Knowledge, perceived risk and barriers to testicular self-examination among male university students in Uganda

Keywords

Young males
Testicular cancer
Knowledge
Risk
Cancer prevention

Joshua Kanaabi Muliira, Priscilla Bbosa Nalwanga, Rhoda Suubi Muliira and Ziada Nankinga

Joshua Kanaabi Muliira, RN, BSN, MA, MSN, DNP
Sultan Qaboos University, College of Nursing, P. O. Box 66 Alkhod, 123, Muscat, Oman

Priscilla Bbosa Nalwanga, RN, BSN
Masaka Hospital, Uganda

Rhoda Suubi Muliira, RN, BSN, MSc. PRH
Sultan Qaboos University, College of Nursing, P.O.Box 66, Alkhod, Muscat, Oman

Ziada Nankinga, RN, BSN, MSC
Department of Nursing, School of Health Sciences, College of Health Sciences, Makerere University, P.O. Box 7072, Kampala, Uganda

E-mail:
jkmuliira@gmail.com

Online 20 January 2012

Abstract

Background: Testicular cancer (TC) is the most common malignancy among men aged 15–35 years and although Africa has one of the lowest prevalence rates, TC is often diagnosed late. The aim of this study was to describe TC knowledge, perceived risk and barriers to testicular self-examination (TSE) among young males in Uganda.
Method: Self-administered questionnaires and a systematic random sampling technique were used to collect data from 323 male students in a Ugandan University.
Results: The participants were mostly in the 18–22 years age range (59%) (mean age = 22 $\pm$ 2.5 years). The majority of participants (87%) did not know what age group was most at risk for TC, when to perform TSE (71%) or whether testicular lumps are a sign of TC (77%). Participants mostly perceived their risk for TC as being either low (32%) or moderate (58%). The mean perceived risk for TC was 1.8 $\pm$ 0.61 and few participants (14%) were performing TSE regularly. Most participants (80%) reported a lack of skill for performing TSE as well as perceiving TSE as embarrassing (87%) and time consuming (79%). Self-reported practice of TSE was found to be associated with different aspects of TC knowledge ($P = 0.01$).
Conclusion: Young male Ugandans have little knowledge about TC and perceive their risk for this disease to be low. Findings show that having good knowledge about TC is associated with performing TSE. Implications for practice are that health care providers should scale-up health education about TC to empower young males with the knowledge and skills required for cancer preventive practices and behaviors.

Introduction

Testicular cancer (TC) accounts for 0.8% of all cancers in men and is the most common malignancy in males aged 15–44 years [1]. The lifetime risk of TC in the general population is 1 in 300 men but those with a family history of TC are 4–9 times more likely to develop the disease [2]. TC incidence tends to be highest among populations of North European descent (8.0–9.0 per 100,000 man years) compared to those of Asian and African descent (1 per 100,000 man years) [3,4]. The reasons for the racial differences are unclear, however in adults the most common etiological theories point to prenatal and perinatal endocrine disruptions [4].

Other studies have suggested a causal relationship between TC and factors such as cryptorchidism [5,6] and late descended and undescended testes [7,8]. Maternal and infant factors, such as mother's parity (e.g. already having more than 1 child at birth of boy child),

birth weight [9,10] and having a brother with TC, raises ones risk of getting TC [9,11]. Other risk factors that are especially important in developing countries include: maternal exposure to dichlorodiphenyltrichloroethane pesticides [12]; exogenous estrogen during pregnancy [3]; chronic marijuana use [13]; cigarette smoking and high milk consumption [6,14,15].

In Uganda, the incidence rate of TC is estimated to be in the range of 0.6–1.1 per 100,000 man years [3]. However, as in other types of cancer, most Ugandans affected by TC are diagnosed late and have a very poor prognosis due to their lack of access to screening and treatment options [16]. Studies conducted in other parts of the world with good access to health care, such as North America, have also reported that the majority of patients with TC are diagnosed late, after metastases have spread to solid organs [9,17]. The complications associated with late diagnosis diminish the prospects of cure and are usually fatal. Fatal outcomes because of late diagnosis are unfortunate and unnecessary because TC is treatable and curable when diagnosed early [9,18].

One way of ensuring early diagnosis is to perform regular testicular self-examination (TSE). TSE is a simple technique that can be used by at-risk males to routinely and systematically examine their testicles to ensure early detection of abnormalities [19]. TSE is beneficial and clinicians make most initial TC diagnoses using a technique that is similar to TSE. It is recommended that at-risk men perform TSE at least once every month during or after a shower when the scrotum is relaxed and the testicles are more easily palpated [17,19]. The goal of performing TSE is to look for nodules, indurations, tenderness, enlargement, and atrophy of the testicles, on a monthly basis [20]. The classical presentations of TC include a hard painless testicular mass not involved with the scrotal wall or spermatic cord [9,17]. Other less common manifestations include gynecomastia, thromboembolic events, and palpable supraclavicular adenopathy.

Considering the fatality risk associated with complications of TC and the possibility of curative treatment when it is diagnosed early, it is important to examine young men's TC knowledge, perceived risk for TC and TSE practices. If gaps in knowledge and preventive practices are identified, they can be addressed through deliberately tailored health education by health care providers. Research shows that good health-related knowledge can lead to good preventive practices and health behaviors [21]. Therefore, the purpose of this study was to explore the knowledge, perceived risk and TSE practices of young male Ugandans in preparation for interventions to increase cancer awareness and prevention.

Study setting

The study was carried out among male students in a public university in Uganda. The university has a total population of 43,000 students pursuing undergraduate and graduate studies. Official university statistics show that more than half (55.7%) of the students are males aged 18 years and above [22]. This setting was chosen because college students have been reported to lack knowledge about TC [23] and their age group is at high risk for TC. Students at the public university where the study was conducted come from various parts of Uganda and, therefore, could be considered representative of young males throughout the country.

Methods

A descriptive cross-sectional design was used to collect data from male students after the study was approved by the Department of Nursing at MUK (Makerere University Kampala). A systematic random sampling technique was used to obtain a sample of 323 participants from three male halls of residence. A starting room was randomly selected from the sampling frame (a list of all room numbers in each hall of residence), and then every fifth room was selected. From each room, an eligible participant was selected if he showed evidence indicating official registration with the university. If the first person in the room declined to participate, the other was requested to participate. If the selected room was locked, if the occupants declined to answer the door, or none of the residents were willing to participate, the next room was selected and the sampling interval was continued from that point.

To participate in the study each student needed to be in the age range of 18–35 years and a resident in the hall where he was found.

A total of 450 subjects agreed to participate in the study and were given a consent form and self-administered questionnaire (SAQ). The participants were given clear verbal and written instructions not to include any personal identifying information on the questionnaire. They were also instructed to return the completed SAQ (after 45 minutes) to a receiving box located in the hall lobby. Return of a completed questionnaire was voluntary and was taken as confirmation of consent to participate in the study. Students' halls have no internet connection and all students access the internet in the library or in cafes located outside the halls. This lack of easy access to the internet limited participants' ability to search for answers to the items in the SAQ. Seeking answers from any other sources was not allowed.

Collecting data using this approach helped to increase anonymity, privacy and confidentiality, especially since the study was asking for information about sex organs. Of the 420 questionnaires returned on time, 323 were complete, 97 questionnaires were either incomplete or had nothing written on them and 30 questionnaires were not returned. Only questionnaires with complete data on knowledge, perceived risk and testicular self-examination practices were included in this study. Therefore, the response rate for this study was 76.9%.

Study instrument

The self-administered questionnaire (SAQ) used in this study was developed after an extensive review of the literature on TC and TSE. The researchers independently reviewed the available literature from over 10 reputable databases and developed items to measure TC knowledge, perceived risk for TC, TSE practices, and barriers to TSE. The items developed by each individual researcher were then reviewed by the team and merged into one draft SAQ. The draft SAQ was given to a panel of three oncologists and three nurse clinicians working in cancer prevention. The panel of experts recommended the draft SAQ as an appropriate measure of young men's basic TC knowledge, perceived risk for TC and TSE practices. The panel of experts recommended removing five items relating to foods that increase the risk of TC.

After making adjustments in accordance with the recommendations of the first panel of experts the SAQ was given to a second panel made up of two researchers specializing in reproductive health and cancer prevention who were asked to review the SAQ for face and content validity. This second panel agreed that the SAQ was a suitable instrument and recommended the addition of an open ended question on barriers to TSE. The SAQ was then pre-tested on a group of 20 male students from a private university in another district. The results of the pilot testing showed that the questionnaire was clear, understandable and, on average, required 45 minutes to complete.

The SAQ was written in English and contained both open-ended and closed questions. English is the language of instruction at all levels of education in Uganda and university students communicate with each other in English because of their different tribal backgrounds. The SAQ contained four sections: demographic characteristics, knowledge about TC, perceived risk for TC and TSE practices. Participant's knowledge about TC was assessed by asking questions relating to the age group most at risk of developing TC, signs and symptoms of TC, factors predisposing a man to TC, and recommended TSE practices.

The perceived risk for TC was measured using a visual analogue scale that consisted of a 10 cm line labelled ''0'' at one end and ''10'' at the other end (where ''0'' = lowest and ''10'' = highest perceived risk). Participants were required to mark a cross (''X'') on the visual analogue scale to indicate what they felt was their perceived risk of developing TC in the future, and afterwards to give their reasons for their TC risk rating. Regarding TSE practices, participants responded ''yes'' or ''no'' to the questions: ''Do you feel you have the necessary skills to perform TSE?''; ''Do you examine your testicles regularly?'' The responses were scored as ''1'' for yes and ''0'' for no. Responses to a third question (''How often do you examine your testis?'') were scored as follows: ''2'' = at least once a month; ''1'' = at least once every 3 months; ''0'' = never. A sum of scores on these three items was generated to represent TSE practices (lowest score = 0 and highest score = 4). Participants were also asked to list the barriers that prevented them from performing TSE.

Table 1 Participants' demographic characteristics

Demographic characteristic	Category	freq (%)
Age in years (M = 22; SD = 2.5)	18–22	190 (58.8)
	23–27	128 (39.6)
	28–32	5 (1.6)
Marital status	Single	306 (94.7)
	Married	8 (2.5)
	Living with a partner	9 (2.8)
Religious denomination	Protestant	122 (37.7)
	Catholic	96 (29.7)
	Moslem	21 (6.5)
	Seventh Day Adventist	9 (2.8)
	Born Again Christian	68 (21.1)
	Others/Atheist	7 (2.2)
Year of study	First year	110 (34.1)
	Second year	92 (28.4)
	Third year	82 (25.4)
	Fourth year	37 (11.5)
	Fifth year	2 (0.6)

Total number of participants was 323. M, mean; SD, standard deviation.

Data analysis

All questionnaires with complete data were entered into a database, cleaned and analyzed using SPSS version 15.0 (SPSS Inc., Chicago, IL, USA). Descriptive statistics were used to describe the sample's characteristics, TC knowledge, perceived risk, TSE practices and barriers. Pearson's Chi-square analysis was performed to explore factors associated with TSE.

Results

Participants' demographic characteristics

Most participants (59%) were between the ages of 18 and 22 years and, as shown in Table 1, they were mostly single (95%), protestant by religion (38%), with the majority being in either the first (34%) or second year (28%) of their university studies.

Participants' knowledge about testicular cancer

All participants stated that they had heard of testicular cancer (TC). The results presented in Table 2 show that most participants (87%) did not know which age group is commonly affected by TC, or the most appropriate time for self-examination of the testis (71%). Most participants also did not know that a lump on the testicles is a sign of TC (78%) or that TC can be cured if it is diagnosed early (94%). The majority of the participants (80%) did not know, or could not recall, any of the factors that predispose one to TC. The main source of information about TC was reported to be the media (62%).

Perceived risk for testicular cancer

Results presented in Table 3 show that, on average, participants perceived their risk of getting TC as being low (mean = 1.8, standard deviation (SD) = 0.61), despite the majority (58%) reporting a perception of moderate risk. A significant number of participants were of the view that their chance of getting TC in the future was not high (82%) and they were not worried about getting TC (66%). However, nearly two-thirds (65%) also reported that getting TC would change their lives.

Participants' self-reported testicular self-examination practices and perceived barriers

All the participants had heard about testicular self-examination (TSE) and the results listed in

Table 2 Participants' knowledge about testicular cancer

Knowledge item	Response	freq (%)
Age commonly affected by TC	15–45 years*	41 (12.7)
	45–70 years	67 (20.7)
	Don't know	215 (66.6)
Most appropriate time to examine the testis	After or during a shower*	92 (28.5)
	Before going to sleep	28 (8.7)
	On a sunny day	17 (5.2)
	Don't know	186 (57.6)
Intense pain is a common symptom of TC	Yes	95 (29.4)
	No*	24 (7.4)
	Don't know	204 (63.2)
A lump on the testicle is a common sign of TC	Yes*	72 (22.3)
	No	23 (7.1)
	Don't know	228 (70.6)
Treatments are available for testicular cancer	Yes*	164 (50.8)
	No	9 (2.8)
	Don't know	150 (46.4)
There is little chance of curing TC even when diagnosed early	Yes	119 (36.8)
	No*	18 (5.6)
	Don't know	186 (57.6)
Factors which increase the risk of getting TC	Multiple sexual partners	54 (16.7)
	Unprotected sex	8 (2.5)
	Having a father with TC*	64 (19.8)
	Contact with a person with TC	1 (0.3)
	Don't know	196 (60.7)
Source of information about TC	Media (radio/television/newspapers)	200 (61.9)
	Friend	55 (17.0)
	Parent/guardian	8 (2.5)
	Hospitals	52 (16.1)
	School/teachers	8 (2.5)

* indicates correct response for the item measuring TC knowledge. TC, testicular cancer.

Table 4 show that the majority felt that they did not have the necessary skills to perform TSE (80%) and were not examining their testicles regularly (84%). Additionally, most participants reported that they had never felt their testicles by touching (60%) and that their doctors had never performed a testicular examination (92%). The main perceived barriers to TSE were lack of knowledge on how to perform TSE (98%), perceiving TSE as a time consuming (87%), embarrassing (79%) and painful (74%) procedure. Generally the sample had a very poor score for actually carrying out TSE (mean = 0.83).

Factors associated with self-reported level of TSE practices

As indicated in Table 5, statistically significant relationships were found between self-reported TSE practices and: knowing that a testicular lump is a sign of TC, χ^2 (2, $n = 323$) = 16.67, $P = 0.000$; knowing TC is curable if diagnosed early, χ^2 (2, $n = 323$) = 7.4, $P = 0.001$; knowing the age group at greatest risk of developing TC, χ^2 (3, $n = 323$) = 11.55, $P = 0.003$; knowing how to perform TSE, χ^2(1, $n = 323$) = 45.86, $P = 0.000$; and perceiving one's age as a factor that increases the risk of getting TC, χ^2 (3, $n = 323$) = 9.93, $P = 0.020$.

Discussion

The participants for this study comprised a group of young males at risk for TC because of their age. Although the participants had heard of TC, they generally had little knowledge about the disease, especially with regard to important aspects such as risk factors, the

Table 3 Perceived risk for testicular cancer

Perceived risk item	Response	freq (%)
Perceived risk as measured on 0–10 cm visual analogue scale (M = 1.79; SD = 0.61)	Low (0–3cm)	102 (31.6)
	Moderate (3.5–6cm)	188 (58.2)
	High (6.5–10cm)	33 (10.2)
My chance of getting TC in future is high	Yes	58 (18.0)
	No	265 (82.0)
I worry about getting TC in future	Yes	110 (34.0)
	No	213 (66.0)
I am afraid of thinking about TC	Yes	165 (51.1)
	No	158 (48.9)
If I got TC it would change my whole life	Yes	210 (65.0)
	No	113 (35.0)
My gender and age increase chance of getting TC	Yes	183 (56.7)
	No	140 (43.3)

M, mean; SD, standard deviation; TC, testicular cancer.

most appropriate time to examine one's testicles, signs of TC, and the possibility of being cured when diagnosed early. Studies conducted in developed countries have also found that the majority of young men susceptible to TC are uninformed and have little knowledge about the disease [23–25]. This lack of knowledge is not unique to young men because health care providers themselves have also been found to have knowledge gaps on issues related to TC [23,26].

Lack of knowledge about a disease negatively impacts people's preventive practices, and when it comes to cancer the stakes are even higher. In this study, self- reported TSE was found to be very low and significantly associated with different aspects of knowledge. Most participants stated that they did not

Table 4 Testicular self-examination (TSE) practices and perceived barriers to TSE

Variable	Response	freq (%)
Do you feel you have the necessary skills to perform TSE	Yes	64 (19.8)
	No	259 (80.2)
Examines testicles regularly	Yes	50 (15.5)
	No	273 (84.5)
Feels testicles by touching them	At least once a month	104 (32.2)
	At least once in 3 months	24 (7.4)
	Never	195 (60.4)
Self-reported practice of TSE (M = 0.83, SD = 0.88)	Poor (0–1)	280 (86.7)
	Good (2–4)	43 (13.3)
The doctor examines my testis	On every visit	8 (2.5)
	On every annual check up	17 (5.3)
	Has never examined	298 (92.2)
TSE can help me find signs of TC	Yes	276 (85.4)
	No	47 (14.6)
In your opinion what barriers affect your engagement in TSE (*Multiple responses)*	It is embarrassing for me	255 (79.3)
	I am afraid of finding abnormalities	79 (24.5)
	I think it is painful	240 (74.3)
	TSE is time consuming	280 (86.7)
	My friends would make fun of me	60 (18.6)
	It may interfere with other activities	67 (20.7)
	It is against my religion or culture	81 (25.1)
	I don't know how to perform TSE	317 (98.1)

m, mean; SD, standard deviation; TC, testicular cancer; TSE, testicular self-examination.

Table 5 Factors associated with level of TSE practices

Variable	Response	Level of TSE practices		Pearson's Chi-square (χ^2)	Degrees of freedom	*P*-value
		Poor freq (%) (*n* = 280)	Good freq (%) (*n* = 43)			
Has skills to perform TSE	Yes	39 (12.1)	25 (7.7)	45.86	1	0.00
	No	241 (74.6)	18 (5.6)			
Lump on testicles is common symptoms of TC	Yes	54 (16.7)	18 (5.6)	16.67	2	0.00
	No	17 (5.3)	6 (1.8)			
	Don't know	209 (64.7)	19 (5.9)			
My age increases the chances of getting TC	Yes	159 (49.2)	24 (7.4)	9.93	3	0.02
	No	121 (37.5)	19 (5.9)			
TC is most curable if diagnosed early	Yes	95 (29.4)	24 (7.4)	7.4	2	0.00
	No	16 (5.0)	2 (0.6)			
	Don't know	169 (52.3)	17 (5.3)			
Age at which TC commonly affects male	15–45	35 (10.8)	6 (1.8)	11.55	3	0.00
	45–70	50 (15.5)	17 (5.3)			
	Don't know	195 (60.4)	20 (6.2)			

TC, testicular cancer; TSE, testicular self-examination.

know how to perform TSE and were not examining their testicles regularly. The few who were performing TSE were doing so at the wrong time of day or at inappropriate intervals. Similar findings were found among college students in Turkey and Sweden [21,27]. Low levels of TSE have also been reported among young males in Europe and the USA where the prevalence of TC is higher [28].

The factors associated with TSE practices in the current study all point to knowledge as a critical aspect in ensuring cancer prevention practices. The apparent lack of knowledge and poor TSE practices in this study could be the tip of a bigger phenomenon of neglected cancers. Cancers that have low prevalence rates and that affect age groups considered to be healthy youths have received less attention both in the lay literature and in scientific research. This observation leads to the conclusion that young males, in particular, are a neglected population when it comes to cancer prevention and research. However, this is a paradox and contradictory to the widely accepted notion of ''catch them early'' so that young people can learn good health behavior practices to follow throughout their lives. One of the revelations of this study is that cancer prevention efforts in Uganda, and maybe in other countries, are not equitably focusing on the entire spectrum of the population. As a result young men are unaware of the value of important health promoting practices such as TSE or their risk of developing cancers such as TC [29,30].

The other important dimension to the problem of young men's lack of TC knowledge and preventive practices, is that of the health care providers. It has been reported that health care providers frequently do not directly ask their patients questions about sexual health because of their discomfort with the topic and their perception that patients are uncomfortable disclosing this information [31]. Health care providers caring for young men assume that they have healthy sexual functions and normal development and, because of these assumptions, do not discuss issues related to sexuality with them [32]. In this study nearly all of the participants reported that their doctors had never examined their testicles. The failure by doctors to examine the testicles of young males inherently conveys undesirable messages such as testicular examination is not important or healthy young males are not at risk for any problems.

The other barriers to TSE reported by the participants, such as TSE being time consuming, painful and embarrassing, could be rooted in culture and their experiences from other physical examinations. Similar barriers have been found in other studies and have been reported to limit TSE practices among young men [2,25,28]. These barriers can be addressed through health education by health care providers caring for young males and by deliberate clinical practices that emphasize the examination of the testicles. There is also a need for equitable focus on cancers that specifically affect youths. Such efforts are likely to increase TC knowledge, risk awareness, TSE and other preventive practices [24].

Limitations

The limitations of this study include the use of a self-report method and a non-standardized SAQ for data collection. The SAQ used for data collection was developed by the authors and it was pre-tested on a small scale. There was also very limited literature about TC and TSE practices among men in Uganda and Africa as a whole. Additionally, in Uganda, reproductive Organs are not openly talked about because of cultural and religious reasons. These limitations could have affected the participants' responses and, subsequently, the results of the study. Therefore, the findings of this study may not be generalizable to other young men either in Ugandan or other universities.

Conclusion

Despite its limitations, the current study does highlight the challenges associated with cancer prevention among young males in resource-poor settings. Key aspects are a lack of knowledge and health care providers' practices in relation to organs affected by specific cancers. The challenges are complex because they require multifaceted approaches together with commitment at different levels of the healthcare system in order to address them. Healthcare providers are the centerpiece, because they can scale-up TC health education by integrating it into other services that are routinely provided to young men. However, to register success there is a need for equitable focus on cancers that affect neglected sections of the population.

References

[1] Parkin DM, Bray F, Ferlay J, Pisani P. Global cancer statistics 2002. CA Cancer J Clin 2005;55:74–108.

[2] Vadaparampil ST, Moser RP, Loud J, Peters JA, Greene MH, Korde L. Factors associated with testicular self-examination among unaffected men from multiple-case testicular cancer families. Hered Cancer Clin Pract 2009;7(1): 11.

[3] Chia VM, Quraishi SM, Devesa SS, Purdue MP, Cook MB, McGlynn KA. International trends in the incidence of testicular cancer, 1973–2002. Cancer Epidemiol Biomarkers Prev 2010;19:1151–9.

[4] Walsh TJ, Davie BJ, Croughan MS, Carol PR, Turek PJ. Racial differences among boys with testicular germ cell tumors in the United States. J Urol 2008;179(5):1961–5.

[5] Cortes D, Thorup J, Petersen BL. Testicular neoplasia in un-descended testes of cryptorchid boys – does surgical strategy have an impact on the risk of invasive testicular neoplasia? Turkish J Pediatr 2004;46:35–42.

[6] Garner MJ, Turner MC, Ghadirian P, Krewski D. Epidemiology of testicular cancer: an overview. Int J Cancer 2005;116(3): 331–9.

[7] Ritzen EM. Undescended testes: a consensus on management. Eur J Endocrinol 2008;159: 87–90.

[8] Akre O, Pettersson A, Richiardi L. Risk of contra-lateral testicular cancer among men with unilaterally undescended testis: a meta-analysis. Int J Cancer 2009;124(3):687–9.

[9] Albers P, Albrecht W, Algaba F, Bokemeyer C, Cohn-Cedermark G, Fizazi K, et al. EAU guidelines on testicular cancer: 2011 update. Eur Urol 2011;60(2):304–19.

[10] Cook MB, Graubard BI, Rubertone MV, Erickson RL, McGlynn KA. Perinatal factors and the risk of testicular germ cell tumors. Int J Cancer 2008;122(11):2600–6.

[11] Dong C, Lonnstedt I, Hemminki K. Familial testicular cancer and second primary cancers in testicular cancer patients by histological type. Eur J Cancer 2001;37:1878–85.

[12] Coupland CA, Forman D, Chilvers CE, Davey G, Pike MC, Oliver RT. Maternal risk factors for testicular cancer: a population based case control study. Cancer Causes Control 2004;15(3):277–83.

[13] Trabert B, Sigurdson AJ, Sweeney AM, Strom SS, McGlynn KA. Marijuana use and testicular germ cell tumors. Cancer 2010; 117:848–53.

[14] Garner MJ, Turner MC, Ghadirian P, Krewski D, Wade M. Testicular cancer and hormonally active agents. J Toxicol Environ Health Part B Crit Rev 2008;11(3&4):260–75.

[15] Ganmaa D, Li XM, Qin LQ, Wang PY, Takeda M, Sato A. The experience of Japan as a clue to the etiology of testis and prostate cancers: milk and dairy products are causatively related to these malignancies. Med Hypotheses 2003;60:724–30.

[16] Gondos A, Brenner H, Wabinga H, Parkin DM. Cancer survival in Kampala, Uganda. Brit J Cancer 2005;92:1808–12.

[17] Moul JW. Timely diagnosis of testicular cancer. Urol Clin N Am 2007;34(2):109–17.

[18] Feldman DR, Bosl GJ, Sheinfeld J, Motzer RJ. Medical treatment of advanced testicular cancer. J Am Med Assn 2008;299(6):672–84.

[19] McGilligan C, McClenahan C, Adamson G. Attitudes and Intentions to performing testicular self -examination: utilizing an extended theory of planned behavior. J Adolesc Health 2009;44(4):404–6.
[20] Gilligan T. Testis cancer: rare, but curable with prompt referral. Clev Clin J Med 2007;74(11):817–25.
[21] Rudberg L, Nilsson S, Wikblad K, Carlsson M. Testicular cancer and testicular self-examination: knowledge and attitude of adolescent Swedish men. Cancer Nurs 2005;28(4):256–62.
[22] Makerere University (MUK). Makerere University Fact Book: Registered Students by Sex and Level. Kampala: Makerere University Uganda; 2010.
[23] Casey RG, Grainger R, Butler MR, McDermott TE, Thornhill JA. Public awareness of testis cancer, and the prevalence of testicular self–examination – changing patterns over 20 years. Urology 2010;76(4):915–8.
[24] Powe BD, Ross L, Wilkerson D, Brooks P, Cooper D. Testicular cancer among African American college men: knowledge, perceived risks and perceptions of cancer fatalism. Am J Mens Health 2007;1(1): 73–80.
[25] Ugurlu Z, Akkuzu G, Karahan A, Beder A, Dogan N, Okdem S, et al. Testicular cancer awareness and testicular self-examination among university students. Asian Pac J Cancer Prev 2011;12:695–8.
[26] Brewer G, Roy M, Watters J. Testicular self-examination in an adult community sample. Am J Mens Health 2011;5(1):57–64.
[27] Yilmaz E, Kutlu AK, Çeçen D. [The knowledge, attitude and behaviors school of health students related testicular cancer and testicular self-examination]. Firat Sag˘lik Hizmetleri Dergisi 2009;4:72–85 [In Turkish].
[28] Göçgeldi E, Koçak N, Ulus S, Yeg˘iner C, Başal . [Investigation of the frequency of testicular self-examination performance in young adults males]. Gülhane Tip Derg 2011;53(1):17–25 [In Turkish].
[29] Daley CM. College men's knowledge, attitudes and beliefs about testicular cancer. Am J Mens Health 2007;1(3):173–82.
[30] Ward KD, Weg MW, Read MC, Sell MA, Beech BM. Testicular cancer awareness and self-examination among adolescent males in a community youth organization. Prev Med 2005;41(2):386–98.
[31] Politi MC, Clark MA, Armstrong G, McGarry KA, Sciamanna CN. Patient–provider communication about sexual health among unmarried middle-aged and older women. J Gen Intern Med 2010;24(4):511–6.
[32] Farrow JA. Male sexual health during adolescence and young adulthood: contemporary issues. J Mens Health 2009;6(3):177–82.

This article has been cited by:

1. Ebru Karazeybek, Cafer Özdemir, Büşra Nur Temür, Nilgün Aksoy. 2022. Beliefs and behaviours of students in health-related faculties regarding testicular self-examination. *International Journal of Urological Nursing* **16**:1, 18-25. [Crossref]
2. Serife Zehra Altunkurek, Merve Çil. 2021. Determination of high school students' knowledge regarding testicular cancer and testicular self-examination. *International Journal of Urological Nursing* **15**:3, 131-137. [Crossref]
3. Saide Faydalı. 2018. Sağlık eğitimi alan erkek öğrencilerin kendi kendine testis muayenesi yapma durumları ve etkileyen faktörler. *TURKISH JOURNAL of CLINICS and LABORATORY* . [Crossref]
4. Mohamad M. Saab, Margaret Landers, Josephine Hegarty. 2018. Males' Awareness of Benign Testicular Disorders: An Integrative Review. *American Journal of Men's Health* **12**:3, 556-566. [Crossref]
5. Hossein Asgar Pour, Dilara Kunter, Reza Norouzzadeh, Mohammad Reza Heidari. 2018. The Effect of Testicular Self-Examination Education on Knowledge, Performance, and Health Beliefs of Turkish Men. *Journal of Cancer Education* **33**:2, 398-403. [Crossref]
6. Mohamad M. Saab, Margaret Landers, Eoghan Cooke, David Murphy, Martin Davoren, Josephine Hegarty. 2018. Enhancing Men's Awareness of Testicular Disorders Using a Virtual Reality Intervention. *Nursing Research* **67**:5, 349-358. [Crossref]
7. Mohamad M. Saab, Martin Davoren, Aileen Murphy, David Murphy, Eoghan Cooke, Margaret Landers, Serena Fitzgerald, Noel Richardson, Michael Rovito, Christian Von Wagner, Mike Murphy, Darren Dahly, Josephine Hegarty. 2018. Promoting men's awareness, self-examination, and help-seeking for testicular disorders: a systematic review of interventions. *HRB Open Research* **1**, 16. [Crossref]
8. Mohamad M. Saab, Martin Davoren, Aileen Murphy, David Murphy, Eoghan Cooke, Margaret Landers, Serena Fitzgerald, Noel Richardson, Michael Rovito, Christian Von Wagner, Mike Murphy, Darren Dahly, Josephine Hegarty. 2018. Promoting men's awareness, self-examination, and help-seeking for testicular disorders: a systematic review of interventions. *HRB Open Research* **1**, 16. [Crossref]
9. Mohamad M. Saab, Margaret Landers, Josephine Hegarty. 2017. Exploring awareness and help-seeking intentions for testicular symptoms among heterosexual, gay, and bisexual men in Ireland: A qualitative descriptive study. *International Journal of Nursing Studies* **67**, 41-50. [Crossref]
10. Mohamad Saab, Margaret Landers, Josephine Hegarty. 2016. Testicular Cancer Awareness and Screening Practices: A Systematic Review. *Oncology Nursing Forum* **43**:1, E8-E23. [Crossref]
11. Muharrem Ak, Cemal Taşdemir. 2013. Reappraisal of the Efficacy of Testicular Self-Examination. *Journal of Men's Health* **10**:1, 37-37. [Citation] [Full Text] [PDF] [PDF Plus]