

Fertility Preservation among Cancer Patients in Saudi Arabia: Knowledge and Attitudes of Medical Students

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Keywords

Medical students · Knowledge and attitudes ·
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Abstract

Introduction: Cancer education and informing people about cancer treatment and its sequel and their fertility can significantly lessen their health risk. **Objective:** The aim of the current study was to assess medical students' knowledge, attitudes, and understanding toward fertility preservation (FP) for cancer patients. **Methods:** This cross-sectional study was conducted among medical students at two universities in Riyadh. A questionnaire was developed based on different surveys and was adapted to our culture. It was composed of two parts:

sociodemographic data and questions assessing students' knowledge and attitudes regarding FP. The second section discussed factors that could influence the utilization of FP services. It was composed of 5 questions, 4-point Likert scale (greatly, usually, rarely, never) scored from 1 for never to 4 for greatly. **Results:** Students, particularly females, were more knowledgeable about different FP methods, such as Gonadotrophin releasing hormones, sperm cryopreservation, and oocyte cryopreservation. They stated that cost, lack of information, and access to FP services are the most common factors hindering the utilization of services. They expressed a good attitude toward FP; however, nearly half of them mentioned that cancer treatment should be started first before FP. **Conclusion:** This study demonstrated the respectable awareness and attitude of FP among Saudi

medical students. However, some gaps are present, indicating the need to improve education about FP in the medical curriculum.

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Introduction

Global Cancer Statistics mentioned that there are 19.3 million new instances of cancer worldwide in 2020. Long-term predictions show that, by 2030, there would be a 1.8-fold rise in cancer incidence [1]. According to data from the Saudi Cancer Registry in 2018, the prevalence of cancer among the Saudi Arabia population had been reported to be increasing in both males and females [2]. Despite advancements in chemotherapy drugs that are more effective, their toxicity to reproductive organs results in long-term fertility consequences that are frequently irreversible, such as infertility and sterility, which affect patients' quality of life. Ideal conditions for cancer treatment include early identification, efficient therapy, and rapid posttreatment care. One of the negative consequences of successful cancer treatment is impaired fertility [3]. Cancer patients' future quality of life is impacted if they are diagnosed before or during their reproductive years [4–6]. Reproductive endocrinology fertility cryopreservation technologies give hope to cancer survivors for life following cancer treatments [7]. In 2011, a study by Arafat et al. [8] identified several knowledge gaps and poor attitudes and practices of oncologists in Saudi Arabia toward fertility preservation (FP) in cancer patients. Recently, we re-assessed their knowledge and attitudes after 12 years after the first study following the recent Fatwa from The Council of Senior Religious Scientists which permitted the freezing of tissues from the ovarian membrane, the entire ovary, and the eggs for future use in reproduction to preserve the offspring, 4 years ago. To successfully implement cancer education curricula for medical students, linked to FP, it is necessary to identify any gaps and other obstacles which could be overcome through medical education to enhance their future clinical practices.

Cancer education and informing people about cancer treatment and its sequelae and fertility can significantly lessen health risks. An understanding of cancer complications can make people better able to care and support those with the disease, as well as help them diminish risks to possibly prevent cancer. To the best of our knowledge, there are no studies in our region addressed such a new topic, therefore, the current study was carried out to

assess medical students' attitudes and understanding concerning FP for cancer patients to identify the gaps in their knowledge and perceptions.

Material and Methods

The present cross-sectional study was conducted among medical students in their final years from two universities in Riyadh: one governmental (King Saud University) and one private (King Faisal University). Students from the two universities were invited to participate in the study. The questionnaire was developed from different surveys and adapted to our culture. The data were collected through a personal interview and online (Google form). It was tested through a pilot study on 15 students; the Chronback's alpha was 69%.

The survey: The first part of the survey was about socio-demographic data; gender, marital status, and grade (fourth and fifth year). The second part was assessing students' Knowledge and attitude regarding FP. Knowledge questions were composed of 2 sections; the first was about familiarity with the different types of FP options for males and females (Yes/No responses), awareness of the sided effects (Yes/No responses), and knowledge about the availability of centers providing FP services in Saudi Arabia (Yes/No responses), where yes attained 1 and no attained 0. The second section discussed the factors that could influence the usage of FP services. It was composed of 5 questions, 4-point Likert scale (greatly, usually, rarely, never) scored from 1 for never to 4 for greatly, they were summed up to calculate the total knowledge score, the minimum was 0 and the maximum score was 29. The student's attitude was covered by four questions, and 4-point Likert scale. They discussed their perception of the importance, extent of success, and priority of initiation of FP. The final question was addressed who is mainly responsible for post-cancer treatment fertility.

Statistical Analysis

The frequencies for categorical variables were summarized: the mean and standard deviation. The associations between categorical variables resulting from yes/no responses were evaluated using χ^2 tests of independence. Using the independent samples *t* test, attitude, and knowledge questions with responses on a 4-point Likert scale were compared. The means of these scores indicate the knowledge and attitude of the population studied. Multiple regression was employed to detect the most significant predictors of students' knowledge and attitude scores. All analyses were carried out using SPSS version 23. *p* values of less than 0.05 were considered to indicate statistical significance.

Results

Out of 430 students contacted; 320 responded and returned their survey, those who completed their questionnaire were 308 students (71%). Their age ranged from 20 to 27 years (the mean 23.1 + 1.1). Nearly all of them (97.4%) were unmarried, and females constituted more than half (52.9%) of our sample.

Table 1. Distribution of knowledge and perception statements among medical students

Statement	Number	%		
Are you familiar with the following FP options				
Embryo cryopreservation (yes)	151	49		
Ovarian tissue cryopreservation (yes)	91	29.5		
Oocyte cryopreservation (yes)	207	67.2		
Ovarian transposition (yes)	109	35.4		
GnRH (yes)	271	88		
Sperm cryopreservation (yes)	225	73.1		
Testicular tissue cryopreservation (yes)	75	24.4		
Are you aware of the side effects of cancer treatment on fertility?				
Yes	242	78.6		
No	78	24.4		
Availability of FP services in your country				
Yes	142	46.1		
No	166	53.9		
		Greatly, n (%)	Usually, n (%)	
		Rarely, n (%)	Never, n (%)	
Factors that could influence the utilization of FP services				
Increased risk of recurrence in the future	46 (14.9)	188 (61)	66 (21.4)	8 (2.6)
Lack of access to FP services	134 (43.5)	138 (44.8)	34 (11)	2 (0.6)
Lack of information on FP options	192 (62.3)	86 (27.9)	25 (8.1)	5 (1.6)
Cost of FP options	207 (67.2)	86 (27.9)	13 (4.2)	2 (0.6)
Disappointment of treatment results	64 (20.8)	144 (46.8)	95 (30.8)	5 (1.6)

The highest attained total knowledge score was 24, with a mean of 16.7 + 3.18 (66.9%). Female students were significantly more knowledgeable than males, where their mean total knowledge score was 16.5 + 3.2, in comparison to that of male students, 15.5 + 2.2, $t = 2.9$, and $p = 0.003$. No significant association was detected between knowledge score and marital status, grade, and age ($p > 0.05$).

Table 1 illustrates the distribution of knowledge statements and the perception of medical students toward FP. The majority (78.6%) have a good knowledge about the side effects of cancer treatment on fertility, however, less than half (46%) know about the availability of FP services in their states. Most of them were aware of FP options like Gonadotrophin-releasing hormones (GnRH), and sperm cryopreservation (88% and 73%, respectively), and to a less extent with oocyte cryopreservation (67.2%). However, their knowledge about testicular tissue cryopreservation, ovarian tissue cryopreservation, and ovarian transposition was poor (24.4%, 29.4%, and 35.4%, respectively). Students mentioned that the cost of FP, shortage of information, and lack of access to FP services, in order, are the greatest significant factors that could impact the utilization of FP services among cancer patients.

The mean of the total attitude score was 8 ± 1.8 (72.7%). Table 2 displayed the different attitude statements, where students expressed a positive and very good attitude toward FP. They perceived the importance of FP and used one of its options as greatly and usually as 92.8% and 92% for both statements, respectively. Nearly 69% believed that FP is usually successful, while only 1% and 15.6% mentioned that FP never or rarely succeeds.

Only less than one-fourth (24.4%) stated that FP should be started before cancer treatment, and less than half (49%) mentioned that cancer treatment should be started first. One-fourth of the students believed that fate is responsible for the management and treatment of infertility of cancer patients after treatment, 56% mentioned that physicians should be responsible for the whole process, while 18.5% cited that patients and their families should take care of that responsibilities. Using total knowledge and total attitude scores as the dependent variables, multiple regression analysis displayed that gender was a significant predictor for students' knowledge and attitude toward FP in addition to age for the attitude model, Table 3.

Table 2. Distribution of students' attitude statements

Statement	Greatly, <i>n</i> (%)	Usually, <i>n</i> (%)	Rarely, <i>n</i> (%)	Never, <i>n</i> (%)
How important is preserving fertility in cancer patients?	196 (63.6)	90 (29.2)	19 (6.2)	3 (1)
How important is using fertility options in cancer patients?	187 (60.7)	96 (31.2)	21 (6.8)	4 (1.3)
To what extent is the success of FP	45 (14.6)	212 (68.8)	48 (15.6)	3 (1)
Which one has more priority: cancer treatment or starting FP?				
FP	75 (24.4)			
Cancer treatment	151 (49)			
No idea	82 (26.6)			

Table 3. Multiple regression analysis results for the knowledge and attitude scores

	Standardized coefficients Beta	<i>t</i>	<i>p</i>
Total knowledge score			
Gender	0.18	3.1	0.002
Age	0.09	1.4	0.13
Marital status	0.1	1.8	0.06
Grade	0.02	0.34	0.72
Total attitude score			
Gender	0.149	2.636	0.009
Age	0.147	2.178	0.030
Marital status	-0.076	-1.357	0.176
Grade	-0.108	-1.598	0.111

$R^2 = 45\%$ and 43% for both models, respectively.

Discussion

Due to cultural and societal restrictions, we focused our study on medical FP and not on elective FP. The progression of FP technology has been effective at permitting patients who have experienced gonadotoxic treatment to have families.

Medical students in the current study have a good knowledge of FP services, in comparison to other studies conducted in the Western population. Most of our medical students are aware of the disadvantages of cancer therapy on patients' fertility; yet, less than half know about the availability of FP services in their regions. GnRH and sperm cryopreservation were the most common methods they recognized for FP. Other methods, like testicular tissue cryopreservation, ovarian tissue cryopreservation, and ovarian transposition, were not familiar with.

Cross-sectional studies have been carried out to evaluate college students' comprehension of fertility in Canada [9], Serbia [10], the USA [11], and China [12]; they indicated a shortage and inadequate knowledge about FP. On the other

hand, the overall perception and attitudes of obstetrics and gynecology residents in the Philippine study on FP were encouraging. They were most knowledgeable about the usage of GnRH agonists (80.42%), fertility-sparing surgery (83.22%), and oocyte freezing (84.62%) as FP methods. However, most referrals from the respondents were for GnRH agonist use (48.25%) and fertility-saving procedures (48.95%) [13]. Residents from the study of American Council for Graduate (ACOG) Medical Education were more likely to back oocyte cryopreservation in cancer patients regardless of the woman's age [14]. Such results reflect the information and exposure that may have been acquired during the clinical OB-GYN module in the fifth year of study and indicate that timely and suitable instruction may have improved the medical students' awareness of FP.

One of the important findings of the current study is about the beliefs of the medical students regarding factors that could affect the utilization of FP services; where they expressed that cost, shortage of information, and deficient access to FP services are the main factors that could Obstacle FP services. Although there has been an increase in interest in FP over the past 10 years, there are still many obstacles standing in the way of fair access to these services, including exorbitant costs, worries about treatment delays, a lack of provider knowledge of available resources, and patient eligibility. The biggest obstacle to trying to preserve fertility is still the cost [3]. Offering insurance protection for FP also shows a dedication to decreasing health inequalities and raising the use of FP services.

There is a dearth of research on the alternatives and sources for FP services for cancer patients [15–18]. Lack of correct referral to a reproductive specialist and appropriate counseling is particularly troublesome since life-saving cancer treatment must be started right once, and if proper referrals are not made, the chance of future reproduction may be lost. Even though there are impediments, numerous studies have failed to prove how they affect the usage of FP services [19, 20].

Even if there is a lesser likelihood of future conception, FP should still be investigated as early as possible before treatment in older female cancer patients because of the diminished reproductive capability associated with advanced maternal age. The patient should make an informed choice regarding whether to pursue FP. All women of reproductive age should receive proper counseling on FP alternatives, even though FP is not advised if it is useless [21].

The perception and attitudes of medical students in our study toward FP are highly positive and inordinate, they recognized the importance, utilizing of FP options in cancer patients, and its success to a great extent. However, half of them believe that cancer treatment has the priority to be started before FP. The study of Mc Carter K, which examined how cancer patients used FP services, found that 77% of referrals took place before the start of cancer-specific therapy. 19% of referrals came after the first round of therapy, and 3% came while the patient was still receiving therapy [21]. According to the American Society of Clinical Oncology recommendations, before beginning cancer treatment, oncologists should discuss the possibility of infertility with patients who are still fertile. They should also be ready to talk about potential FP options or refer suitable and interested patients to reproductive specialists [3].

Gender, particularly females, was a significant predictor of student's knowledge and attitude. Perhaps, females at this age are more concerned with childbearing, they think more about having children and creating a family in the future. The findings of Armuand et al. [20] demonstrate significant sex differences in the receipt of information about fertility and the use of FP, where the male sex was an independent predictive indicator for learning about FP. It is imperative to create fertility-related information tailored to female cancer patients to increase their opportunity to take part in informed decisions about their treatment and potential future offspring. In a German study, female and nonmedical degree program students were more likely to plan to have children sooner than male or medical degree program students. An overall better understanding of women's fertility was linked to female sex or medical degree programs [22]. Most students were aware of the basics of oocyte freezing but would not use it. However, compared to their peers in similar circumstances in other Western countries, young female students in Italy are much less aware of the age-related loss in fertility and the potential of using social egg freezing [23].

The knowledge and attitudes of medical students in our community are promising and encouraging; however, certain gaps are present, such as that related to the re-

sponsibility of FP in cancer patients, and the timing to start FP. It was believed by 25% of the students that fate is responsible for FP in cancer patients, and only 55% believed that physicians are responsible for that subject. Previous research has indicated that even brief FP education programs for house staff and medical students may be beneficial [11].

The most appropriate way for increasing cancer awareness is through cancer education, and spreading information about cancer prevention. This can be done through different way; education sessions, and continuous medical education programs, for medical students, oncologists, and nurses dealing with cancer patients for whom their fertility will be affected with cancer treatment. Such education programs will enhance their knowledge and improve their practice, they should be aware about the availability of FP services in the governmental and private centers, cost, timing, and different procedures.

Conclusions

The improvement of public education on this subject and understanding of fertility issues should be included in the undergraduate medical curriculum as well, as insufficient knowledge about this topic would have a great inference on students' careers.

Limitations

First, our study included 2 universities, one governmental, and one private; more universities should be included to describe the different diversity of medical students. Second, inability is to characterize nonrespondents. Third, we did not expressly inquire about the students' educational backgrounds, which would have impacted their understanding.

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Statement of Ethics

Ethical Review Board: approval was granted by the Ethics Committee of both the College of Medicine at King Saud University (No: 23/0290/IRB) and the Research Advisory Council of King Faisal Specialist Hospital and Research Centre at King Faisal University (No: RAC# 2221107), Riyadh, Saudi Arabia. This research is compliant with the guidelines of human studies and was conducted ethically in

accordance with the World Medical Association Declaration of Helsinki. An electronically signed consent form was obtained from participants prior to participating in the study.

Conflict of Interest Statement

The authors have no relevant financial or non-financial interests to disclose.

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Author Contributions

K.H.F., M.A.A., and D.M.R.: design, analysis, and interpretation of data; D.K.A., S.H.B., S.M.A., A.A.B., and M.A.A.: data collection; K.H.F. and M.A.A., M.M.A.: drafting and/or critical revision of important scientific content; all authors approved the version to be published.

Data Availability Statement

Research data are not publicly available on legal or ethical. However, it is available from the correspondence author upon reasonable request.