, 54.2% (n = 26) of the participants reported that they smoked, whereas 43.8% (n = 21) of the participants in Group II reported that they smoked. Family history of cancer was evaluated in both groups. In Group I, 22.9% (n = 11) of the participants had a family history of cancer, and 12.5% (n = 6) of the participants in Group II had a family history of cancer (Table I) (P > 0.05). Two participants had an increased risk of TC as a result of undescended testicles in childhood.

### TC knowledge and TSE practice

A *t*-test for independent groups was used to determine the effects of different peer education training methods on TSE and TC knowledge (Table II). The results showed a significant increase in TSE and TC knowledge in both groups (P = 0.001). Again, a *t*-test for independent groups was used to assess the difference between the two groups (the interactive education group and the pamphlet education group) in terms of TSE and TC knowledge. There was no statistically significant difference between Groups I and II (P = 0.147) in the pre-education comparison; however, statistically significant differences were observed between these groups (P = 0.005) after education. The TSE and TC knowledge levels were higher for the participants who received interactive education than for those who received the pamphlet (Table II). A total of 54.1% (n = 52) of the participants had not heard of TC and TSE. In the pre-education assessment, only 5.2% (n = 5) of the sample practiced TSE (Table III). However, after the intervention, 83.3% (n = 40) of the participants in Group I practiced TSE, and 54.2% (n = 26) of the participants in Group II practiced TSE (P < 0.05) (Table III).

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**Table I. Sociodemographic characteristics**

<table>
<thead>
<tr>
<th>Characteristics</th>
<th>Group I</th>
<th>Group II</th>
<th>Significant</th>
<th>P</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>n</td>
<td>%</td>
<td>n</td>
<td>%</td>
</tr>
<tr>
<td>Education</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Primary education</td>
<td>17</td>
<td>35.4</td>
<td>17</td>
<td>35.4</td>
</tr>
<tr>
<td>High school</td>
<td>21</td>
<td>43.8</td>
<td>25</td>
<td>52.1</td>
</tr>
<tr>
<td>University</td>
<td>10</td>
<td>20.8</td>
<td>6</td>
<td>12.5</td>
</tr>
<tr>
<td>Marital status</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Married</td>
<td>23</td>
<td>47.9</td>
<td>23</td>
<td>47.9</td>
</tr>
<tr>
<td>Not married</td>
<td>25</td>
<td>52.1</td>
<td>25</td>
<td>52.1</td>
</tr>
<tr>
<td>Smoking status</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Smoker</td>
<td>26</td>
<td>54.2</td>
<td>21</td>
<td>43.8</td>
</tr>
<tr>
<td>Non-smoker</td>
<td>22</td>
<td>45.8</td>
<td>27</td>
<td>56.2</td>
</tr>
<tr>
<td>Family history of cancer</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Yes</td>
<td>11</td>
<td>22.9</td>
<td>6</td>
<td>12.5</td>
</tr>
<tr>
<td>No</td>
<td>37</td>
<td>77.1</td>
<td>42</td>
<td>87.5</td>
</tr>
<tr>
<td>History of testicular disease</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Yes</td>
<td>9</td>
<td>18.8</td>
<td>4</td>
<td>8.3</td>
</tr>
<tr>
<td>No</td>
<td>39</td>
<td>81.2</td>
<td>44</td>
<td>91.7</td>
</tr>
</tbody>
</table>

*Pearson chi-square test. Student’s *t*-test.

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**Table II. Evaluation of the effectiveness of testicular cancer and testicular self-examination training**

<table>
<thead>
<tr>
<th>Characteristics</th>
<th>Group I</th>
<th>Group II</th>
<th>Significant</th>
<th>P</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>n</td>
<td>%</td>
<td>n</td>
<td>%</td>
</tr>
<tr>
<td>Average age</td>
<td>28.88 ± 4.7</td>
<td>21–37</td>
<td>28.38 ± 4.33</td>
<td>20–37</td>
</tr>
</tbody>
</table>

*P* = 0.001.
This study also analysed the effect of peer education on the participants’ health beliefs. The Health Beliefs Scale for Testicular Cancer and Testicular Self-Examination [24] was used to assess health beliefs regarding TC and TSE. The Cronbach’s alpha values for internal consistency for each subdimension were as follows: susceptibility (0.85), severity (0.90), benefits (0.87), barriers (0.73) and self-efficacy (0.84).

On the CHBM subscales, the differences between the pre and post-education values were analysed using the t-test for both dependent and independent variables (Table III).

The test results demonstrated that perceived confidence increased significantly (\( P = 0.003 \)) and that

### Table II. Pre- and post-intervention TSE knowledge by education method

<table>
<thead>
<tr>
<th>TSE knowledge score</th>
<th>Pre-education</th>
<th>Post-education</th>
<th>Difference</th>
<th>( P )</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>( \bar{X} )</td>
<td>SD</td>
<td>( \bar{X} )</td>
<td>SD</td>
</tr>
<tr>
<td>Group I</td>
<td>3.3</td>
<td>2.4</td>
<td>12.0</td>
<td>1.9</td>
</tr>
<tr>
<td>Group II</td>
<td>2.7</td>
<td>2.3</td>
<td>10.4</td>
<td>3.7</td>
</tr>
<tr>
<td>( P )</td>
<td>( P = 0.147 )</td>
<td>( P = 0.005 )</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

*Intragroup difference in pre- and post-education knowledge. *Intergroup difference in pre-education knowledge. *Intergroup difference in post-education knowledge.

### Table III. The distribution of TC knowledge and TSE practice

<table>
<thead>
<tr>
<th>Pre-education</th>
<th>Group I</th>
<th>Group II</th>
<th>Significant</th>
<th>( P )</th>
</tr>
</thead>
<tbody>
<tr>
<td>Questions</td>
<td>( n )</td>
<td>%</td>
<td>( n )</td>
<td>%</td>
</tr>
<tr>
<td>Do you know anything about TC and TSE?</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>I don’t know</td>
<td>26</td>
<td>54.2</td>
<td>26</td>
<td>54.2</td>
</tr>
<tr>
<td>Heard, but don’t know</td>
<td>18</td>
<td>37.5</td>
<td>18</td>
<td>37.5</td>
</tr>
<tr>
<td>My knowledge is adequate</td>
<td>4</td>
<td>8.3</td>
<td>4</td>
<td>8.3</td>
</tr>
<tr>
<td>The early stages of TC can be detected by TSE?</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Impossible</td>
<td>29</td>
<td>60.4</td>
<td>38</td>
<td>79.2</td>
</tr>
<tr>
<td>Possible</td>
<td>19</td>
<td>39.6</td>
<td>10</td>
<td>20.8</td>
</tr>
<tr>
<td>Are you performing TSE?</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Yes</td>
<td>3</td>
<td>6.2</td>
<td>2</td>
<td>4.2</td>
</tr>
<tr>
<td>No</td>
<td>45</td>
<td>93.8</td>
<td>46</td>
<td>95.8</td>
</tr>
<tr>
<td>Post-education</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Do you know anything about TC and TSE?</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Heard, but don’t know</td>
<td>10</td>
<td>20.8</td>
<td>20</td>
<td>3.7</td>
</tr>
<tr>
<td>My knowledge is adequate</td>
<td>38</td>
<td>79.2</td>
<td>28</td>
<td>58.3</td>
</tr>
<tr>
<td>The early stages of TC can be detected by TSE?</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Impossible</td>
<td>3</td>
<td>6.2</td>
<td>9</td>
<td>18.8</td>
</tr>
<tr>
<td>Possible</td>
<td>45</td>
<td>93.8</td>
<td>39</td>
<td>81.2</td>
</tr>
<tr>
<td>Are you performing TSE?</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Yes</td>
<td>40</td>
<td>83.3</td>
<td>26</td>
<td>54.2</td>
</tr>
<tr>
<td>No</td>
<td>8</td>
<td>16.7</td>
<td>22</td>
<td>45.8</td>
</tr>
</tbody>
</table>

*Pearson chi-square test. *\( P < 0.05 \).
perceived barriers decreased significantly ($P = 0.022$) after the intervention for the participants in both groups. In both groups, the differences between the participants’ pre- and post-education health beliefs were also significant for the other subscales ($P < 0.05$) (Table IV).

### Discussion

One of the best ways to reduce the growing burden of cancer is to strive for its prevention. Screening to detect early signs of cancer has been proven to be an effective approach. Individuals can take responsibility for the early detection of cancer through TSE, although this subject is controversial. Some authors argue that there is no evidence that routine TSE is beneficial for survival [35]. However, many authors suggest that TSE is important in the early stages of clinical diagnostics [15, 30, 35]. The World Health Organization has proposed training programs to detect the early signs of cancer for early diagnosis [36].

The aim of this study was to provide knowledge of TSE by comparing two HBM-based educational programs (pamphlets or an interactive education program with a slide presentation) and to prevent and detect testicular disease at an early stage.

The participants’ ages ranged from 20 to 37 years old. The participants in our study were a group of young males at risk for TC. The literature concerning TC was examined [1, 8, 13]. TC is the most common cancer in men aged 20–40 years. For our study, we selected men from the age group that is commonly studied in the literature to obtain data on the level of knowledge of TC and TSE and on health beliefs to evaluate the content of health education materials and to guide training methods.

The results of our study showed that the majority of men were unaware of TSE and therefore did not practice these examinations before the intervention. These results are supported by other studies conducted in various regions of the world in which participants were evaluated before and after interventions and were found to exhibit positive changes in terms of knowledge of TC and TSE and on health beliefs to evaluate the content of health education materials and to guide training methods.

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testicles [5]. Treatment for TC varies with the type of tumor and the tumor stage [2, 6]. In the early stages, the 5-year survival rate increases to 95% with TSE [2, 4, 24]. TSE is an early diagnostic method that is easy to perform and can be used to detect early signs of TC [3, 11]. In the pre-education assessment, 60.4% \((n = 9)\) of the participants in Group I believed that it was impossible to identify TC with TSE compared with 79.2% \((n = 38)\) of the participants in Group II (Table III). This difference was statistically significant \((P < 0.05)\). Because our study participants were patient care personnel who worked in a hospital, it was expected that a higher percentage of the participants would be aware that early detection of TC was possible with TSE. In a study by Dachs et al. [38], 61% of the participants were not aware that early detection was important for TC; this value was 47.4% in a study conducted by Göçgeldi and Koçak [4].

After the intervention, there were significant differences in the practice of TSE between the two groups \((P < 0.05)\). After the training, the rate of TSE was higher in Group I (interactive training). In a similar study by Dachs et al. [38], the percentage of participants practicing TSE increased from 9 to 36% after training. In a study by McCullagh et al. [25] in the United Kingdom, the use of TSE increased from 58.4 to 69.3% among the study participants after training. In a study by Rodríguez et al. [39] in Puerto Rico, a conference and written material were used for training. TSE use increased from 2.4 to 87.5% in the patients who participated in the conference. According to the results of our study, education plays a positive role in behavioral change. Furthermore, this study showed that training was successful in producing behavioral change.

According to the HBM (Rosenstock et al. 1988 [28]), if the perceived susceptibility to TC and the perceived severity of TC are high, the likelihood of practicing TSE will increase. In addition, if the perceived benefits of TSE outweigh the perceived barriers, the practice of TSE will increase. After the intervention, both groups showed a statistically significant difference in health beliefs \((P < 0.05)\). However, when comparing the training methods, the only barrier was a statistically significant difference in the perception of self-efficacy \((P < 0.05)\).

In a study by Gürsoy et al. [40], the results of the BSE (breast self examination) and SIM were similar to the results in this study. Perceived self-efficacy was high; however, there was no difference between the groups.

Similar to our study, Brown et al. [41] and others have conducted studies evaluating different training methods. These studies have demonstrated significant differences in perceptions of seriousness and susceptibility between groups trained with videos and groups trained with other methods. In the study by Brown et al. [41], perceived barriers were assessed by identifying the differences between the groups. In our study, the audiovisual material used in the interactive group increased the perceived benefits and minimized the obstacles associated with TSE. The interactive education included visual descriptions of TSE with questions and answers, and greater perceived self-efficacy was associated with the interactive educational strategy. In this study, participants with health care exposure may have influenced the generalizability of the results and may have had an effect on the retention of information and health beliefs about TC and TSE.

### Conclusion and Recommendations

(1) The results of this study indicate that men are unaware of the causes and symptoms of TC. In addition, the findings demonstrate a significant difference in the post-education TC and TSE knowledge scores of Group I (the interactive education group) and Group II (the pamphlet group).

(2) There is evidence that the rate of screening among men increases with two educational methods. Knowledge about TC and the practice of TSE were higher following interactive education than with the pamphlet education method. Thus, these two methods of education can be used to increase the participation
of men in screening programs and as early diagnosis and screening approaches.

(3) For men with TC, information on TSE is an important part of education for decision making. Many screening methods for breast cancer in women have been discussed in previous studies, but there are few intervention studies on screening for men with TC. Training methods for health professionals in the community should address a larger population of men to encourage them to take responsibility for the prevention of cancer.

(4) Health professionals should receive audiovisual education and training in the use of screening methods, such as interactive education.

(5) The inclusion of participants with health care exposure may have influenced the generalizability of this study and may have had an effect on the retention of information and health beliefs about TC and TSE. Therefore, it is recommended that future studies include different groups of men, such as active duty males, students, and patient care personnel.

(6) By using the health belief scale for the assessment of TC, primary health care professionals can benefit from an understanding of the beliefs that influence men’s TSE knowledge and practice. Further research is recommended using a larger sample size.

Limitations

One limitation of this study is that it was conducted in a single hospital with a small sample. Another limitation is that the data on TSE practice were self-reported by the participants. In addition, there is limited literature regarding the HBM for TC and TSE for men in Turkey and other countries. Additionally, discussing sexual matters is taboo in Turkey for cultural and religious reasons. These limitations may have affected the participants’ responses and the results of the study. Therefore, the findings of this study may not be generalizable to other young men in Turkey or other countries.

Conflict of interest

None declared.

References