RESEARCH ARTICLE

Cancer Screening Knowledge and Attitudes of Under- and Post-Graduate Students at Kasr Al Ainy School of Medicine, Cairo University, Egypt

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Abstract

Background: Increasing knowledge and awareness of cancer screening significantly influence health promotion behavior which could markedly reduce incidence rates. In many countries, health care providers are the principal source of information concerning cancer screening. This study was carried out to assess the level of knowledge concerning cancer screening among medical students, house officers and residents and to explore their attitude towards cancer screening practices. Materials and Methods: This cross-sectional study was conducted in Kasr Al Ainy Medical School at Cairo University in Egypt, with 300 undergraduate medical students and 150 postgraduates (interns and residents) enrolled. A pre-tested self-administered questionnaire was used to collect data from the study participants regarding personal and education-related information, knowledge about cancer screening and its sources, and attitude towards cancer screening. Results: More than 64% of participants had knowledge scores of ≤ 10 points (out of 24). The total knowledge score (out of 6 points) for breast cancer screening increased from 1.9±1.0 to 2.3±1.2 and 2.4±1.1 for 4th, 5th and 6th year respectively, interns showed the highest score of 2.6 ±1.1, P= 0.001. Year of enrollment at medical school was a significant positive predictor of acquiring knowledge about cancer screening (post graduate vs. undergraduate students) (OR= 1.30, C.I =1.01-1.63), lack of or none receiving of orientation/training about cancer screening was the sole negative significant predictor for proper knowledge about cancer screening (OR=0.50, C.I=0.31-0.82). Over 92% of students agreed that they had insufficient knowledge about cancer screening, 88.2% appraised the need to have enough knowledge in order to direct/advice patients, relatives and friends, and 93.7% required that the faculty should emphasize the importance of cancer screening in the delivered curricula at medical school. Conclusions: A relatively low to moderate level of knowledge about cancer screening was detected among the selected medical students regardless of their year of enrollment at medical school or their graduation status, which may implicate a negative impact on early cancer detection especially in a low resource country like Egypt.

Keywords: Cancer screening - health promotion behaviors - knowledge - attitude - medical students

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Introduction

Cancer remains a major cause of mortality worldwide. Despite being potentially among the most preventable and treatable chronic diseases, million lives are lost annually due to cancer alone (Cancer Research UK). Cancer is the leading cause of death in developed countries and the second leading cause of death in developing countries (WHO, 2008). Worldwide, it is estimated that there were around 196 million years of healthy life lost globally because of cancer in 2013 (Fitzmaurice et al., 2015).

It was also estimated by the World Health Organization that there were about 14 million new cancer cases, 8.2 million cancer deaths and 32.6 million people living with cancer (within 5 years of diagnosis) in 2012 worldwide. Fifty seven percent (8 million) of new cancer cases, 65% (5.3 million) of the cancer deaths and 48% (15.6 million) of the 5-year prevalent cancer cases occurred in the less developed regions (Ferlay et al., 2015). For many cancers, it is predicted that the incidence rates could increase substantially in the future, with up to 15 million new cases in 2020, most of which will be in developing countries (Salminen et al., 2005). The total number of new cases is expected to increase by 29% in the developed countries whereas; in developing countries an increase of 73% is expected, largely as a result of ageing, urbanization and change in dietary habits by 2020. Developing countries contribute by 53% of the incidence and by 56% of cancer deaths (Torre et al., 2015).

Much of the disparity in death rates from cancers

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between developed and developing countries is attributed to lack of prevention or early detection (Torre et al., 2015). The combined efforts in both prevention and treatment are needed to control cancers in developing countries, emphasizing the need for advancements in two specific areas: cancer surveillance and cancer control systems. Surveillance of cancer is critical to the implementation and evaluation of primary and secondary prevention programs while survival data are an essential measure of outcomes (Sudo et al., 2014). There is a growing body of evidence that increasing knowledge and awareness of cancer screening and prevention recommendations significantly influence health behaviors (Bastani et al., 2010). Cross- sectional studies have shown that knowledge is associated with health promotion behaviors (Berkowitz et al., 2008; Mongsawaeng et al., 2016). However, a number of previous studies have revealed that cancer education is insufficient, fragmented and unorganized, and that students' knowledge of cancer need to be improved (Jeeva et al., 2007; Villarreal-Garza et al., 2010). Similarly other reports have shown poor knowledge of basic cancer facts among medical students and residents as well as suboptimal knowledge of cancer screening recommendations. Thus screening for cancer is an essential clinical skill recommended for inclusion in medical students' and residents' education (Villarreal-Garza et al., 2010). Prior research conducted in Egypt and included physicians revealed that most of them lacked proper knowledge about early cancer detection and screening, the study recommended that better planning and collaboration among medical schools could increase new physicians' knowledge of cancer detection and prevention (Soliman et al., 2003). In Egypt no previous studies addressed medical students' knowledge in the domain of cancer screening and prevention, this study was conducted to assess the level of knowledge concerning cancer screening among medical students, house officers and residents at Cairo University and to explore their attitude towards cancer screening practices.

Materials and Methods

Setting and design

This cross-sectional study was conducted in Kasr Al Ainy Medical School at Cairo University in Egypt, one of the ancient and prestigious medical schools in Africa and the Middle East, along the past centuries it adopted a traditional curriculum, and teacher-centered education. Each year Kasr Al Ainy Medical School graduates about 900-1000 interns (ranked 1st in the number of graduates in Egypt and the Middle East). Along the different years of enrollment at the medical school, the number of students ranged from 800 to 1000 per study year, these cohorts passing from the academic departments in year one to three, in the fourth year; students are exposed to community medicine and starts the clinical patients' encountering. Health promotion and chronic disease prevention is delivered by many departments starting from the second year of the program but in a fragmented, non-comprehensive fashion" topics delivered through Community Medicine curriculum, lectures by other departments (internal medicine), and extracurricular activities (health awareness campaigns". The study was carried out during the period from September 2014 to June 2015 at the Faculty of Medicine; Cairo University targeting the 4th, 5th and 6th year medical students who represented the undergraduate stage along with house officers (interns), and residents at different clinical departments at Kasr Al Ainy Hospitals.

Sample size and sampling method

The sample size was calculated using open-epi online calculator (http://www.openepi.com/SampleSize/SSPropor.htm) and applying the formula where the sample size n=[DEFF*Np(1-p)]/ [(d2/Z21-α/2*(N-1)+p*(1-p)] n=the desired sample size, Z=standard deviation at 95% confidence level (1.96), p is the proportion in the target population estimated to have a particular characteristic. P is the proportion of medical students/interns with knowledge about cancer screening. Since there are no previous studies regarding this topic in Egypt, p is taken as 50%, the required sample size was 384 students. Adding a 20% for the possible non-response, the final sample size should include 461 students. Multistage sampling was used for the recruitment of study participants, in the first stage we applied an appropriate sampling fraction, the minimum number required from each year from students at each category in the college another sampling fraction was applied to guarantee representation of the both genders. In the second stage we used systematic random sampling method to select students in each year where every fifth student (10% sampling) was selected using statistical software (SPSS 21.0, Statistical package for Social Science) through employing of the students' academic number. Those selected were received an appropriate orientation regarding the objectives and impact of the study, with emphasis on their right not to participate.

Data collection technique

A pre-tested self-administered questionnaire was used to collect data from the study participants. It included four sections: *i)*. Personal and education-related information: gender, age in years, educational year, last year grade for students, final year grade for house officers and residents, ever receiving educational training or educational materials about cancer screening, and frequency of searching for topics related to cancer screening in the last year. *ii)*. Knowledge about cancer screening: The original data collection form was composed of 29 items (7 about breast cancer, 7 about cervical cancer, 5 colo-rectal, three for ovarian cancer, 3 prostate, two for bladder cancer and two for lung cancer). The questions format included close-ended with true, false, and not sure options and multiple choice option to assess participants' knowledge about screening tests for different types of cancers Questions used in this section were adopted from the available literature and the American Cancer Society guidelines (American cancer Society, 2015). *iii)*. Sources of knowledge about cancer screening was also inquired using multiple option format as revealed from the pilot testing, included educational courses, providers in clinical wards, self-learning, media including TV, and

others including relatives diagnosed with cancers. *iv)*. Attitude towards cancer screening: five questions were used to assess the participants' attitude regarding cancer screening, their willingness to receive information about cancer screening, and their need to know and disseminate cancer screening knowledge.

Selected participants were personally approached and invited to participate following proper orientation about the objectives of the study, for undergraduates, each grade was assigned a date for data collection using lecture halls, for interns and residents those selected were reached out during their duty hours.

Pilot testing

The preliminary data collection sheet was tested on 50 students to assess the clarity and comprehension of the questions, and to assess the time needed for filling in the questionnaire. Some questions were modified to be clearer and others were deleted to avoid repetition. Following the pilot the data collection form was reduced to include 24 items with reliability coefficient (Cronback's alpha) of 0.641, 5 items were removed due to lack of responses with low reliability coefficient (r=0.442), the final form included inquires about breast cancer (n=6), cervical cancer (n=7), colo-rectal (n=4), ovarian cancer (n=2), prostate cancer (n=2), bladder cancer (n=2) and one for lung cancer. Also, inquiry about sources of knowledge for cancer screening was evolved during the pilot.

Data analysis

A total of 531 questionnaires were distributed, those responded were 501 (response rate 94.5%). Questionnaires with missing of two or more items were discarded (n=51), completed forms were revised for completeness and logical consistency. Pre-coded data were entered into the Statistical Package of Social Science (SPSS) version 21.0 (SPSS Inc. IBM, U.S.A.) to be statistically analyzed. Data were presented as frequencies and percentages for categorical data, Chi square test was used for comparison when appropriate. For quantitative variables, mean, median, standard deviation and interquartile range were used for expression; non-parametric tests (Mann Whitney and Kruskal Wallis) were used for comparison. The total knowledge score was computed (total of 24 questions), correct response assigned a score of 1 and incorrect or not sure scored nil. Similarly, the total attitude score was computed (total of 5 questions). The total knowledge score had a 25th of 7.0 points (out of 24), a median of 10.0 points, and 75th percentile of 11 or more points, those scored >10 points were assigned more knowledgeable. Logistic regression model was generated to determine the independent variables significant at the univariate level and responsible for the knowledge (score of >10) about cancer screening among the study sample. All statistical tests were considered statistically significant at P<0.05.

Ethical considerations

Informed consent was obtained directly from each student, house officer, and resident before enrolment and after explanation of the study objectives. All procedures for data collection were treated with confidentiality.

Results

The study included 450 participants, 300 undergraduates medical students (66.7%) and 150 postgraduates (interns and residents). The mean age of the participants was 22.69 ±1.28, with a minimum age of 20 years and a maximum age of 30 years. Males constituted 58.9% of the sample and those younger than 22 years of age constituted 47.1% (Table 1). Of the included sample 99 (22.0%) had previously received training / orientation about cancer screening during their enrollment at the medical school.

Knowledge about screening of different types of cancers

For the six items included to explore the knowledge about breast cancer screening, 20.2% of participants mentioned that mammography is the screening test shown to reduce breast cancer (BC) –related mortality, 70.7% failed to identify the age for breast BC screening, 62.4% correctly mentioned that breast cancer screening should begin at 25 years for patients with breast cancer genes (BRCA) positive, 91.9% falsely believed that breast self-examination and mammography are effective than mammography alone in reducing breast cancer mortality, 70.7% correctly identified that mammography and clinical breast examination are recommended for BC screening in women aged 40 to 49 years, 60.9% falsely believed that magnetic resonance imaging is the best cancer screening test for detecting early breast lesions (Table 2). Interns were significantly more knowledgeable concerning breast cancer screening compared to residents and under graduate students. The total knowledge score for breast cancer (out of 6 points) was 2.3±1.1 (median of 2.0), increased from 1.9±1.0 to 2.3±1.2 and 2.4±1.1 for 4th, 5th and 6th year respectively interns showed the highest score of 2.6 ±1.1 (median 3.0), P=0.001 (Figure 1).

Considering cervical cancer screening for the seven items included, 79.1% of participants incorrectly pointed out that sexually active women younger than 21 years should be screened for cervical cancer, while 70.7% correctly mentioned that screening may prevent CC in women aged 20-40 years. Nearly 34% knew that human

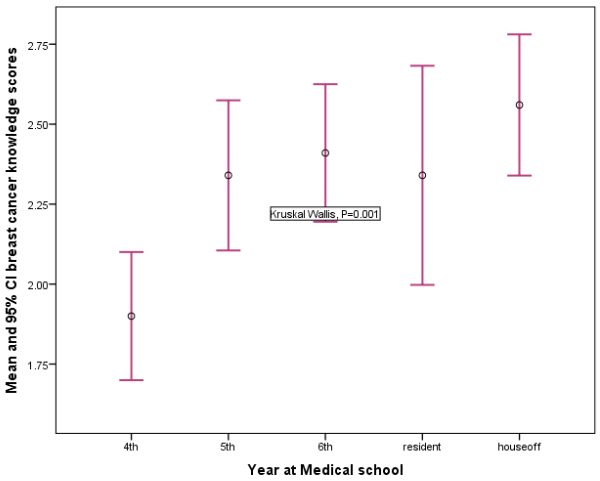

Figure 1. The Knowledge Score for Breast Cancer among the Included Participants, Undergraduate, Interns and Residents. Kasr Al Ainy Medical school, Cairo University, Egypt

Papilloma Virus (HPV) infection-induced cervical lesions regress without intervention and similar percentage agreed that Cytology alone is recommended for CC screening, 56.2% correctly knew the essential role of co-testing while screening for cervical cancer (cytology and HPV testing), 36.9% incorrectly mentioned that women who have received HPV vaccination should not be screened for cervical cancer, and 84.0% falsely believed that Pap smear is the best screening test for cervical cancer with high specificity. For the seven items included the total score was 2.8±1.4 (median of 3.0), without significant change in relation to the year of enrollment at medical school, male students scored significantly higher 2.9±1.4 (median=3.0) compared to females (2.6±1.3), P=0.012.

For colo-rectal cancer screening the responses towards the four items included showed that: only 9.6% correctly identified that persons with one first-degree relative affected with CRC should not be screened more frequently, 48.0% correctly knew that persons with one or more first-degree relatives with CRC should start screening at the age of 40, only 23.6% correctly identified that fecal DNA should be done every three years for those at risk of CRC, and 48.4% knew that the recommended method/test for colorectal cancer screening is colonoscopy. The mean score for CRC (out of four points) was 1.1±0.7 (median of 1.25), significantly higher among interns compared to other categories included (P=0.001).

For ovarian cancer screening, 59.3% agreed that Trans-vaginal ultrasonography and CA 125 testing are recommended, while only 14.0% correctly denied that screening the general population for ovarian cancer using CA125 is recommended, 94.4% falsely believed that prostate specific antigen (PSA) is the most specific test for prostate cancer screening, and 50.7% correctly identified the optimal age for employing PSA screening is 55-69 years, 34.7% of the participants correctly identified the false statement that adults in the general population should be screened for urinary bladder cancer, 73.6% mentioned incorrect tests with high sensitivity for screening urinary bladder cancer (Urine analysis, Urine Cytology and Tumor markers like carcinoembryonic antigen), and 75.3% correctly identified those targeted for lung cancer screening. The total knowledge score was (out of 24 points) 9.3±3.1 (median of 10.0), increased from 8 points for those at the 4th year to 9.7 points at the sixth year, interns were significantly more knowledgeable (P=0.001). Of the total sample, 35.8% scored > 10 points (out of 24), while 64.2% scored ≤10 points, significantly more among interns (P=0.013).

Mean knowledge score for the entire group was 9.3 ± 3.1. Males had higher knowledge score of 9.6 ±3.2 compared to females 8.9±2.7 (P= 0.006). In the same context, medical students and graduates stated receiving educational training, attained higher knowledge score (9.9±2.5, median of 10.0) compared to those who didn't receive training (9.1±3.2, median of 9.0) (P=0.002).

Table 1. Characteristics of Participants, Students and Graduates of Kasr Al Ainy Medical School, Cairo, Egypt.

Characteristics	No. (total =450)	Percent
- Sex:		
Male	265	58.9
Female	185	41.1
- Age group: (in years)		
20-<22	212	47.1
22-<24	207	46
24-<26	29	6.4
26 or more	2	0.5
- Class Year: (year of enrollment)		
Fourth	100	22.2
Fifth	100	22.2
Sixth	100	22.2
House officers (interns)	100	22.2
Residents	50	11.2
- Received educational training/orientation about cancer screening during their study:		
Yes	99	22
No	351	78
- Last year evaluation:		
Excellent	133	29.6
Very good	186	41.3
Good	112	24.9
Accepted	19	4.2

Predictors of knowledge

Logistic regression model employing cutoff of knowledge score as >10 points as being more knowledgeable (dependent) against the independent significant variables at the univariate analysis (Table 3) revealed that the year of enrollment at medical school is a significant positive predictor of acquiring knowledge about cancer screening (post graduate vs. undergraduate students) (Odds ratio, OR= 1.30, confidence intervals C.I =1.01-1.63), lack of or none receiving of orientation/ training about cancer screening is the sole negative significant predictor for proper knowledge about cancer screening (OR=0.50, C.I=0.31-0.82). Both low exam score evaluation at medical school and female gender were negatively associated with being knowledgeable about cancer screening but without significant difference.

Source of knowledge about cancer screening

Self-learning stood out as the most common source of acquiring knowledge among the study group (53.8%), followed by textbooks (43.1%), bedside teaching in 34.9%, providers in clinical wards by 32.4%, and 23.3%

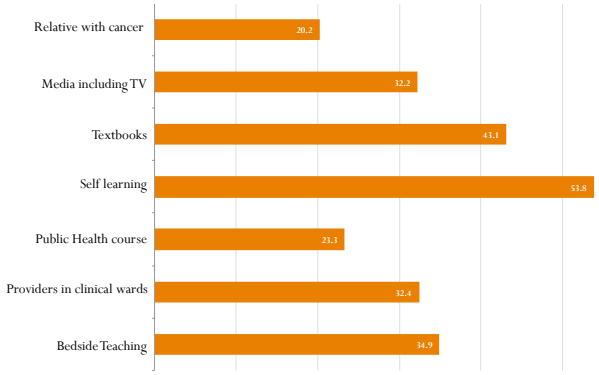

Figure 2. Sources of Knowledge (%) about Cancer Screening Stated by Medical Students and Graduates, Kasr Al Ainy Medical School, Cairo, Egypt (n=450)

Table 2. Percentage of correct responses about cancer screening by Kasr Al Ainy Medical students and graduates, Cairo University, Egypt (n=450)

Knowledge Items	Class Year: Correct responses (%)						
	Total (n=450)	Fourth (n=100)	Fifth (n=100)	Sixth (n=100)	Residents (n=50)	Interns (n=100)	P value*
1- Mammography is the screening test shown to reduce breast cancer (BC)–related mortality: (T)	20.2	22	25	21	18	18	0.379
2- BC screening should be offered at least biennially to women aged 50 to 74 years: (F)	29.3	21	30	22	22	26	0.001
3- BC screening should begin at 25 years for patients with breast cancer genes (BRCA) positive: (T)	62.4	56	60	71	68	60	0.195
4- Self- examination + mammography are effective than mammography alone in reducing mortality: (F)	8.9	5	14	5	4	14	0.02
5- Mammography and CBE are recommended for BC screening in women aged 40 to 49 years: (T)	70.7	69	65	77	74	70	0.419
6- Magnetic Resonance Imaging is the best cancer screening test for detecting early breast lesions: (F)	39.1	17	40	45	44	52	0.001
7- Sexually active women younger than 21 years should be screened for cervical cancer (CC) :(F)	20.9	19	23	23	22	18	0.862
8- Screening may prevent CC in women aged 20- 40 years: (T)	70.7	71	65	78	62	73	0.183
9- Human Papilloma Virus (HPV) infection- induced cervical lesions regress without intervention: (T)	34.2	27	34	40	50	28	0.026
10- Cytology alone is recommended for CC screening: (T)	34	32	31	42	41	28	0.212
11- Women aged 30 to 65 years should be screened for CC by cytology and HPV testing (co- testing): (T)	56.2	51	61	59	52	56	0.607
12- Women who have received HPV vaccination should not be screened for CC : (F)	63.1	58	58	67	56	73	0.085
13- Pap smear is the best screening test for CC with high specificity: (F)	16	7	15	20	12	24	0.013
14- Persons with one first- degree relative affected with CRC should be screened more frequently: (F)	9.6	7	10	11	12	9	0.844
15- Persons with one or more first- degree relatives with CRC should start screening at the age of 40: (T)	48	38	40	53	52	59	0.013
16- Fecal DNA should be done every three years for those at risk of CRC: (T)	23.6	31	29	15	22	20	0.049
17- The recommended method/test for colorectal cancer screening is: options (Colonoscopy)	48.4	38	55	44	50	56	0.056
18- For ovarian cancer; Trans- vaginal ultrasonography and CA 125 testing are recommended : (T)	59.3	37	55	70	64	73	0.001
19- Screening the general population for ovarian cancer using CA125 is recommended:(F)	14	11	4	19	18	20	0.005
20- Prostate Specific Antigen (PSA) is the most specific test for prostate cancer screening :(F)	5.6	9	18	11	12	26	0.007
21- The optimal age for employing PSA screening is 55- 69 years: (T)	50.7	53	44	51	48	56	0.512
22- Adults in the general population should be screened for urinary bladder cancer :(F)	34.7	29	30	28	42	48	0.01
23The most sensitive screening test for urinary bladder cancer is: options (None)	26.4	16	15	25	38	44	0.001
24- Lung cancer screening is recommended for: options (Smokers for more than 30 years)	75.3	73	76	75	74	78	0.94
Cronback's alpha of internal consistency: (24 items)	0.614						
Knowledge score: Mean± SD	9.3±3.1	8.0±2.9	9.0±2.8	9.7±3.0	9.6±3.3	10.5±2.9	
Median (IQR)	10 (7- 11)	8 (7- 10)	9 (7- 11)	10 (9- 12)	10 (8- 13)	10 (9- 12)	0.001**
Knowledge score (no.) ≤10 points	289	80	68	59	62	51	
>10 points	161	20	32	41	38	49	0.013

[T=true, F=False, CBE= clinical breast examination, CC=cervical cancer, CRC=colorectal cancer, CA 125=Cancer Antigen 125, SD= standard deviation, IQR=interquartile range, * Chi-square of independence, ** Kruskal Wallis test of significance]

mentioned the medical curricula (community medicine and others) as the source of their knowledge (Figure 2).

Attitudes about cancer screening

Over 92% of students agreed that they had insufficient knowledge about cancer screening, 81.6% were planning

Table 3. Logistic Regression Model for Predictors of Cancer Screening Knowledge among Medical Students and Graduates, Kasr Al Ainy school of Medicine, Cairo, Egypt

Independent variables	B coefficient	Wald	Odds ratio (95% Confidence Intervals)	P value
Gender (female)	-0.302	2.125	0.74(0.49-1.11)	0.144
Age: older age	0.112	0.874	1.20 (0.90-1.42)	0.35
Year of enrollment (advanced)	0.285	7.711	1.30 (1.01-1.63)	0.005
Students' evaluation; low	-0.231	3.701	0.80 (0.63-1.00)	0.054
Received educational/training about cancer screening: (none)	-0.692	7.626	0.50 (0.31-0.82)	0.006

Knowledgeable of more 10 points; % predicted= 63.3, Hosmer-lemeshow, Chi Square=15.97, P=0.033

Table 4. Attitude Towards Cancer Screening and their need for Training, Medical Students and Graduates, Kasr Al Ainy School of Medicine, Cairo University (N=450).

Attitude items	Responses (%)				
	Strongly agree	Agree	Neutral	Disagree	Strongly disagree
Willing to increase my knowledge about cancer screening	59.6	33.1	6.4	0.7	0.2
Planning to inform my friends/family about cancer screening and its benefits	40.7	40.9	15.3	2	1.1
I should have enough knowledge to direct patients, relatives and friends for cancer screening when needed	60.9	27.3	7.1	2.2	2.4
I should be aware of the current guidelines and recommendations for cancer screening	49.5	40	8.7	1.1	0.7
Staff members at the Faculty of Medicine should emphasize the importance of cancer screening along the delivered curriculum	61.3	32.4	4.7	0.7	0.9

to inform friends and family about the importance of cancer screening, 88.2% appraised the need of enough knowledge about cancer screening in order to direct/ advice patients, relatives and friends. 89.5% expressed their need to be aware about the current guidelines and recommendations for cancer screening, and 93.7% of participants required that the faculty should emphasize the importance of cancer screening along the delivered curricula at medical school (Table 4).

Discussion

The current study showed the lack of appropriate knowledge about early detection of different cancers among medical students; they expressed their scarce source for such knowledge especially during their early years of their enrollment and also their needs for fulfilling this gap through different modalities of training. Enhancing the competencies of future health care providers poses extremely crucial role for their career path, and community health. Thus the rationale behind selection of this study population was to assess the level of knowledge among medical students, house officers, and residents' about cancer screening aiming at defining the gap in their current knowledge which may be reflected on cancer yield in a developing country like Egypt. This study showed that cancer screening knowledge level among house officers was significantly higher than that of medical students and residents, which can be explained by being recently graduated and gaining increased academic exposure during the final year of medical education and followed by intense clinical patients' encountering. This was not the case among residents despite of their full exposure to clinical cases along their practical and training settings. Previous studies also stated that cancer prevention education is missing from curricula of many medical professional programs and that most medical students graduate without the fundamental skills needed to direct patients in cancer prevention and early detection (Applebaum et al., 2009; Nekhlyudov and Braddock, 2009).

Two studies included physicians in Israel at Rabin Medical Center in 2004, and among Malaysian medical students in 2013, revealed the existence of several deficits of their knowledge regarding colorectal cancer screening (Niv and Niv, 2004; Al-Naggar and Bobryshev, 2013). The current study denoted a significant increase in the mean knowledge score while transiting from fourth year to fifth and final year at the medical school, implied improvement of their knowledge status along the years of enrolment in the medical school. This can be partially explained with the clinical exposure to the most common forms of cancer during their clinical rotations (surgical specialties) that are coinciding during this final year at medical school with frequent exposure to screening guidelines for the encountered cases at the bedside teaching.

This was in agreement with the findings of the study conducted at University of Medicine and Dentistry of New Jersey, which illustrated a significant upgrading of medical students' knowledge regarding prostate cancer screening by class year (Marcella et al., 2007). In contrast, no difference was reported between the earlier years of medical school compared with the sixth and seventh years in a Mexican study 2010, and was explained by the fact that the cancer screening knowledge is acquired in the early medical school years, and in the last years, no further

tutoring in this topic is accentuated (Villarreal-Garza et al., 2010), this is not the case in Egypt as there is no early patients' encountering, and also the traditional curriculum is followed where there are almost scarcity of knowledge about cancer and its screening during the first three years of medical school.

In this study those who received previous training scored significantly higher mean knowledge score compared to those who didn't. This finding highlights the possible effect of the educational training about cancer screening in improving the knowledge level among future physicians. In a Mexican study 2010, it was reported that the mean knowledge scores on colorectal cancer increased directly with the level of training (Villarreal-Garza et al., 2010). Of the included Kasr Al Ainy students only 22.6% have reported receiving previous educational orientation concerning cancer screening, chiefly two department namely general surgery (10.7%), followed by Obstetrics-Gynecology (3.8%), while other departments had minimal educational/training inputs, which partially explains the relatively inadequate knowledge level concerning cancer screening among the study group. It could be argued that emphasizing the integration of cancer screening training guidelines to the corresponding specialties curricula would promote the knowledge level of health care providers (Cialdella et al., 2012). Various studies have revealed similar findings; in Kenya, healthcare providers were the principal source of information concerning cancer screening (Sudenga et al., 2013). In Nigeria, the major source of information about cervical smear was a hospital/health facility in Owerri (Owoeye and Ibrahim, 2013). Knowledge concerning screening of breast cancer was relatively high among all participants, and significantly increasing with their year of enrollment at medical school. Additional finding stemmed that correct response to three (out of 6 items) knowledge items was higher among house officers compared to their peers at different years of study and the difference was statistically significant. This could be explained by the emphasis on early detection of breast cancer as a national policy.

A similar finding was detected by a study carried out at the Aga Khan University Hospital including residents, consultants in addition to medical students. This revealed that the majority of participants had fairly good awareness regarding the risk factors, symptoms and role of mammography in detection of breast cancer (Kumar et al., 2009). The knowledge of our participants about cervical cancer screening showed no significant difference in relation to the year at medical school; rather males were significantly more knowledgeable than females. This finding might be explained by the assumed low prevalence of cervical cancer in Egypt, and consequently no emphasis on related knowledge items. Similar results were encountered in a Mexican study in 2010, where no difference was encountered between students and residents concerning cervical cancer (Villarreal-Garza et al., 2010). Pap smear test was wrongly recognized to be the best screening test for cervical cancer with high specificity, coupled with low knowledge level among students, compared to house officers. Similar results were encountered by another study conducted at the Niger Delta University, Nigeria. The study recruited all female staff, where Pap smear was the most known screening test in both staff and student (25.5% and 44.9%). This finding was explained by the fact that Pap smear test has been in existence for over 60years, unlike other cervical screening tests (Owoeye and Ibrahim, 2013). In this study, there was a significant gain of knowledge about colorectal cancer screening with the year of enrollment at the medical school. Almost 50% of the participants were aware that the recommended test for colorectal cancer screening is colonoscopy.

This might be explained by the fact that colorectal cancer is a prominent topic in the surgical programs learned by medical students at our institution. Consistent with these results, another study emphasized that among the screening modalities available for colorectal cancer, most students were aware that colonoscopy and fecal occult blood test were the recommended tests but fewer were aware of flexible sigmoidoscopy and double-contrast barium enema being screening options (Boehler et al., 2011). The previous notion was explained by the direct relation to the common use of colonoscopy and the relative infrequent use of the other modalities in the environment to which the students were exposed. This might suggest that observation of clinical practice is more influential in developing a knowledge base about screening practices than theoretical facts that both schools routinely discuss in the curricula (Boehler et al., 2011). The need for educational training/orientation about cancer screening was expressed by more than 90% of the participants as they agreed strongly or somewhat that they are willing to increase their knowledge regarding cancer screening. Nearly 82% of them agreed strongly or somewhat on their willing to inform their friends and family about cancer screening and its benefits. About 90 % agreed strongly or somewhat to the crucial role of awareness of the current guidelines and recommendations for cancer screening.

The same pattern was reported in Athens study 2012, where 78% agreed to subsequently inform their families and friends about the importance of CRC screening (Papanikolaou et al., 2012). In accordance with such results another study illustrated that nearly 90% of students agreed strongly or somewhat about the essential role of screening cancer prostate in improving patients' survival (Marcella et al., 2007). There is a compelling need for the integration of cancer screening guidelines in the medical students' curricula. An argument could be made to the goal of medical education with provision of basic fundamentals knowledge as a step for undergraduate students to build on during their postgraduate training, i.e., residency and fellowships. Many studies highlighted that a cancer education curriculum for medical students increased students' knowledge of and improved their attitudes toward cancer prevention (Hauer et al., 2008; Boehler et al., 2011). The Association of Preventive Medicine Teachers recommended curricular requirements in prevention to achieve the goal of making preventive medicine an integral part of the education, training and practice of physicians (Berg, 2008).

This cross-sectional study can be interpreted in the lights of the following limitations, first the structure of

the data collection being optioned with three choices in many places left the room for guessing, second, in this study, we tried to explore the level of knowledge, but cannot anticipate how this knowledge could actually impact their compliance.

In conclusion, this study revealed a relatively low to moderate level of knowledge about cancer screening among the selected medical students regardless of their year of enrollment at medical school or their graduation status. Such insufficient level of knowledge may implicate a negative impact on early cancer detection especially in a low resource country like Egypt and influence their upcoming role as healthcare providers.

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