Testicular Cancer Preventive Behavior among Nursing Males' Students: Intervention Guidelines

Safaa S. Ahmed[1], Laila A. H. Ali[2], Mervat A. Ahmed[3], Aziza M. Abozied[4]

[1]lecturer Maternal and Newborn Health Nursing, Faculty of Nursing, Beni-Suef University, Egypt
Email: Safa.ashraf@yahoo.com
[2]Lecturer of Medical-Surgical Nursing, Faculty of Nursing, Zagazig University, Egypt
Email: laila_zu9@yahoo.com
[3]Lecturer of Community Health Nursing, Faculty of Nursing, Beni-Suef University, Egypt
Email: M_Rahma2004@yahoo.com
[4]Lecturer of Community Health Nursing, Faculty of Nursing, Beni-Suef University, Egypt
Email: Draziza55@gmail.com

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ABSTRACT

Context: Testicular cancer is the most common form of urogenital cancer among young men aged between 20–40 years. The incidence of testicular cancer is rapidly increasing. It is highly curable when detected and treated early.
Aim: This study aimed to evaluate the effect of intervention guidelines on preventive behaviors among male nursing students.
Methods: A quasi-experimental study was conducted at the technical institute of Beni-Suef university through the academic year 2018-2019. A convenient sample of 250 student male nurses has been included in this study. Tools of data collection were a self-administered questionnaire, Champion Health Belief Model Scale, testicular self-examination checklist, and a student follow-up card.
Results: The current study revealed that the mean age of students was 18.45±1.65. The study showed a significant increase in the mean score of satisfactory knowledge about testicular cancer and its preventive behaviors during follow-up post-application of the intervention guideline (p=0.001). Furthermore, an improvement in the testicular self-examination practices at post-intervention and follow (p=0.001). A statistically significant correlation was revealed between the student nurse's knowledge, practice, and preventive health believes and behaviors.
Conclusion: The study concluded that intervention guidelines designed based on the health belief model positively affects promoting testicular cancer-preventive behaviors of student male nurses by improving their knowledge, practices, and health beliefs and behaviors. The study recommended the dissemination of intervention guidelines among males at different stages of life started from adolescents to reduce the risk of testicular cancer and its consequences on males reproductive health. Integrate the concept of TSE as a screening procedure for early detection of testicular cancer and other testicular disorders into the undergraduate curriculum of nursing faculties. Further research is required to investigate barriers influencing the practice of testicular self-examination among Egyptian males.

Keywords: Testicular cancer, preventive behaviors, intervention guideline

1. Introduction

Testicular cancer predominantly affects men aged 18 to 35 years. It constitutes 0.5% of all cancer cases and accounts for 0.1% of all cancer mortalities in the United States *(National Cancer Institute, 2014)*. Testicular cancer accounts for around 1% of all male *cancers (Le Cornet et al., 2014)*. It is the most common type of cancer affecting adolescent and young males of European ancestry *(Cook et al., 2010)*. Global testicular cancer incidence has increased since the 1970s, with the highest rates in Western and Northern Europe, Australia and New Zealand, and Northern America, and lowest rates in Asia and Africa *(Huyghe, Matsuda, & Thonneau, 2003)*. Testicular cancer incidence continues to increase worldwide *(Znaor, Lortet-Tieulent, Laversanne, Jemal, & Bray, 2015).*

The 5-year net survival rate for testicular cancer is 96% *(Canadian Cancer Society, 2017)*, with a poorer prognosis for those presenting at a later stage of the disease *(Cancer Research UK, n.d.).* In addition to early detection may reduce the physical and psychosocial distress associated with prolonged anti-cancer treatment *(Shanmugalingam, Soultati, Chowdhury, Rudman, & Van Hemelrijck, 2013).* Approximately 95% of testicular cancers present with a painless testicular lump or swelling *(Rudberg, Nilsson, Wikblad, & Carlsson, 2005).*

In the past two decades, numerous research efforts have been made to explore and improve males' awareness of testicular cancer and its screening. European Association of Urology recommends routine TSE for individuals with testicular cancer risk factors *(Albers et al., 2010)*. Men in the general population have poor awareness of testicular cancer and TSE *(Saab, Landers, & Hegarty, 2016b). Nasrallah, Nair, Congeni, Bennet, and McMahon (2000)* reported that only 15% of the participants would seek help in the event of testicular swelling within the correct frame. Similar findings were reported by *Congeni, Miller, and Bennett (2005).* In Egypt, *Abdelghany, Soilman and Abdel-Raoof, (2015)* reported poor knowledge regarding testicular

[1]*Corresponding author: Safaa Soiliman Ahmed*

cancer among the majority of the studied students at Mansoura University.

Riley et al. (1998) recommend health promotion should occur during childhood and adolescence, with an emphasis on positive health awareness rather than a ritualized "check for cancer" *(Wilson et al., 2018).* Mainly because this type of cancer is highly curable if detected early. Research does not support population-based screening for testicular cancer; however, awareness-raising campaigns have been recommended *(Devany, 2019).* Testicular cancer screening should occur in any setting in which nurses are employed *(Abdelghany et al., 2015).* Maternity services, public health, pediatrics, urology, primary care are settings that can reach young men include schools and colleges, sports and other community organizations and events, workplace, and youth centers. Health promotion, primary care, formal and non-formal education, and community-based voluntary groups are also involved in this obligation *(Devany, 2019).*

Nurses play a vital role in promoting health and wellness. By health promotion and risk reduction, the individual develops behavior forms that promote a healthy lifestyle and decrease disease risk. The challenge for nurses is to find methods to motivate clients and families to develop health-promoting behaviors. Client teaching is a chief intervention for promoting health. So the nursing role should develop and adapt to a simple way and technique to help implement healthy behavior as leaflets and guidelines for standard of care. Nursing education is a vital aspect of self-management to increase public knowledge and awareness of TC and TSE amongst male populations *(Barling & Lehmann, 2014).*

Education should begin immediately and be reinforced frequently with young men. Nurses play a vital role in the early detection and screening of the diseases *(Brown, 2004),* teaching the early symptoms of cancer and identifying these symptoms. Nurses can also research patient attitudes, health behaviors, and nursing creativities can be advanced to modify these attitudes and increase beneficial health behaviors through the health belief model (HBM) implementation. The HBM is used to evaluate susceptibility, seriousness, health motivation, barriers, benefits, and self-efficacy in male TC screenings *(Ilknur & Busra 2018; Metwally, Elsayed & Abd elmonem, 2019).*

Nurses can use various teaching and learning methods to disseminate information about the disease and help mass media and local advertisements inform the target population of disease prevention *(Brown, 2004).* Additionally, self-examination is a health promotion behavior that generates awareness and can guide TC's early diagnosis *(Ilknur & Busra 2018; Metwally et al., 2019).* Self-examination is one of the most important aspects of self-care for health promotion, which increase the man's awareness about the importance of screening procedures and the benefits of early detection for diseases and proper treatment, less complication and better health status *(Jeihooni, Kashfi, Hatami, Avand, & Bazrafshan, 2017).* Testicular self-examination (TSE) is an early diagnostic procedure for TC that is recommended to be performed once a month after a warm bath or shower by students male over 15 years of age *(Mcglynn & Trabert, 2012; Katz, Meyers & Walls(1995).*

2. Significance of the study

In Egypt, the relative incidence rate is 0.5 per 100,000 in Lower Egypt, 0.5 per 100,000 in middle Egypt, and 0.4 per100,000 in Upper Egypt *(Ibrahim, Khaled, Mikhail, Baraka, & Kamel, 2014).* Another International epidemiological report from El-Garbia governorate, Egypt, in 2007 reported an age-standardized incidence rate (per 100,000) of testicular cancer over 30 years of 0.5 *(Manecksha & Fitzpatrick, 2009).* The incidence of testicular cancer has risen in the last few decades.

Surprisingly, many nursing studies concerned women's health, but very few studies explored males' awareness of this condition. This study, therefore, sought to target the young age population who might benefit from early intervention before the development of testicular cancer, examining the effect of intervention guidelines on the preventive behavior among male nursing students.

3. Aim of the study

This study aimed to evaluate the effect of intervention guidelines on preventive behaviors among nursing males students through the following:

- Assess male student nurses' knowledge, practice, and preventive behaviors of testicular cancer.
- Design intervention guidelines for preventive behaviors of testicular cancer.
- Evaluate the effect of implementing the intervention guidelines on male student nurses' knowledge, practice, and preventive behaviors of testicular cancer.

3.1. Research hypothesis

Male student nurses exposed to the intervention guidelines will exhibit better knowledge, practice, and preventive behavior regarding testicular cancer post-intervention compared to their pre-intervention level.

4. Subjects & methods

4.1. Research design

A quasi-experimental (pre, post, and follow-up) design was used to achieve the study's aim. This design was used to measure the degree of change occurring due to the intervention of the Health belief model for testicular cancer preventive behaviors among male nursing students**.**

4.2. Study setting

The study was conducted at the technical institute of Nursing at Beni Suef University through the academic year (2018-2019). The data collection began in March 2019 and was completed at the end of May 2019.

4.3. Subjects

A convenient sample of (250) male students were included in the study. The sample size was (280) male students. The researchers excluded 28 students of a pilot study from the sample. Besides, two students in the first

year withdrawn voluntarily from the study during the follow-up period may be due to the research out of their interest or clinical area duties load them.

4.4. Tools of Data Collection

Four tools of data collection used.

4.4.1. Self-Administrative Questionnaire

It developed by the researchers for the current study depends on relevant textbooks and articles *Abd Algany et al. (2015); Metwally et al. (2019).* It consists of three parts. 1st part is designed to assess characteristics of the studied sample such as age, mothers' and fathers' education, residence, and practicing testicular self-examination, and if not, what is the reason. Also, it assesses the family history of testicular problems. 2nd part is concerned with the assessment of the family history related to testicular abnormalities. 3rd part embraces assessment of male students' knowledge regarding testicular cancer and testicular self-examination. It consisted of (15 questions) related to TSE and testicular cancer.

This part includes a question regarding males` reproductive system anatomy (1 question), function (1 question), the definition of testicular self-examination TSE (1 question), the importance of TSE and normal finding of TSE (1 question), suitable time of TSE (1 question), techniques (1 question), abnormal signs & symptoms of TSE (1 question) and definition of testicular cancer (TC) (1 question), high-risk group (1 question), signs & symptoms of TC (1 question), causes (1 question), risk factors (1 question), types (1 question), preventive methods (1 question) and treatment of testicular cancer (1 question).

It evaluated based on (incorrect answer scored as =1, incomplete correct answer scored as=2, and complete, correct answer scored as=3) (possible score 1–45). The total score is categorized into either satisfactory level (from 70% and more) or unsatisfactory level (less than 70%) from total score (45) points. Alpha Cronbach test = 0.85. The time allowed to fill questionnaire was 15 minutes.

4.4.2. Champion's Health Belief Model Scale

It was adopted from *Champion (1993); Ilknur and Busra (2018)* to assess the male student nurses' behavior**.** It was a five-point Likert type scale that consisted of 37 statements; each item scored on a 5-points Likert scale ranging from 1 (strongly disagree) to 5 (strongly agree). The 5-Point Likert scale further reduced to a 3-points scale by collapsing 'agree' and 'strongly agree' into one category ('agree') and collapsing 'disagree' and 'strongly disagree' into another category ('disagree').

The health belief model scale subdivided into six subscales which are perceived susceptibility (five items), perceived seriousness of testicular cancer (ten items), perceived barriers of performing testicular cancer screening (nine items), perceived benefits of testicular cancer screening (six items), self-efficacy (four items), and motivation (three items). The range for the total scale was 1-185. The scale Alpha Cronbach reliability test equal to 0.87.

4.4.3. Testicular Self Examination Checklist

It developed by the researchers for the current study depends on relevant textbooks and articles *The Canadian Testicular Cancer Association (2012); National Health Service (2014); Irish Cancer Society (2014).* It is used to assess students' accuracy of performing testicular self-examination. It consisted of (10) steps; each step has two categories: A score of (2) for correct technique but a score of (1) for incorrect technique. The total practice scores 20 points, that categorized into (1 <10) poor practice and (10 – 20) good practice. Finally, total pre, post, and follow-up practice were compared to evaluate the effects of the guideline on nurses' college practice related to TSE. A reliability coefficient for internal consistency was 0.88.

4.4.4. Student Follow-up Card

The researcher developed it to record the male student's self-report of abnormal findings detected with their reaction for disorders and referral to medical consultation to start treatment. It was used once after the intervention guidelines implementation.

4.5. Procedures

Tools validity and reliability: The quantitative face validity and the qualitative content validity of the questionnaire assessed through jury consist of 5 experts' faculty members in obstetric and gynecological, medical-surgical, and community health nursing besides the Andrology field to test its contents and face validity. Accordingly, their notes regarding some statements rephrased; adding and deleting some questions were done. The researchers designed a supportive material for the intervention guideline in simple Arabic language in the relevant literature. It was also reviewed and validated by the same panel of experts. Accordingly, their comments were considered, and necessary modifications were implemented.

The guideline is divided into three parts: the first part is concerned with the essential information (included illustration) regarding TSE, and testicular cancer started with males` reproductive system anatomy and function. The second part included a definition of TSE, its importance, normal findings, appropriate time, techniques, abnormal signs & symptoms, the definition of testicular cancer, high-risk group, signs & symptoms, causes, risk factors, types, preventive methods, and treatment of testicular cancer. The third part involved a copy of the examination checklist. The guidelines attached with a scientific film on CD and the implementation of the testicular self-examination utilizes a male manikin for technique application.

Ethical considerations included oral consent gained from male student nurses. They informed that they had a right to withdraw from the study at any time — confidentiality of students' information secured using code number for students' sheets. The study methodology is safe

with no harm to nurses` students. The information obtained is used only for scientific research.

The study was conducted through the following phases. The preparatory phase included reviewing the relevant literature on testicular cancer and testicular self-examination textbooks, articles, periodicals, and internet searches to develop the study tools for data collection. A pilot study was conducted on (28) students. They were selected randomly from the studied sample as representing 10% of the total student patch. These students were excluded later from the total study sample. The pilot study was conducted to estimate the time needed for data collection, reliability of the tools, and the feasibility of the research process. The tools and intervention guidelines changed accordingly to simplify the scientific terminology and guidelines translation performed to maximize the applicability.

The fieldwork runs after official permission to carry out the current study. It was obtained from the institutional directors at the selected setting after explaining the aim of the study. Ethical approval took from the ethics committee of the Faculty of Nursing of Beni Suef University. The actual fieldwork carried out from the beginning in March 2019 and completed at the end of May 2019, in the previously mentioned setting, where the researchers were available in the study setting three days per week (Saturday, Monday & Wednesday), from 9 am to 2 pm for each student (depending on free or break time of students). Researchers clarified the aim of the study and obtained verbal approval to participate in the study depend on the schedule with the head manager of the scientific department's permission. The researchers introduced themselves to the participant and explained the purpose of the study and its expected outcome.

The researcher started to collect data discovering the missing information and misconception among the study subjects, preparing guidelines booklet according to the detected need, and planning intervention sessions and teaching aids such as booklet, poster, and picture. The aim of the study at first explained to the male students. The researchers started to collect data from them at the settings mentioned above using the pre-constructed tools. The males students filled in the tools for the theoretical part (15 minutes) and by the researchers for the practical part (15 minutes for the observational checklist and 5 minutes for the HBM scale). The guidelines were developed based on an analysis of the actual educational needs of males students under the study in the pre-test. Content of the guidelines has written in simple Arabic language, consistent with the related literature and males` students' level of understanding — the guidelines presented in theoretical and practical sessions. Researchers' allocated studied students randomly into six groups; each group included 25 or 30 students, and repeated sessions included all of them. Each group obtained two sessions (one theory and one practice).

Moreover, each male student is guided by simple instructions. The theoretical content taught in one session for each group; the session lasted about one hour and covered the following items: TSE and testicular cancer (reproductive system anatomy, function, definition, importance, and normal finding, appropriate time for examination, techniques, abnormal signs & symptoms of testicular Self-Examination and definition, high-risk group, signs & symptoms, causes, risk factors, types, preventive methods, and treatment of testicular cancer). It is conducted through lectures and group discussions with the use of PowerPoint, boosters, and pictures. Guidelines distributed as a handout. The practical part was conducted through demonstration and re-demonstration using simulation mannequins, booklets, posters, pictures, and videos. It applied in one session for each group; the session lasted about one hour and covered testicular self-examination skills. Males` students were then evaluated individually according to their health condition and understanding.

The study was carried out through four phases: assessment, planning, implementation, and evaluation. The assessment phase (pre-test) collected the following data personal characteristics of the studied sample, family history related to testicular abnormalities, males' students' knowledge regarding testicular cancer and testicular self-examination, and male students' student's testicular self-examination checklist, and males` students' follow up card. The data obtained during this phase constituted the baseline (pre-test) for further comparisons to evaluate the effect of guidelines intervention. The average time for completing each male student's interview was around (20-30 minutes).

In the planning phase, based on the results obtained from the assessment phase, the researchers designed an illustrated booklet; it covered the required knowledge regarding testicular cancer and testicular self-examination. It was designed to improve male students' knowledge and practice regarding testicular cancer and testicular self-examination. It is constructed in simple Arabic language. The implementation phase is conducted as planned, considering the student duties, time, and lecturing schedule. Tools distributed and clarified to students to fill them the questionnaires related to the health belief model and student personal characteristics, knowledge, and attitude toward testicular cancer and TSE in the presence of the researchers to answer any student's questions. The practical part started after finishing the pre-test; the students attended educational & training sessions that were applied for each group individually. Each session took 45 minutes at the end of the sessions` intervention guidelines, follow-up cards, and checklist dispersed on the students.

Evaluation Phase: The researchers assess the student's performance about TSE for students through re-demonstration about TSE on simulator model or manikin at the lab. The researchers conducted several meetings with selected students for filling tools of data collection immediately post-intervention to evaluate the effectiveness of the intervention guideline. Follow-up phase: students' follow-up session conducted after three months post-intervention to evaluate changes in student's knowledge, practice, and behavior regarding TSE to detect the presence of testicular cancer early.

4.6. Data analysis

The collected data coded and analyzed by researchers by using tables and figures. Data analyzed by using numbers and percent for qualitative variables. Mean and standard deviation used for quantitative variables. Correlation is used to find out the correlation between quantitative variables. Paired t-test was used to compare mean scores of quantitative variables pre and post-intervention. Chi-square (X^2) test used to compare mean scores of quantitative variables that not following the normal distribution curve pre and post-intervention. Statistical significance of the results considered as follows: $P \leq 0.001$ highly significant, ≤ 0.05 significant, and > 0.05 not significant.

5. Results

Table 1 shows that nurses students mean age of 18.45±1.65 years. Regarding mothers' and fathers' education, 38% of the mothers can read and write, while 36% of fathers had secondary school education. Whereas 69.2% of them came from rural areas, and 95.2% of them do not practice TSE.

Figure 1 displays that nurses' students do not practice TSE because 75% of them not having knowledge about TSE, and 2% of them had a guilty sense about TSE.

Figure 2 reveals the family history of testicular problems; 90 % do not have any abnormality, while 2% of them have a positive history of cancer-testis.

Table 2 shows studied male student nurses' satisfactory knowledge about testicular cancer and testicular self-examination in pre/posttests. Results indicate significant improvement in student male nurses' total knowledge mean percent as regards post and follow-up tests (mean percent = 93.7±3.4 and 90.3±3.6 respectively) compared to pre-test (26.1±8.5), with t-test = 62.5 & 16.7 respectively) at $p < 0.05$.

Table 3 illustrates a highly statistically significant change between the three study phases at (p=0.001) regarding testicular cancer health believes and preventive (TSE) behaviors named susceptibility to testicular cancer, the seriousness of testicular cancer, barriers, benefits, self-efficacy, and motivation to perform testicular self-examination.

Table 4 shows a statistically significant improvement in TSE practice accuracy between post-intervention compared to pre-intervention. Also, a statistically significant improvement was revealed regarding the frequency of practicing TSE at post-intervention compared to pre-intervention. This improvement maintained at the follow-up phase as there are non-statistical significant differences regarding accuracy and frequency of practice at follow-up compared with post-intervention.

Figure 3 reveals abnormal findings that need medical consultation among the studied student male nurses. The figure shows that 20%, 25%, and 35% of the studied student complained of scrotal swelling, tenderness, and heaviness of testicle, and fluid collection before the intervention. New complaints appeared after intervention as 20% of the student detected a decrease in the size of one testis. Some complaints identified after the intervention compared to pre-intervention such as scrotal swelling (20%, 35%, 42% respectively), and tenderness and heaviness of testicle (25%, 30, 32% respectively), some complaints improved such as scrotal fluid collection (35%, 20%, 15% respectively).

Table 5 reveals a highly statistically significant correlation between student male nurses' total knowledge score and total practice and behavior score (p=0.001) throughout the three study phases.

Table (1): Frequency and percentage distribution of student male nurses' personal characteristics (n=250).

Variables	No	%
Age Mean ± SD	18.45 ± 1.65	
Mother's education		
Illiterate	65	26.0
Read and write	95	38.0
Secondary school	50	20.0
College and above	40	16.0
Father's education		
Illiterate	45	18.0
Read and write	60	24.0
Secondary school	90	36.0
College and above	55	22.0
Residence:		
Urban	77	30.8
Rural	172	69.2
Practicing TSE		
Yes	12	4.8
No	238	95.2

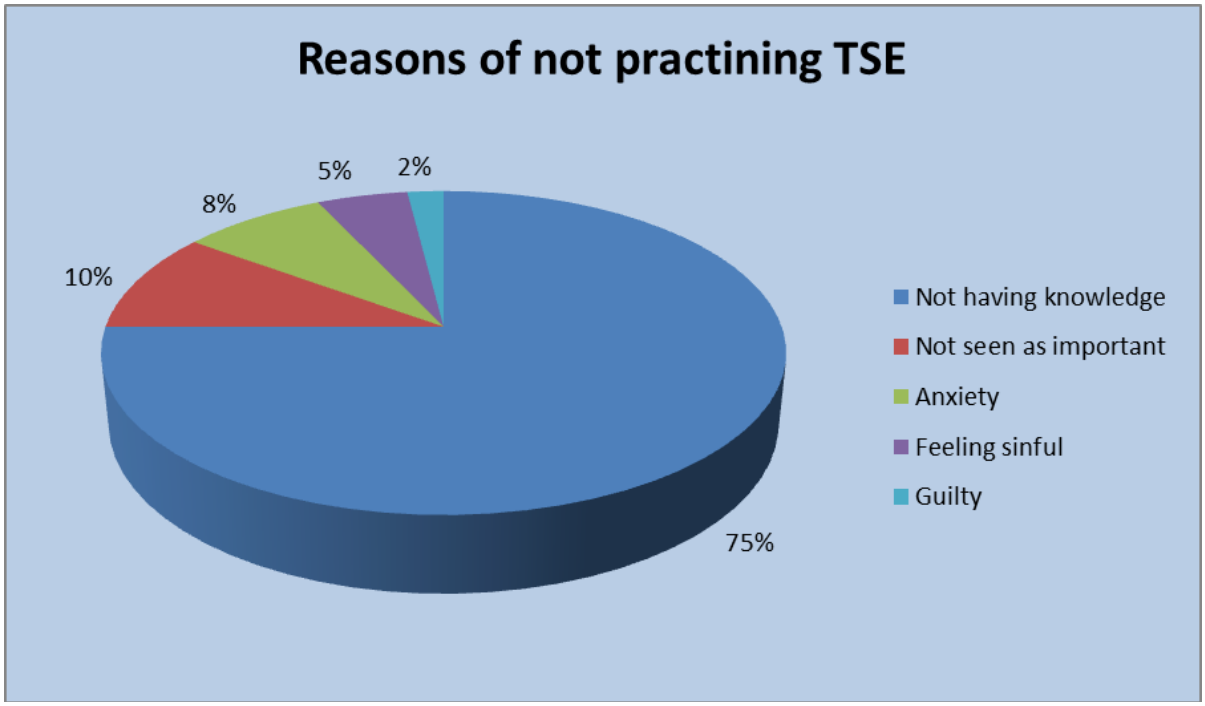


Figure (1): Percentage distribution of student male nurses' regarding the reasons behind not practicing testicular self -examination (n=250).

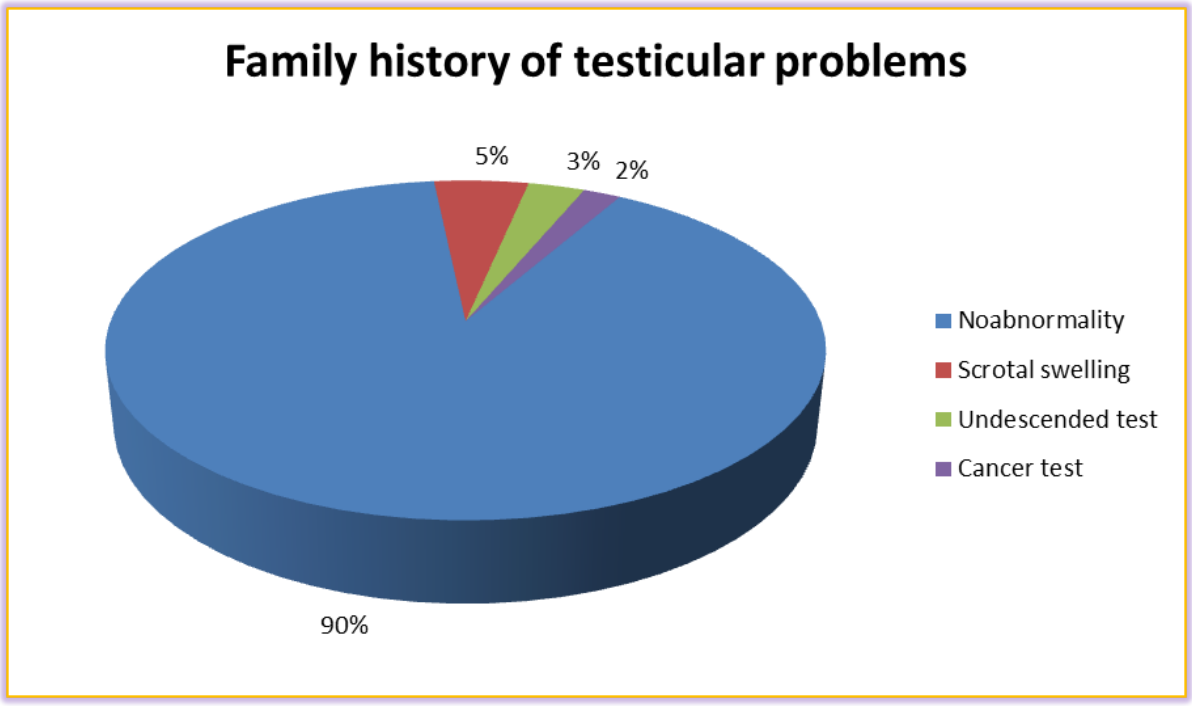


Figure (2): Percentage distribution of student male nurses regarding family history of testicular problems (n=250).

Table (2): Percentage distribution of student male nurses' satisfactory knowledge about testicular cancer and testicular self-examination (250).

Knowledge about Testicular Cancer and Testicular Self-Examination	Students' satisfactory knowledge			X^2	P-value
	Pre-test Complete %	Post-test Complete %	Follow up Complete %		
Males` reproductive system anatomy	55.0	92.0	90.0	53.32	<0.001
Males` reproductive system function	65.0	96.0	92.0	42.49	<0.001
Testicular Self-Examination definition	25.0	95.0	92.0	71.45	<0.001
Importance and normal finding of Testicular Self-Examination	20.0	94.0	90.0	84.38	<0.001
Suitable time of TSE	15.0	96.0	93.0	66.69	<0.001
Techniques of testicular self-examination	20.0	95.0	91.0	86.03	<0.001
Abnormal signs & symptoms of testicular self-examination	22.0	94.0	92.0	71.45	<0.001
Testicular cancer definition	25.0	92.0	90.0	57.79	<0.001
The high-risk group of testicular cancer	19.0	93.0	90.0	76.94	<0.001
Signs & symptoms of testicular cancer	17.0	95.0	92.0	13.52	<0.001
Causes and risk factors of testicular cancer	30.0	96.0	94.0	23.12	<0.001
Types of testicular cancer	22.0	94.0	92.0	40.83	<0.001
Preventive methods of testicular cancer	25.0	92.0	90.0	57.79	<0.001
Treatment of testicular cancer	19.0	93.0	90.0	76.94	<0.001
Total mean score ±SD	26.1±8.5	93.7±3.4	90.3±3.6	71.45	<0.001

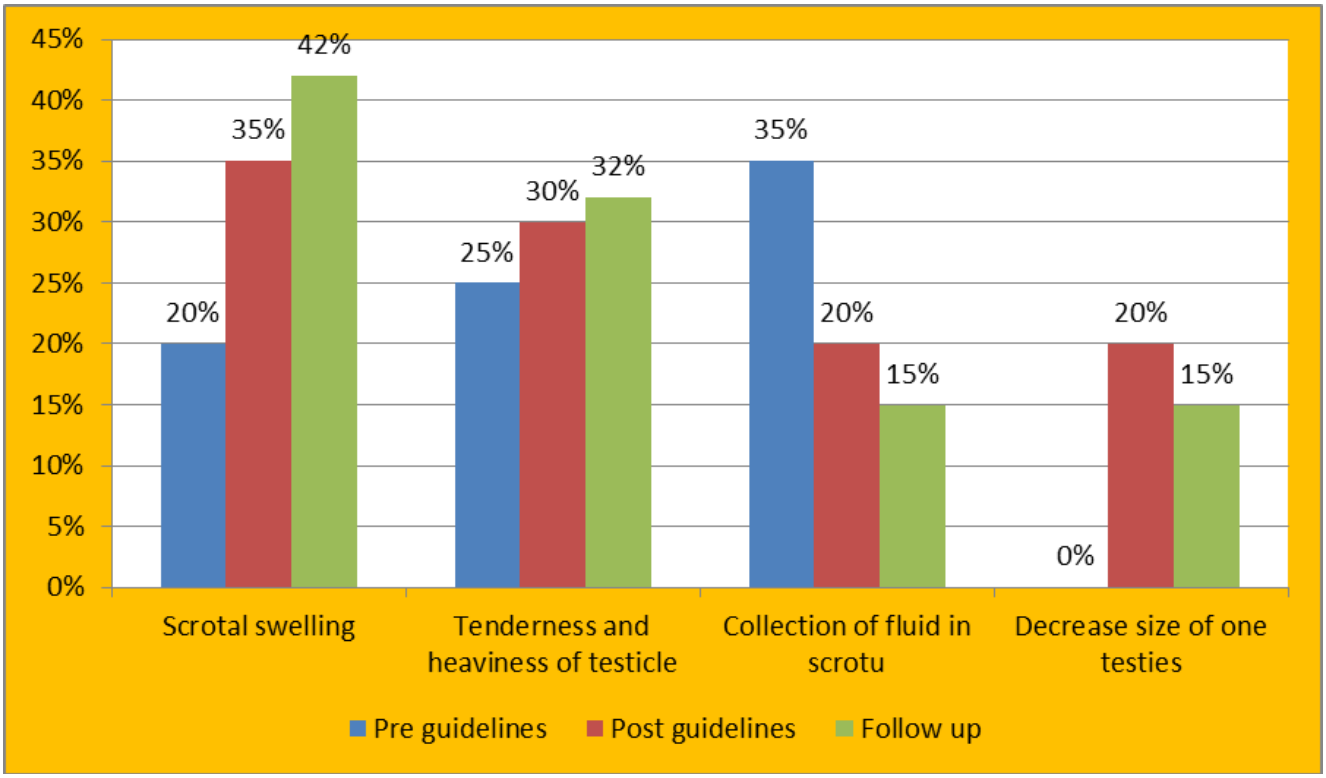
Table (3): Comparison of student male nurses' health beliefs and preventive behavior regarding testicular cancer throughout the three study phases.

Health belief model subscale dimensions	Pre guideline	Post guideline	Follow up (after three months)	ANOVA test (F)	P-value
	Mean ± SD	Mean ± SD	Mean ± SD		
Susceptibility(sensitiveness) to testicular cancer	6.68±0.09	19.45±1.88	24.12±1.04	10.44	<0.001
The seriousness of testicular cancer	9.06±3.15	39.88±2.65	47.05±2.42	12.46	<0.001
Barriers to testicular self-examination	41.99±1.14	35.25±2.13	10.62±1.23	11.44	<0.001
Benefits to testicular self-examination	7.52±1.03	26.67±2.88	38.67±2.04	14.62	<0.001
Self-efficacy to perform testicular self-examination	5.27±1.34	16.22±0.92	19.53±1.54	13.87	<0.001
Health motivation to perform testicular self- examination	3.82±0.78	11.01±0.37	15.33±0.85	12.53	<0.001

Table (4): Percentage distribution of student male nurses' practice of self-testicular examination.

Knowledge about Testicular Cancer and Testicular Self-Examination	Students' performing practice			X^2 1*	P-value	X^2 2	P-value
	pre-test %	Post-test %	Follow up %				
Accuracy of practicing TSE							
Poor practice	95	8	10	13.85	<0.001	16.82	<0.001
Good practice	5	92	90				
Frequency of practice TSE							
Monthly regular practice	3	95	92	12.25	<0.001	18.16	<0.001
Irregular practice	97	5	8				

**X2 1 compares pre-intervention versus post-intervention, $X^2$2 compares post-intervention versus follow-up.*



Figures (3): Percentage distribution of abnormal findings that need medical consultation as reported by the studied male student nurses.

Table (5): Correlation between total scores of male student nurses' knowledge, practice, and behavior through the study phases.

Total knowledge score	Total practice score		Total behavior score	
	r	p	r	p
Pre-guideline	78.7	<0.001	82.2	<0.001
Post-guideline	90.4	<0.001	93.3	<0.001
Follow-up	92.6	<0.001	94.2	<0.001

6. Discussion

Nurses play significant advanced and prolonged roles in health promotion. These include self-management support, patient education, counseling, referral to other health professionals, and monitoring disease and treatments *(Asgar & Cam 2014)*. So, this study was conducted to evaluate the effect of intervention guidelines on preventive behavior among male nursing students.

The study results show that the studied sample's average age was 18.45±1.65 years. In late adolescence, this age group was identified as the beginning of the possibility of testicular cancer, so raising awareness about regular self-screening at such age is of utmost importance as a preventive measure. This finding matched with *de Souza, dos Reis, Gomes, and de Carvalho (2011),* who reported that testicular cancer mainly affects men between 15 and 40. *Brassil Ministerio da Saude (2008); Protzel, Klebingat, and Hakenberg (2008); McCullagh and Lewis (2005)* reported similar findings. More than two-thirds of them came from rural areas, and most of them do not practice TSE. This finding reflects the great need for orientation to the risk they may expose. This finding is supported by *Ugurlu et al. (2011),* who studied "testicular cancer awareness and testicular self-examination among university students" at a university located in Ankara, Turkey." The study founded that most of the studied students did not have information about the occurrence age of testicular cancer and not practicing TSE.

The reason behind not practicing TSE was revealed by the current study as three-fourths of the studied students had inadequate knowledge. It also reflects the importance of intervention guidelines to enhance the students' knowledge regarding testicular cancer. This result is supported by *Ugurlu et al. (2011),* who indicated that (44%) of students heard about TC during their education and life. Still, most participants have to lack knowledge about the sign and symptoms of TC. Only 5.9 % of them (n=38) indicated they received information on TSE, and 17.7 % have performed the practice of TSE before; only one out of 21 students performed TSE monthly. The reason for not doing TSE was mostly (83.4%) "Not having knowledge" and "not seen as important" (55.7%). Additionally, the present results agreed with *Mulira, Blos, and Nalwange (2011)*, who studied "Knowledge, perceived

risk and barriers to testicular self-examination amongst male university students in Uganda." The findings revealed that most of the participants (87%) of 323 students reported a lack of skill for performing TSE, 80% perceived TSE as embarrassing, and 79% perceived TSE as time-consuming.

The present study showed that only two percent of the study sample had a positive family history of testicular cancer. This finding is compatible with the prior study conducted by *Metwally et al. (2019),* who studied "evidence-based practice guideline for promoting testicular cancer preventive behavior among nursing males' students." The study found no family history of testicular cancer among most of the study sample (91.4%), while a limited percentage has this problem in the family (1.7).

Moreover, the current study showed that more than two-thirds of the studied nurses' knowledge about testicular cancer and TSE was unsatisfactory before the program implementation. This knowledge level was significantly improved for most of them after program implementation and maintained at the follow-up evaluation. This finding may be due to the general population usually lack awareness of testicular cancer and TSE *(Saab et al., 2016). Saab et al. (2016)* also reported a knowledge deficit regarding TC and its screening. Similarly, *Barling & Lehmann (2014),* who studied testicular self-examination among young adult men, emphasized that self-examination knowledge increases significantly for the intervention group receiving the training.

Moreover, the present results agree with *Ingwu, Ohaeri and Ezeude (2016),* who studied "awareness and practice of testicular self-examination among male medical students of the University of Nigeria Enugu campus south-east Nigeria." The study revealed that the majority, 110 (64%) of the respondents, have a good knowledge level of testicular cancer and testicular self-examination after the educational intervention. Also*, Pour, Kunter, Norouzzadeh and Heidari (2016)* studied "the effect of testicular self-examination education on knowledge, performance and health beliefs of Turkish men" and stated that TSE training is useful in young men but should be repeated periodically for the better efficacy.

The current study revealed highly statistically significant changes throughout the three study phases regarding testicular cancer health believes and related preventive behaviors (susceptibility to TC, the seriousness of TC, perceived barriers, benefits, self-efficacy, and motivation to perform testicular self-examination. These findings revealed the benefits students gained from exposure to the intervention guidelines that increase their self-awareness of testicular cancer and testicular self-examination. The current results agree with *Pour et al. (2016); Gutema, Debela, Walle, Reba, and Wondiye's (2018)* studies results showed a significant increase in self-effectiveness and a significant decrease in the obstacles regarding TSE after training.

This significant change in health believes and related preventive behaviors are reflected in the practice of current studied students, as most of them were poorly practiced and were irregular in doing testicular self-examination before the study. This finding has statistically significantly improved at the post-implementation phase and sustained in the follow-up phase regarding accuracy and frequency of performing TSE. Again, it evidenced the effect of intervention guidelines to improve the student practice regarding preventive behaviors.

In the same line of the study for the effect of TSE intervention guidelines on Turkish men's knowledge, practice, and health beliefs for *Pour et al. (2018)*, TSE training is useful in young men but should be repeated periodically for better efficacy. Nevertheless, the present results disagreed with *Mulira et al. (2011)*, who reported that most participants (87%) reported a lack of skill for performing TSE, 80% perceived TSE as embarrassing, and 79% perceived TSE as time-consuming. Moreover, this finding has also disagreed with *Ingwu et al. (2016),* who revealed that while students have established adequate instruction of TSE and have adequate knowledge, they have not translated this into practice as only 33 (34%) of them have performed TSE.

Even though the researchers cannot confirm the accuracy of student performance in detecting any testicular abnormalities through TSE independently, the study's findings denoted an increase in the identified testicular abnormalities after intervention guidelines application. These findings supported by *Metwally et al. (2019)*, who reported 28 cases of abnormalities detected by self-report of students as (scrotal swelling, tenderness, the heaviness of testicle, collection of fluid in the scrotum, and decrease the size of one) and these cases referred to medical consultation for follow up. These findings confirmed the significant effect of practical guideline application on student's behavior, beliefs, and practices. Hence, the presented study findings are supporting the current research hypothesis.

The present study demonstrated a highly statistically significant correlation between student nurses' knowledge, practice, and health beliefs and behaviors pre, post, and follow-up utilization of intervention guidelines of TSE. These results highlight the importance of increasing awareness through nursing education, particularly for prevention and health promotion for such issues as testicular cancer. The current results were consistent with *Saab et al. (2016b); Gutema et al. (2018); Metwally et al. (2019)*. They stated that most men perceived TC education as a positive step toward raising awareness about this malignancy and TSE.

7. Conclusion

Finally, the researchers concluded that male nurse's students have a general lack of knowledge regarding TC and TSE reflected in their poor practices before implementing the intervention guidelines. These findings positively changed due to the application of intervention guidelines planned based on the health belief model, positively promoting testicular cancer preventive behavior among nursing students. The present study evidenced that intervention guideline was positively useful for improving nurses' students' knowledge, practice, and health beliefs and

behaviors towards TC. These findings further supported the study hypothesis. Augmenting the current study results shows that education and training courses have a vital role in improving nurses' knowledge, performance, and preventive behaviors toward testicular cancer.

8. Recommendations

- Disseminating the intervention guideline among males at a different stage of life started from adolescence. It is highly recommended to decrease the risk of testicular cancer and its consequences on male reproductive health.
- Integrate the concept of TSE as screening procedures for early detection of testicular cancer and other disorders into the undergraduate curriculum of nursing.
- Further research on a larger probability sample is essential to achieve generalization. Further researches are also needed to investigate barriers influencing the practice of TSE among Egyptian males.

9. References

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