Comparison of the level of knowledge on, attitude towards, and skills of medical and nursing students between pre- and post-training of the breast self-examination in Oman

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Abstract:

**Purpose:** Breast cancer is one of the most common cancers in women worldwide. Educative and awareness programs do impact early practices of breast self-examination resulting in early detection of cancer and thereby decreasing mortality. The study aimed to assess the level of knowledge and awareness of breast cancer and breast self-examination among medical and nursing students in Oman and to compare the knowledge on, attitude towards, and skills of students after the training program.

**Methods:** This is a quasi-experimental study that was carried out for medical students from in the College of Medicine and Health Sciences, National University of Science & Technology, Oman and nursing students in the Oman College of Health Sciences and the Al Bathina Nursing Institute in November 2019. The pre-test questionnaire was given before the training program and a post-test questionnaire was administered after the training program. Knowledge on, attitude towards, and skills of students on breast cancer and breast self-examination were compared.

**Results:** Pre-test and post-test were collected from 170 students—90 students from medical, and 80 students from nursing schools. A significant improvement was observed in the post-test scores for knowledge on, attitude towards, and skills of students after the intervention (P < 0.001).

**Conclusion:** An educational training program on breast cancer and breast examination with emphasis on skills can motivate the participants to perform breast self-examination regularly. Therefore, it may help students to train target women for the early detection of breast cancer.

Key words: Breast neoplasm; Breast self-examination; Early detection of cancer; Nursing students, Medical students.

**Introduction**

**Background/rationale:** Breast cancer is one of the major cancers leading to morbidity and mortality among females in the Sultanate of Oman. According to the latest statistics up to 2015 released by the Ministry of Health, it accounts for about 26.9% of the total cancer cases among women in the country[1]. One out of 5 Omani women is diagnosed with breast cancer in her lifetime and the overall standardized incidence rate is 15.6 cases per 100,000 [2]. The frequency of cancers among Omani females had increased steadily from 64 in 2003 to 212 in 2015. Breast self-examination (BSE) is a relatively simple, low-cost...
method of early detection that can be performed more frequently than mammography or clinical breast examination. Monthly breast self-examination has been reported to be effective in detecting the early symptoms of breast cancer which, in turn, greatly reduces mortality from breast cancer. The implementation of breast cancer screening programs is highly determined by national policies, healthcare organization, available resources, and other factors. With the collaboration of various professionals of the health care sector and with the help of their expertise, it will be easier to achieve this common goal.

**Objectives:** It aimed to assess the level of knowledge and awareness of breast cancer and breast self-examination among medical and nursing students in Oman and to compare the knowledge on, attitude towards, and skills before and after planned teaching program among medical and nursing students. Furthermore, it compared the effectiveness of the two methods of educational interventions used.

**Methods**

**Ethics statement:** Approval was obtained from the Research and Ethics committee to conduct the study (CMHS/REC/038/19/C). Respondents participated in the survey and expressed their consent by completing the informed consent form.

**Study design:** This is a quasi-experimental study conducted among the undergraduate medical students (premedical and preclinical) of the College of Medicine and Health Sciences, National University of Science and Technology, and nursing students from Oman College of Health Sciences and Al Bathina Nursing institute in November 2019.

**Participants:** The study was conducted in November 2019. Medical students consisted of 90 students from preclinical and premedical students attending the program. BSc Nursing students consisted of 80 students from 1st year, 2nd year and 3rd year attending the program. Clinical year students and BSc nursing year 4 students and those students who did not give consent for participating in this study were excluded from the study.

**Study size:** To get the difference of means in paired sample, a priori sample size was computed as 54 using G*Power 3.1.9.4 (available from: [http://www.gpower.hhu.de/](http://www.gpower.hhu.de/)) : tails =2, effect size d_z=0.5, α error probability=0.05, and power (1-β error probability) =0.95. A sample size 80 and 90 in each group was sufficient. **Educational intervention:** The breast cancer awareness workshop was conducted for two
days (Suppl. 1) on each day of the program; there was one common lecture session which was followed by a pre-test. Then the students were divided equally into two groups approx. Group 1 had a post-test immediately after the lecture session. The active learning session was done after the post-test before the dispersal. So they are not deprived of the privilege of undergoing this active learning. Group 2 had an active learning session (video demonstration of breast self-examination, hands-on activity on breast model for examining the breast and clay activity to determine different tumor sizes) after the lecture session. This was followed by a post-test. For pre and post-test self-administered questionnaires were given. The breast model used in the program was developed by the principal investigator and was approved by the subject experts.

**Data source/measurement:**

**Measurement tool:** For the questionnaire, an extensive review of the literature was done and items were developed in reference to the already validated items from published articles written by Suwarna Madhukar et al and Ayesha Ahmed et.al [3,4]. Tools of both articles were used under the Creative Commons license without the permission of the authors. An item of 24 main questionnaires was pooled that addressed different variables on knowledge of breast cancer, knowledge on, attitude towards, and skills of breast self-examination (Suppl. 2). The following 4 domains were included in the questionnaire: knowledge on breast cancer (7 items), knowledge on breast self-examination (5 items), attitude towards breast self-examination (8 items), and skills of practicing breast self-examination (4 items). Correct answers to knowledge on breast cancer and breast self-examination are marked 1 and wrong answers as marked 0, total scores are calculated. For attitude items, 5 point Likert scale (strongly agree/agree/neutral/not agree/strongly not agree) was used. For a positive attitude item - scores of 5, 4, 3, 1, and 1 corresponded “strongly agree”, “agree”, “neutral”, “disagree” and “strongly disagree”, respectively.

- This scoring is reversed for the negative attitude items. The questionnaire also consisted of few subjective type questions on information and practice of performing of breast self-examination.

**Validity and reliability test of the measurement tools:** The content validity check for the questionnaire was done by involving 5 experts from the College of Medicine & Health Sciences, National University of Science & Technology, Oman. Each expert was given a copy of the scale and explained the purpose and
objectives of the study to them individually. The experts were then asked to rate each item based on relevance, clarity, grammar or spelling, ambiguity, and structure of the sentences on the 5-point Likert scale. Item-level content validity index (I-CVI), scale’s content validity index (S-CVI), and modified kappa were analyzed for all the questions using Microsoft excel. The items that had CVI over 0.75 remained and those ranged from 0.70 and 0.79 were revised. S-CVI/UA was calculated by adding all items with I-CVI equal to 1 divided by the total number of items. An S-CVI/UA of 24 items ranged from ≥ 0.8 and ≥ 0.9, which means items have excellent content validity. Modified kappa was calculated using the formula, \( K = (I-CVI - PC) / (1 - PC) \). Items with ≥0.74 were retained and those ranging from 0.04-0.59 were revised. The teaching module was validated by panel of experts. The reliability test was applied for Likert type questions and the Cronbach alpha was 0.765.

**Statistical methods:** Descriptive data are presented as frequency and percentage, while continuous data are presented as mean and standard deviation. Pre- and post-scores for knowledge on breast cancer, knowledge on BSE, attitude towards, and skills of breast self-examination were compared by paired t test. Comparison of post-test skills of practicing breast self-examination – After lecture only and after lecture and activity was done by Students t test. Data were analyzed using SPSS 22 (IBM Corp., Armonk, NY, USA).

**Results**

**Participants:** The present study was conducted on 90 medical students from the College of Medicine and Health Sciences, National University, 80 nursing students from the College of Health Sciences, and Al Bathina Nursing institute. 86 students aged between 18-20 years-old and 84 were above 20 years. The medical students were 21 from MD1, 16 from MD2, 21 from MD3 and 32 from MD4. The nursing students constituted were 29, 32 and 19 from BSc Nursing year 1, 2 and 3 respectively (Table 1).

<table>
<thead>
<tr>
<th>Parameters</th>
<th>No.</th>
<th>Percentage</th>
</tr>
</thead>
<tbody>
<tr>
<td>Age (N=170)</td>
<td></td>
<td></td>
</tr>
<tr>
<td>18-20 years</td>
<td>86</td>
<td>51</td>
</tr>
<tr>
<td>&gt;20 years</td>
<td>84</td>
<td>49</td>
</tr>
</tbody>
</table>

Table 1- Demographic information of the surveyed students
**Main results:**

Raw data of the students’ responses were available from Datasets 1 and 2. A statistically significant improvement was observed in the post-test scores for knowledge on, attitude towards and skills after the intervention (P < 0.001). The mean scores of pre- and post-test for four domains including knowledge on breast cancer, knowledge of breast self-examination, attitude towards breast self-examination, and skills of practicing breast self-examination were presented in Tables 2 and 3. However, mean score of attitude in pre-test and post-test showed no statistical significance among nursing students (P=0.320).

<table>
<thead>
<tr>
<th>Marital status (N=170)</th>
<th>Married</th>
<th>3</th>
<th>2</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Unmarried</td>
<td>167</td>
<td>98</td>
</tr>
<tr>
<td>Academic year</td>
<td>Medical (N=90)</td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>MD1</td>
<td>21</td>
<td>23</td>
</tr>
<tr>
<td></td>
<td>MD2</td>
<td>16</td>
<td>18</td>
</tr>
<tr>
<td></td>
<td>MD3</td>
<td>21</td>
<td>23</td>
</tr>
<tr>
<td></td>
<td>MD4</td>
<td>32</td>
<td>36</td>
</tr>
<tr>
<td></td>
<td>Nursing(N=80)</td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>1ST YEAR</td>
<td>29</td>
<td>36</td>
</tr>
<tr>
<td></td>
<td>2ND YEAR</td>
<td>32</td>
<td>40</td>
</tr>
<tr>
<td></td>
<td>3RD YEAR</td>
<td>19</td>
<td>24</td>
</tr>
<tr>
<td>Family history of breast cancer</td>
<td>Yes</td>
<td>14</td>
<td>8</td>
</tr>
<tr>
<td></td>
<td>No</td>
<td>156</td>
<td>92</td>
</tr>
<tr>
<td>If yes mention the relationship: (N=14)</td>
<td>Aunt</td>
<td>9</td>
<td>64</td>
</tr>
<tr>
<td></td>
<td>Sister</td>
<td>4</td>
<td>29</td>
</tr>
<tr>
<td></td>
<td>Grand mother</td>
<td>1</td>
<td>7</td>
</tr>
</tbody>
</table>
Table 2. Comparison of pre-and –post-test after the intervention of the program on the breast self-examination for medical and nursing students in Oman

<table>
<thead>
<tr>
<th></th>
<th>Pre-test (Mean ± SD)</th>
<th>Post-test (Mean ±SD)</th>
<th>P value</th>
<th>Pre-test (Mean ±SD)</th>
<th>Post-test (Mean ± SD)</th>
<th>P value</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Medical</td>
<td>Nursing</td>
<td></td>
<td>Medical</td>
<td>Nursing</td>
<td></td>
</tr>
<tr>
<td>Knowledge on breast cancer</td>
<td>11.6±2.6</td>
<td>16.8±2.2</td>
<td>&lt;0.001</td>
<td>8.2±3.0</td>
<td>14.2±2.4</td>
<td>&lt;0.001</td>
</tr>
<tr>
<td>Knowledge on breast self-examination</td>
<td>1.9±1.2</td>
<td>2.8±0.6</td>
<td>&lt;0.001</td>
<td>1.6±1.3</td>
<td>2.6±0.6</td>
<td>&lt;0.001</td>
</tr>
<tr>
<td>Attitude towards breast-self-examination</td>
<td>29.2±4.2</td>
<td>31.1±3.8</td>
<td>0.002</td>
<td>27.4±4.3</td>
<td>28.1±4.3</td>
<td>0.32</td>
</tr>
</tbody>
</table>

† - Maximum score for Knowledge on breast cancer – 22, Knowledge on breast self-examination-3

Table 3- Skills of practicing breast self-examination – pre-test and post-test among medical and nursing students

<table>
<thead>
<tr>
<th>Skills</th>
<th>Group 1</th>
<th></th>
<th>Group 2</th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Pre-test Mean± SD</td>
<td>Post-test Mean± SD</td>
<td>P value</td>
<td>Pre –test Mean± SD</td>
</tr>
<tr>
<td>Medical</td>
<td>3.42± .988</td>
<td>5.33± .769</td>
<td>0.000</td>
<td>3.76± 1.368</td>
</tr>
<tr>
<td>Nursing</td>
<td>2.65± 1.424</td>
<td>4.95±1.085</td>
<td>0.000</td>
<td>3.00±1.633</td>
</tr>
</tbody>
</table>

† - Maximum score for skills - 6  *Group 1- after lecture only  *Group2 - after lecture and activity

The mean scores of skills of practicing breast self-examination after lecture with activity was 5.69 and 5.45 when compared to mean scores obtained after lecture only was 5.33 and 4.95 respectively among medical and nursing students. The results are statistically significant with P value, 0.014 and 0.016 respectively.

Knowledge of breast self-examination: The 72 out of 90 medical and 57 out of 80 nursing students had heard about breast self-examination before the training program. Majority of students got the information
through doctors (24 medical students), internet (21 medical students), and family members (24 nursing students).

Skill of practicing breast self-examination: Only 35 medical and 22 nursing students performed breast self-examination before. (Fig. 1). Some students performed breast self-examination as they got advice from family (17 students) and doctors (13 medical and 16 nursing students). The 24 medical and 36 nursing students did not know how to perform breast self-examination.

Discussion

Interpretation: The breast cancer awareness program can prove to be successful in creating awareness of breast cancer and breast self-examination among medical and nursing students. The students’ prior knowledge of breast cancer and breast self-examination was assessed before the implementation of the educational program. The findings demonstrated low levels of satisfactory knowledge in all the areas tested. This gap in the knowledge among students is not enough. The finding is in agreement with those of Aygül Kissal et al. (2017) [6]. Significant improvements in the knowledge of breast cancer and self-examination were observed after the training program among the students. This can be attributed to the content of the program which covered all the identified needs and knowledge gaps among the students. The educational intervention on the breast cancer screening practice uptake, knowledge, and health beliefs of Yemeni female school teachers in Klang Valley, Malaysia using a randomized control trial study was proven to be effective and successful [7].

Media plays a significant role in creating awareness and can be used as the main source of information for breast cancer and promote breast self-examination [8]. In our study, the students come from educated family background and hence the source of information probably is mainly through doctors (24 medical students), internet (21 medical students) and family members (24 nursing students).

In the present study, attitudes towards breast cancer and breast self-examination appeared to be positive among the majority of the students after the intervention. This education program was able to motivate the students and has shown improvements in the mean score in the post-test. However, attitude in the mean score of pre-test and post-test scores among nursing students was not statistically significant. Videos on experiences shared by breast cancer survival were used to motivate the importance of early
detection of breast cancers. However, trial of newer methods of teaching methods can be experimented with to impart a positive attitude. Therefore, it is important to explore newer ideas to motivate students for practicing breast self-examination regularly. The study conducted by Kissal A et al (2019) [9] showed the effectiveness of an educational intervention in improving the attitudes among the nursing students towards breast self-examination.

With regards to students’ practices of breast self-examination, the current study findings revealed that the students did not have sufficient knowledge and skills to correctly perform the steps of the breast self-examination before the intervention. The reason could be a lack of awareness, training, and motivation. A similarly low prevalence of the practice of breast self-examination was reported in a study from Ajman in the United Arab Emirates (Al-Sharbatti et al, 2013)[10]. However, the post-test of the present study demonstrated significant improvements in students’ performance of BSE, which is certainly attributed to the skills activity which involved a demonstration of all the steps of breast self-examination using breast model in the program, video demonstration of breast self-examination and clay activity that was given to determine and recognize different tumor sizes. Each student was given an opportunity to demonstrate the breast model and clay activity which gave them a joyful learning environment and also the confidence of performing BSE. The effectiveness of the program in improving the practice of breast self-examination is in agreement with a number of studies ([11, 12]. Creating exciting learning settings and using breast models to teach is more impactful than just giving didactic lectures. This was evident in our study. The mean scores of skills of practicing breast self-examination after the lecture with activity were higher than mean scores obtained after lecture only (P<0.001). Hence the present intervention teaching skills and knowledge must help in better understanding and retaining the content of the study.

Limitations: The study was conducted for premedical and preclinical years and B.Sc. Nursing year1, 2, and 3 who had no clinical exposure. The total sample size calculated was 210, because of academic obligations some of the students who registered for the breast cancer training program could not attend.

Generalizability: Breast cancer is the global concern; each and every country has breast cancer awareness programs. Implementation of effective methods of teaching breast self-examination would certainly motivate women around the world to practice it regularly.
**Conclusion:** An important dimension in breast cancer awareness is to inculcate innovative techniques to create interest and motivate a positive attitude for performing breast self-examination. All universities medical or other allied health professions can initiate such programs for their students. Promoting this kind of educational intervention - do have positive impact to spread awareness on breast cancer for early detection for better survival and health outcome.

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**Authors’ contributions**

- Conceptualization: RR, JM, MS, TM, MAK
- Data curation: RR, JM, MS
- Formal analysis: RR, TM
- Methodology: RR, JM, MS
- Project administration: RR, JM, MS
- Visualization: RR, JM, MS, TM, MAK
- Writing – original draft: RR
- Writing – review & editing: RR, JM, TM, MAK

**Conflict of interest**

No potential conflict of interest relevant to this article was reported.

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None
**Data Availability**

Data files are available from Harvard Dataverse

Dataset1. Raw data of the students’ response for pre-test before educational intervention

Dataset2. Raw data of the students’ response for post-test after educational intervention

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None

**Supplementary materials**

Supplement 1. Schedule of the breast cancer awareness program done November 11 and 12, 2019 in National University of Science & Technology, Sohar, Oman;

Supplement 2. 24 items questionnaire tool

**References**


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https://doi.org/10.1007/s13187-014-0622-1


Figure

Fig.1 Number of students performed Breast Self-Examination before the training program
Legends for figure:

Fig1. Number of students performed breast self-examination before the training program