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### ASSESSMENT OF MEDICAL STUDENTS' KNOWLEDGE, ATTITUDE AND THE IMPACT OF EDUCATIONAL INTERVENTION ON TESTICULAR CANCER AWARENESS AT QASSIM UNIVERSITY, SAUDI ARABIA

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#### ABSTRACT

**Background:** Testicular cancer (TC) is one of the most common solid cancers in young men. In Saudi Arabia, testicular cancer accounts about 1. 7% of all diagnosed cancers, this motivated us to assess the level of awareness about testicular cancer and testicular self-examination (TSE) among medical students, and the impact of an educational intervention.

**Materials and Methods:** A cross-sectional study was conducted at Unaizah College of Medicine, Qassim University, Saudi Arabia. A questionnaire used to study the awareness level related to testicular cancer and TSE, followed by the educational intervention in form of presentations and written materials. The awareness level and actual practice were reassessed after the intervention. The data were analyzed using the software SAS version 9.4 (SAS Institute Inc., Cary, NC).

**Results:** A total of 157 students participated. The overall awareness level related to testicular cancer was poor to fair, but it improved significantly after the intervention. During the first phase, 56.69% achieved poor awareness scores, 40.13% had fair scores, and 3.18% had had fair scores good scores. After the intervention, 26.11%, 55.41%, and 18.47% had poor, fair, and good awareness scores, respectively. About 49.7% actually practiced TSE after the intervention. Forgetfulness was the factor behind non-performance of the examination in 57% of participants who were not practicing TSE.

**Conclusion:** The results concluded that the awareness of testicular cancer and TSE in young men is low, and dedicated efforts to educate them will improve the outlook and attitudes by helping with early detection of testicular cancer.

**Keywords:** Testicular cancer awareness, testicular self-examination (TSE), health education, cancer, knowledge assessment, Qassim University.

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## Introduction

Testicular cancer is the most frequently diagnosed solid tumor among men aged 18 to 50 years, accounting for 20% of cancer diagnosed in men in this age group. The incidence has also doubled over the past four decades [1, 2]. In the United States, it constitutes 0.5% of all cancer cases and accounts for 0.1% of all cancer mortalities [3]. In Saudi males, testicular cancer represents about 1.7% of all diagnosed cancers with an age-standardized rate of 0.8 cases/100,000 people. Like the rest of the world, the incidence has increased remarkably in recent years [4].

Early detection of localized testicular cancer is associated with a significantly better prognosis as compared to advanced tumor stages. Testicular cancer awareness campaigns have been initiated in various parts of the world. Some examples are "Hodencheck.de" launched by the German Society of Urology and the international campaign by the "Movember" Foundation [5].

Testicular Cancer mortality rate is higher in the developing countries, which is attributed to late presentation and limited access to healthcare. Patients in Saudi Arabia present at a late stage as well. In addition, the lack of awareness appears to be the root cause rather than cultural issues or community pressures. Only a few studies have been conducted to assess the level of awareness about this disease, and experts recommend that more campaigns be conducted for testicular cancer will raise the level of awareness about the disease and the importance of self-

examination and subsequent the benefit of early disease detection in the life surveillance and outcome. [6]. The aim of this study was to evaluate the level of awareness about testicular cancer among medical student at the university of Qassim and the extent to which awareness campaigns may influence the behavior of young men with respect to this disease.

## Materials and Methods

A cross-sectional study was conducted between October 2019 to February 2020 among all students of Unaizah College of Medicine (UCM), Qassim University, Saudi Arabia. The sample included all students from the first to the fifth year (pre-med, MD1, MD 2, MD3, and MD4) except those who did not fulfill the inclusion criteria. Students who were unable or unwilling to participate in either of the two phases of data collection and female students were excluded from the study.

A questionnaire was designed to collect data. The questionnaire was inspected and validated by experts, who reviewed all the contents. It consists of three sections. The first section covers demographic characteristics, and the second section contains questions regarding the knowledge of TC, as shown in Table 1. The third section addresses participants' knowledge, attitude, and practices related to TSE, as shown in Table 2.

Data were collected in the first phase in October 2019, which was followed by a second interventional phase consisting of visual materials comprising PowerPoint

Level of awareness related about testicular cancer				
Academic Year:		Date:	Code:	
Questions		Yes	No	Not Sure
1	What solid cancer do you think is most prevalent in your age group?			
<b>Would you consult a doctor as a top priority (given leave from the college) if you had:</b>		<b>Yes</b>	<b>No</b>	<b>Not Sure</b>
2	Lump in either testis			
3	Discomfort/pain in the testis			
4	Feeling of heaviness in the scrotum			
5	Change in the feeling of either of the testes			
<b>Do you think that the following complaints can somehow be related to any disease of the testes?</b>		<b>Yes</b>	<b>No</b>	<b>Not Sure</b>
6	Cough or breathlessness			
7	Lower back pain			
8	Lower extremity swelling			
9	Neck mass			

**Table 1** Level of awareness related to testicular cancer

presentations, images, videos, and posters along the corridors of the students' classrooms in Arabic and English. The last phase took place three months later to assess the impact of the intervention, which students performed testicular self-examination (TSE), and how frequent they did it. The investigators who collected the data in the first phase were different from those who collected the data in the post-interventional phase.

The data were entered and analyzed using Excel spreadsheets (Microsoft, Redmond, WA) and SAS version 9.4. (SAS Institute Inc., Cary, NC). Qualitative data are expressed as percentages and frequencies. The association between qualitative variables was analyzed using the chi-squared test ( $\chi^2$ ), whereas in cases of zero or small cells, Fisher's exact test was used instead.

Quantitative data are presented as the mean and standard deviation. A t-test was used for comparing 2 quantitative variables with the significance level set at  $p < 0.05$  for normally distributed data. For non-normally distributed variables, a non-parametric test was used, and the variables are expressed as the median and interquartile range.

Based on the scores obtained from testicular cancer awareness study in Table 1, the participants were divided into three categories: poor awareness (score 0-3), fair awareness (score 4-6), and good awareness (score 7-9). One point was given to each correct entry, and zero was given for incorrect or "not sure" responses. The scores related to awareness about TSE in Table 2 were calculated in the form of sums and percentages.

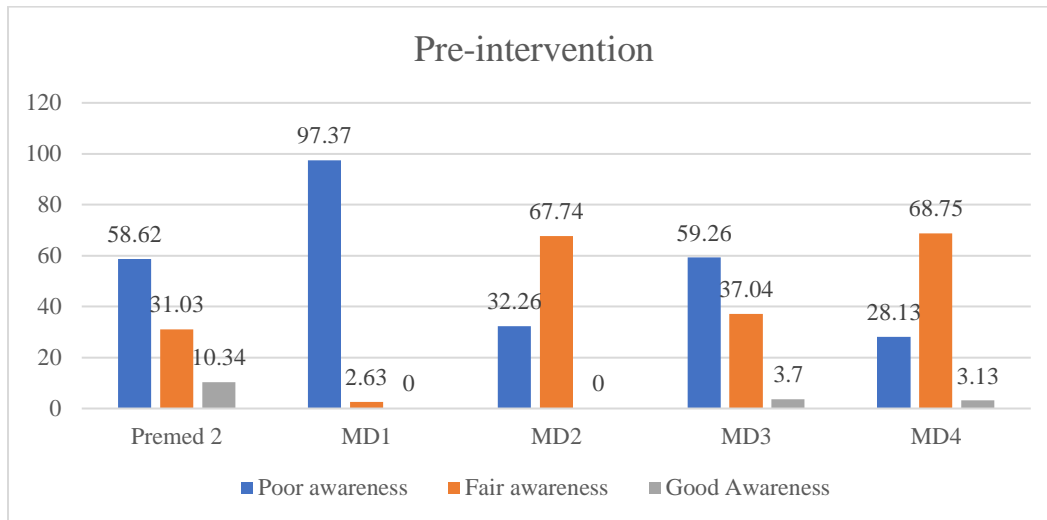
Level of awareness related to testicular self-examination					
Academic Year:			Date:		Code:
Questions			Yes	No	Not sure
1	Have you heard about testicular self-examination?				
For participants who answered 'Yes' to Q 1 (n- )					
2	Did you practice testicular self-examination?		Yes	No	
For participants who answered 'Yes' to Q 2 (n- )					
3	How often did you practice testicular self-examination?	Every week	Every month	Every 2-3 months	Whenever I remember
4	Please explain how you do the testicular self-examination		Correct	Not Correct	
For participants who answered 'Yes' to Q 1 & 'No' to Q 2 (n-)					
5	Why do you not practice testicular self-examination when you are aware?				
	I think it is important but I forget to do it				
	I don't think it is so important				
	I have another reason				

**Table 2.** Level of awareness related to testicular self-examination

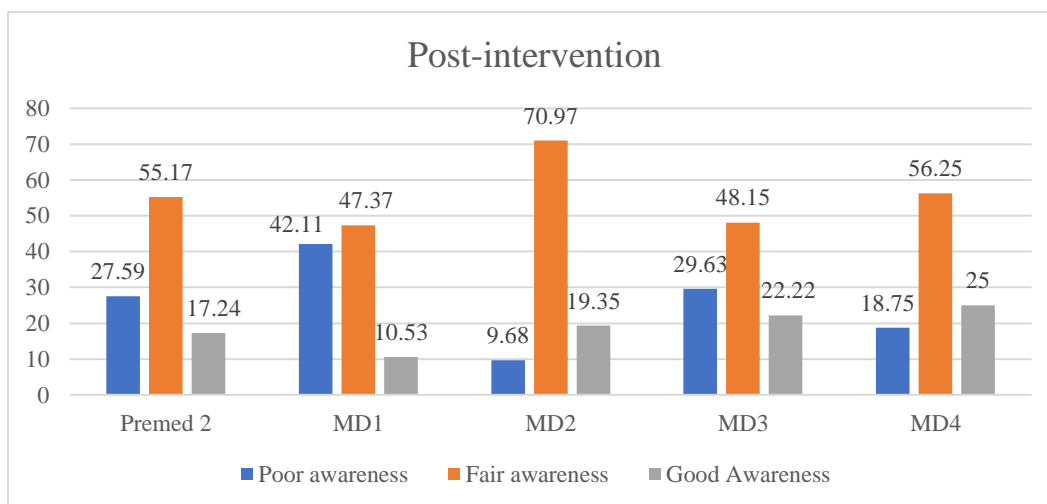
The principal investigator checked the collected data for completeness and applied corrective measures as required. The study did not involve any invasive procedures and hence did not pose any significant risk to the study participants. The objective of the study was explained in accordance with the Declaration of Helsinki, and informed consent was obtained from all participants. The confidentiality of the collected data was guaranteed by using code numbers rather than names or university identifiers and by password protection of the data.

## Results

A total of 157 students from preclinical levels (pre-med, n = 29; MD1, n = 38; MD2, n = 31) and clinical levels (MD 3, n = 27, MD4, n = 32) were included in this study. In the first phase, 89 (56.69%) students achieved poor awareness scores, 63 (40.13%) had fair awareness scores, and 5 (3.18%) students achieved good awareness. After the intervention, 41 (26.11%), 87 (55.41%), and 29 (18.47%) students had poor, fair, and good awareness scores, respectively. The improvement in scores is remarkable.



**Figure 1** Pre-intervention level of awareness about testicular cancer



**Figure 2** Post-intervention level of awareness about testicular cancer.

Improvement was seen in all the four levels of participating students, as shown in Figures 1 and 2.

Regarding TSE, before the intervention, only 15 out of the 157 participants (9.55%) had heard about testicular examination, and only 6 (3.82%) were aware of the correct method and had performed it in the previous month. After the intervention, 146 participants out of

157 (92.99%) were aware of TSE, and 78 (49.7%) had started to practice TSE, as shown in Table 3.

Attitude and practices were found to be better. Forgetfulness was the factor behind non-performance of the examination in 45 (57%) out of 79 participants who were not practicing TSE (Figure 3). This study found

Knowledge and attitude	Frequency n=157	Percent (%)
<b>Pre-intervention</b>		
<b>Have you heard about testicular self-examination?</b>		
Yes	15	(9.55%)
No	125	(79.62%)
Not sure	17	(10.83%)
<b>How often do you practice testicular self-examination?</b>		
Every week	0	(0.00%)
Every month	1	(0.64%)
Every 2-3 months	1	(0.64%)
Whenever I remember	4	(2.55%)
Never	9	(5.73%)
I don't know about the examination	142	(90.44%)
<b>Post-intervention</b>		
<b>Did you practice testicular self-examination?</b>		
Yes	78	(49.7%)
No	79	(50.32%)
Not sure	0	(0.00%)
<b>How often do you practice Testicular self-examination?</b>		
Every week	3	(1.91%)
Every month	20	(12.74%)
Every 2-3 months	16	(10.19%)
Whenever I remember	39	(24.84%)
Never	79	(50.32%)

**Table 3** Level of awareness related to testicular self-examination practice

an association between students from preclinical and clinical levels when it comes to pre-existing knowledge of testicular cancer, with students from clinical levels being more knowledgeable ( $P= 0.0135$ ) (Table 4). After the intervention, 153 (97.45%) out of 157 students felt that their knowledge had improved after the survey, and 116 (73.89%) students were willing to share the information they received with their families and friends (Figure 4).

### Discussion

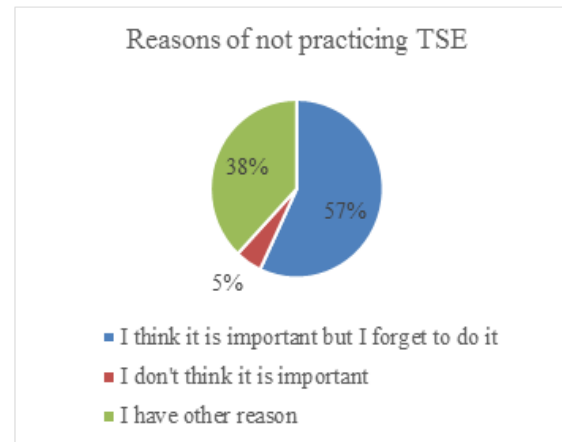
About 20% of testicular cancer among American men is ranged between 18 to 50 years old, and the incidence has been doubled over the past four decades [1, 2]. Also, the incidence rate of testicular cancer has been increasing in Saudi Arabia [7]. In the developing countries, the literature review shows most of the TC patients reported in late-stage, secondary to a lack of knowledge and awareness about the importance of self-

examination [8-13]. Many studies recommend that health planners consider to the incorporation of TSE as part of counseling in healthcare facilities [14]. In Saudi Arabia, this subject was addressed by one study in 2016, where 1600 male subjects aged 15 years and above were interviewed. The study found that 61.36% of participants were lacking knowledge about testicular cancer [6]. We undertook a study on a smaller scale involving medical students, but expand the scope by studying the awareness level before and after the educational campaign, which showed positive feedback [6, 9, 11, 15, 16].

The literature has also shown, that young men are not aware about their potential chance of having testicular cancer, even though it is the most common neoplasm in this age group. Furthermore, in general, healthcare Providers usually do not talk with their patients about the testicular cancer in relation to its risk factors, self-examination, and the importance of early detection on life expectancy and outcome [17].

The results after the interventions in our study revealed statistically significant improvement, with about 94% of the participants achieving fair or good scores in the testicular cancer awareness questionnaire. Similarly, the actual practice of TSE was adopted by 49.7% of the participants, which is very encouraging. Forgetfulness prevented 57% of aware participants from converting knowledge into practice, which could potentially be mitigated by monthly reminders through social media like WhatsApp for several months until the habits are firmly formed.

Mani et al. conducted a study and demonstrated that testicular cancer prevention campaigns are little known



**Figure 3** Reasons for not practicing TSE

amongst German university students. They documented that the knowledge from testicular cancer prevention campaigns resulted in an increased awareness and an increased willingness to perform TSEs [5]. Wanzer et al. also support the concept of comprehensive testicular cancer campaigns. In their study, men exposed to testicular cancer messages were more knowledgeable about testicular cancer and were more likely to conduct TSEs [18]. Paete and Maloret stress the importance of TSE even among men with learning disabilities since they have as much risk of contracting testicular cancer as the general population [19]. Rovito et al. did an extensive literature review and drafted best-practices guidelines for researchers to consult when they design interventions aimed at promoting TSE [20].

In 2016, Thornton did a literature review to evaluate the interventions published in the peer-reviewed journals to identify the methods that are effective in teaching TSE to young males. The most effective techniques in increasing regular TSE were techniques involving direct education from health care professionals, the use of reminder cards, teaching with the use of mannequins, and

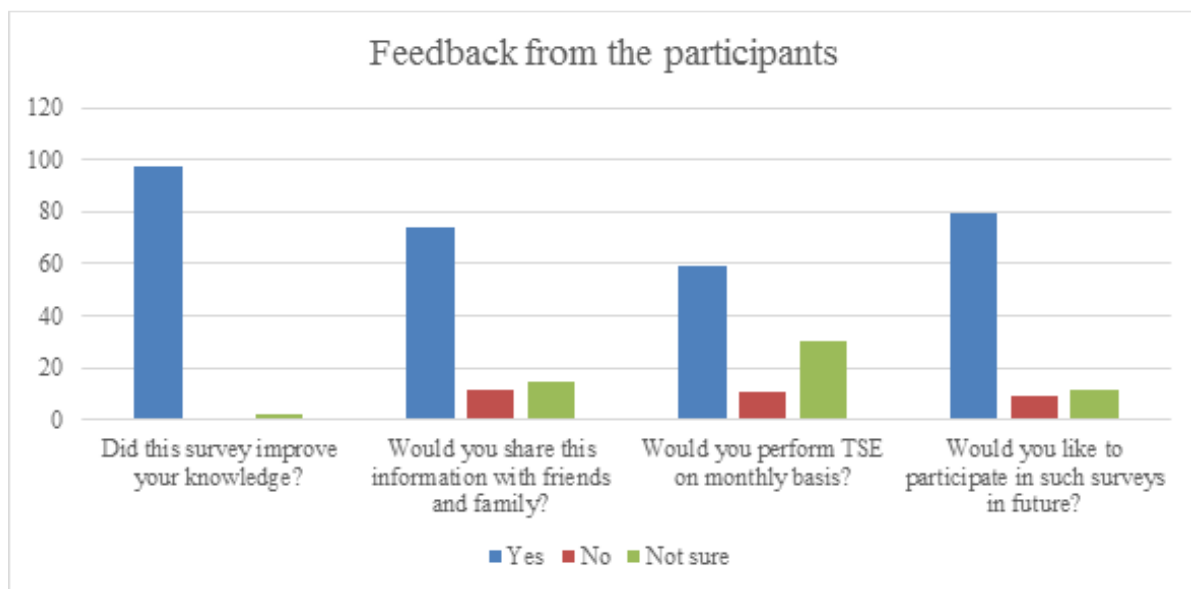
Level of awareness	Overall	Preclinical level	Clinical level	P-value
<b>Pre-intervention</b>				<b>0.0135</b>
Poor awareness	89 (56.69%)	64 (65.31%)	25 (42.37)	
Fair awareness	63 (40.13%)	31 (31.63%)	32 (54.24%)	
Good awareness	5 (3.18%)	3 (3.06%)	2 (3.39%)	
<b>Post-intervention</b>				0.4242
Poor awareness	41 (26.11%)	27 (27.55%)	14 (23.73%)	
Fair awareness	87 (55.41%)	56 (57.14%)	31 (52.54%)	
Good Awareness	29 (18.47%)	15 (15.31%)	14 (23.73%)	

**Table 4:** Comparison of type of education across post-awareness and pre-awareness.

provision of professional information. Using only written material and employing humor in an attempt to appeal to young populations were mostly ineffective [21].

Nevertheless, there have been some recent statements from certain centers of repute that do not support the concept of TSE on the grounds that the incidence of this disease is still low in comparison to diseases like breast cancer, even though it is most common solid

cancer in young men. Furthermore, there is a probability of false-positive results, anxiety, and harm from diagnostic tests or procedures [22]. However, earlier studies by Best et al. have demonstrated that while knowledge levels were increased significantly by providing information about TSE, anxiety levels did not [23]. Furthermore, recent studies also looked at the benefits of TSE beyond early detection of cancer and strongly



**Figure 4:** Feedback from the participants



recommend to use this cost-effective tool to detect other male-specific urogenital health concerns early, including varicoceles, hydroceles, etc. Such an approach fosters informed decision-making skills among males in regard to health concerns and treatment options [24].

The limitation of this study is the involvement of a single institution with a limited number of participants. Nevertheless, this study could serve as a base for further general population-based surveys as local health governing agencies provide approval and as the final stance on the feasibility of TSE for populations is debated. Future studies could address the issue of ill effects like anxiety and cost-effectiveness. The results of the present study may also strengthen the position of workers who are in favor of mass education about TSE and testicular cancer awareness to achieve the goal of early cancer detection.

### Conclusion

The knowledge about testicular cancer and TSE is low among medical students who are at risk due to their age. The information and the actual practice of TSE can potentially be enhanced by organizing properly designed awareness campaigns and using modern technologies like social media. These results could be achieved once a clear consensus is obtained and clear working guidelines are approved by governing health agencies about the significance of testicular cancer screening and self-examination.

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