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Research Article

ONCOFERTILITY CHALLENGES IN SAUDI ARABIA: ETHICAL AND RELIGIOUS IMPLICATIONS

***Isamme N. AlFayyad**

King Saud Bin Abdul-Aziz University of Health Sciences, Saudi Arabia

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ABSTRACT

Background: ‘Oncofertility’’ was introduced to describe a new subspecialty focused on the reproductive future for cancer survivors, who may face infertility. However, preservation of fertility using advanced technology and assisted reproductive technology like sperm banks has brought ethical and religious challenges.
Material and Methods: A multicenter, cross-sectional study was conducted in six major hospitals in Saudi Arabia. **Results**: The total number of the participant was 105, the majority of the physicians (80%) reported sperm banking is important to cancer patients, and 80% agreed that cancer patients are burdened with psychological consequences as a result of infertility. Interestingly, the majority of the physicians (81%) reported dissatisfactory referral rate for sperm banking, nationality (Beta = 0.223, $p < 0.014$) and profession (Beta = 0.068, $p < 0.05$) were significantly independent predictors of the physicians satisfaction.
Recommendations: It is imperative to preserve the fertility of male cancer patient, as it considered a natural right.

INTRODUCTION

Cancer is the leading cause of death in economically developed countries, and it is considered the second leading cause of death in developing countries (Jemal *et al*., 2011). Effective Cancer treatments have led to an increase in the number of cancer survivors (Redig *et al*., 2011). The goal of treatment is to ‘‘cure’’ cancer or to prolong survival in patients with advanced disease, while preserving the highest possible quality of life in both the long and short term (Amanda *et al*., 2012). The presence of cancer and its treatment modalities (chemotherapy, surgery, and radiotherapy) have the potential to affect patient’s reproductive capacity by impairing spermatogenesis, damaging sperm DNA, and causing erectile or ejaculatory dysfunction (Agarwal *et al*., 2014). Surveys of cancer survivors show that the majority are interested in having children, especially if they were childless at the time of cancer diagnosis (Diedrich *et al*., 2011). For patients, a cancer diagnosis is often devastating and overwhelming, and the immediate focus turns typically into therapy and cure of the underlying disease process (Brannigan *et al*., 2007). Furthermore, Male cancer survivors can be burdened with emotional, social, and psychological consequences as a result of infertility (Murphy *et al*., 2013).

****Corresponding author: Isamme N. AlFayyad,***
King Saud Bin Abdul-Aziz University of Health Sciences, Saudi Arabia.

Given the possibility that cancer patients might be faced with impaired fertility or sterility in the future, what options do they have for future child birth and or parenting? The American Society of Clinical Oncology (ASCO) and the American Society for Reproductive Medicine (ASRM) recommend that physicians should discuss the risks of infertility with all cancer patients of reproductive age (Knapp and Quinn, 2010), and inform them about options for fertility preservation at the time of diagnosis (Shah *et al*., 2011). Furthermore, in 2006, the term ‘‘Oncofertility’’ was introduced to describe a new subspecialty that is focused on the reproductive future for cancer survivors, who may face infertility as a result of chemotherapy, radiation, or surgery (Waimey *et al*., 2013). Oncofertility is also an interdisciplinary field that bridges biomedical and social sciences and examines issues that are related to an individual’s fertility concerns, options and choices, in light of cancer diagnosis, treatment, and survivorship (Snyder *et al*., 2006). Preservation of fertility, using advanced technology and assisted reproductive technology like sperm banks, has brought ethical and religious challenges to the fore. Although Islam has encouraged procreation, family formation, and childbirth through natural conception within the frame of marriage (12), Islamic regulations seem to be positively ambivalent toward fertility preservation. On one hand, the permissibility of assisted reproductive technology is grounded in therapeutic goals and sperm banking in itself entails no infringement of the

regulations. On the other hand, Islam takes into account the rigor of protecting and accommodating the progeny and the sanctity of the family's genetic lineage. The cautioned concerns of Islamic scholars and jurists are that the sperm is a property of the patient and should be transferred only to the legal wife of that patient. Their fears are, therefore, related to the perceived risk that sperm samples may mix, and this is great danger in Islamic societies. It is worth questioning the moral position of cancer-treating physicians toward the inherent ethical dilemmas in fertility preservation. Moreover, the need to clarify the attitudes of Muslim oncologists toward sperm banking is necessary, whether they are guided by a legal scholarship or their identity as Muslim physicians do impact their decision.

To the best of my knowledge, a little research, if any, has been conducted to study the ethics of fertility preservation among adult male cancer patients in Saudi Arabia. The aim of this study is to explore the ethical and religious challenges in fertility preservation and sperm banking for adult male cancer patients in Saudi Arabia, through the following:

- To assess the knowledge, attitudes and practice of fertility preservation amongst oncologists, hematologists, radiation oncologists and surgical oncologists.
- To identify the barriers of offering sperm banking for fertility preservation.
- To assess the normative thinking and reflection on the inherent ethical dilemmas in fertility preservation.
- To offer normative analysis for ethical dilemmas in fertility preservation.

Study design: A multicenter cross-sectional study.

Study setting: The Study was conducted in three regions in Saudi Arabia, namely: the Central, the Western and the Eastern region, and included six major hospitals.

Study population: The study involved all physicians who are treating cancer patients, participants were hematologists, medical oncologists, radiation oncologists, surgical oncologists and others, including physicians who are in residency rotation. Sampling technique: by using purposive sampling technique, all eligible physicians, who are treating cancer patients, were targeted.

Data collection methods, instruments used, and measurements: A self-administered questionnaire was used to collect the data. The questionnaire was developed after in-depth literature review. Before the main fieldwork, pilot test study was conducted.

The questions addressed the following: Socio-demographic characteristics of the participants. Both the attitudes of the treating physicians toward sperm banking for fertility preservation, and the impact of patients' psychosocial and religious beliefs and experience on fertility preservation and sperm banking was assessed using the Likert 5-points scale; "1 point" were assigned to strongly agree, "2 points" for agree, "3 points" for neutral, "4 points" for disagree and "5 points" to strongly disagree. Physicians' attitudes were considered positive if the physician score was equal and/or below the mean of the total attitudes score, otherwise considered negative. Physicians' opinions were considered satisfactory if the physician score was equal and/or below the mean of the total opinions score, otherwise considered unsatisfactory. For each physician, the total score was summed, and percent score was calculated.

- Physicians' ethical perception and reflection regarding fertility preservation were assessed, these questions were answered by "Yes," "No," and "I do not know." A "Yes" answer was given 1 point, "No" answer was given 2 points. However, three negative questions were used, the scoring of the negative questions were reversed so that a positively oriented scoring is obtained.
- Physicians' knowledge about fertility preservation was assessed by using 7 questions that were answered by "Yes." "No," and "I do not know." A "Yes" answer was given 1 point, 2 points were given to "No" answers and 3 points was given to "I do not know" answers.
- Factors that play a significant role and influence physician's decision making in discussing and offering the option of sperm banking, these factors assessed by using 11 statements that were answered by (Yes: 1 point), (No: 2 points) and (I do not know: 3 points). Answering "Yes" means those factors are negative because these factors considered as a barrier in offering the option of sperm banking. The factor considered a positive determinant if the physician score was equal and/or above the mean of the factors score, otherwise considered a negative determinant factor.
- Physicians' practice and fertility preservation assessed by using five questions that were answered by "Yes." "No," and "I do not know." A "Yes" answer was given 1 point, 2 points were given to "No" answers and 3 points were given to "I do not know" answers. A satisfaction question was included to assess physician satisfaction about their referral rate for sperm banking.

Ethical considerations: Participants were assured that their identity will not be identified, and all information's are kept confidential. The study was granted ethical approval from Institutional Review Boards (IRB) from the study areas.

Data analysis

SPSS software (IBM SPSS statistics 20.Ink) was used for data analysis. The $\chi 2$ test was used to test significance to compare categorical data; student's t-test was used to test differences between two means, ANOVA test was used to test the difference between more than two means. Multiple regression analysis was used to determine significant predictors of the physicians' characteristics. The choice of the variables was based on the results of univariate analysis. For all statistical analysis, a $p \leq 0.05$ was considered significant.

RESULTS

A total of 105 physicians participated in the study (81% male physicians). Physicians mean age was 3.72±1.22; (mean male age: 3.82±1.236, mean female age: 3.22±1.060) with no statistically significant gender difference ($\chi^2 = 6.598$ p= 0.252). More than one-third (36.2%) of the physicians were medical oncologists, and more than one-quarter (27.6%) were hematologists.

Table 1. Distribution of the study sample by physicians characteristics

	Male (n=85, 81%)		Female (n=20, 19%)		Total (n=105, 100%)		Statistical significant
	n	%	n	%	n	%	
Age group							
Less than 25	2	2.4	0	0	2	1.9	
25 - 30	13	15.3	5	27.8	18	17.5	
31 - 35	17	20	7	38.9	24	23.3	
36 - 40	24	28.2	3	16.7	27	26.2	$\chi^2 = 6.598$ p= 0.252
46 - 50	24	28.2	3	16.7	27	26.2	
More than 50	5	5.9	0	0	5	4.9	
	3.82±1.23		3.22±1.06		3.72±1.22		
Profession							
Hematology	23	27.1	6	30	29	27.6	
Medical Oncology	31	36.5	7	35	38	36.2	
Radiation Oncology	15	17.6	4	20	19	18.1	$\chi^2 = 0.483$ p= 0.975
Surgical	8	9.4	2	10	10	9.5	
Others	8	9.4	1	5	9	8.6	
Years of Experience							
1 - 5 years	20	23.5	11	55	31	29.5	
6 - 10 years	28	32.9	4	20	32	30.5	
11 - 15 years	22	25.9	3	15	25	23.8	
16 - 20 years	12	14.1	2	10	14	13.3	$\chi^2 = 8.038$ p= 0.090
> 20 years	3	3.5	0	0	3	2.9	
Years of Experience	20	23.5	11	55	31	29.5	
	2.41±1.11		1.80±1.06		2.30±1.12		
Nationality of Participant							
Saudi	43	50.6	13	65	56	53.3	$\chi^2 = 1.351$ p= 0.245
Non-Saudi	42	49.4	7	35	49	46.7	

Table 2. Physicians' attitudes and opinions toward sperm banking

Statement	Responses, n (%)				
	Strongly Agree	Agree	Neutral	Disagree	Strongly Disagree
A. Physicians' attitudes toward sperm banking:					
1. Male patients undergoing cancer treatment with the risk of infertility as a side effect should be offered sperm banking.	43 (41)	43 (41)	15 (14.3)	4 (3.8)	0 (0)
2. Patients of advanced/Terminal stages should be offered the option of sperm banking.	8 (7.6)	9 (8.6)	28 (26.6)	36 (34.3)	24 (22.9)
3. Sperm banking service is important to cancer patients.	36 (35)	47 (45.6)	18 (17.5)	2 (1.9)	0 (0)
4. Cancer patients who have children (at least one child) should be offered sperm banking.	15 (14.3)	37 (35.2)	15 (14.3)	33 (31.4)	5 (4.8)
5. It is preferable for a cancer survivor who has undergone cancer treatment to use banked sperm instead of trying to conceive 6-12 months after cancer treatment.	14 (13.3)	42 (40)	37 (35.2)	7 (6.7)	5 (4.8)
•% mean score± (standard deviation): 12.53±3.35					
B.Physicians' opinions responses toward patients' psychosocial and religious beliefs on fertility preservation:					
1. Cancer patients are burdened with emotional, social and psychological consequences as a result of infertility.	23 (21.9)	61 (58.1)	13 (12.4)	8 (7.6)	0 (0)
2.The process of sperm collection for banking could negatively affect the patient's decision for sperm banking.*	6 (5.7)	51 (48.6)	24 (22.9)	22 (21)	2 (1.9)
3. Cancer patients see infertility as a test of faith or God's will, which might affect their decision for sperm banking.*	3 (2.9)	49 (46.7)	30 (28.6)	22 (21)	1 (1)
4. Infertility carries a socially devalued status (stigma, spoiled male identity) amongst cancer patients.	7 (6.7)	39 (37.1)	42 (40)	17 (16.2)	0 (0)
5. Sperm banking causes moral panic for the public, because it is challenging their cultural and religious beliefs.*	8 (6.6)	40 (38.1)	32 (30.5)	24 (22.9)	1 (1)
•% mean score± (standard deviation): 12.78±3.35					

*Score was calculated as a negative statement

The highest response (30.5%) was among physicians with years of experience range of 6-10 years, and 29.5% was among physicians with years of experience range 1-5 years. There was a significant difference in years of experience between genders (t = 2.245, p = 0.027). (Table. 1) About 53.3% of the physicians were Saudi's. The majority of the hematologists and radiation oncologists were non-Saudi 17% and 11% respectively while the majority of medical oncologists and surgical oncologists were Saudis, 21.9% and 6.7% respectively, with statistically significant differences between the nationalities ($\chi^2 = 11.32$ p= 0.023). (Table. 1) Physicians' attitudes toward sperm banking: The mean of the total attitudes score was calculated (12.53±3.35) out of 21. About 64% reported positive attitudes. Amongst the physicians, the majority (80%) reported that sperm banking is important to cancer patients, and 82% agreed that male cancer patients should be offered the option of sperm banking for fertility preservation. However, 31% of the physicians did not agree to offer sperm banking for patients who have children. (Table. 2)

Table 3. Physicians ethical perception regarding Fertility Preservation

Statement	Responses, n (%)		
	Yes	No	Don't know
1.Is fertility preservation in the best interest of the cancer patients	76 (72.4)	16 (15.2)	13 (12.4)
2.Is fertility preservation in the best interest of the future children?	44 (41.9)	42 (40)	19 (18.1)
3.Is sperm banking a Positive right?	71 (68.3)	10 (9.6)	23 (22.1)
4.Is sperm banking a Negative right?	39 (37.1)	52 (49.5)	14 (13.3)
5.Do you trust the technology of Sperm banking in controlling the samples from mixing?	49 (46.7)	29 (27.6)	27 (25.7)
6.Do you trust in the capacity and competency of staff working in sperm banking facilities?	31 (29.8)	48 (45)	25 (24)
7.Is it the patient's right to be informed about sperm banking in order to make his own choice?	104 (99)	0 (0)	1 (1)
8.Is withholding the option of sperm banking considered maleficence (Harm to the patient)?	49 (46.7)	41 (39)	15 (14.3)
9.Is it ethically reasonable to enable reproduction for individuals whose lifespan may be reduced by illness?	38 (36.2)	41 (39)	26 (24.8)
10. Is Procreation (and assistance to procreation) morally acceptable only when the future child will have a reasonably happy life?*	53 (51)	24 (23.1)	27 (26)
11. Do you see that cancer patient cannot knowingly and intentionally bring a child into the world in less than ideal circumstances?*	45 (43.3)	42 (40.4)	17 (16.3)
12. Is it up to the treating physician whether to recommend fertility preservation or not by weighing up the risks and benefits?	57 (54.8)	47 (45.2)	0 (0)
13. Is offering fertility preservation a kind of oncologist's duty to repair what is damaged by cancer treatment?*	58 (55.2)	44 (41.9)	3 (2.9)

* Score was calculated as a negative statement

Table 4. Physicians response about their knowledge regarding fertility preservation

Statement	Responses, n (%)		
	Yes	No	Don't know
1.Are specialist facilities for sperm banking available for your patients?	48 (45.7)	39 (37.1)	18 (17.1)
2.Are specialist facilities for sperm banking accessible for your patients?	41 (40.6)	42 (41.6)	18 (17.8)
3.Have you received courses or training regarding fertility preservation?	8 (7.6)	94 (91.4)	1 (1)
4.Are you aware of the American Society of Clinical Oncology Clinical Practice Guidelines for Fertility preservation?	38 (36.2)	64 (61)	3 (2.9)
5.Do you know that "Oncofertility" is a new subspecialty concerned with fertility preservation for cancer patients?	25 (23.8)	73 (69.5)	7 (6.7)
6.Has your facility ever been involved in providing training (e.g. Seminar and grand rounds) to oncology professionals in male fertility preservation?	8 (7.6)	89 (84.8)	8 (7.6)
7.Is educational material about fertility preservation available for your patients?	4 (3.8)	87 (83.7)	13 (12.5)

Table 5. Physicians' responses to the determinant factors that play a major role in offering the option of sperm banking

Statement	Responses, n (%)		
	Yes	No	Don't know
1. Age	98 (93.3)	7 (6.7)	0 (0)
2. Religion	58 (55.2)	41 (39)	6 (5.7)
3. Life span/Survival Rate	91 (86.7)	10 (9.5)	4 (3.8)
4. Number of Children	83 (79)	31 (20)	1 (1)
5. Marital Status	80 (76.2)	24 (22.9)	1 (1)
6. Availability of the service	95 (90.5)	9 (8.5)	1 (1)
7. Financial Status	26 (24.8)	73 (69.5)	5 (4.8)
8. Urgency to Commence cancer Treatment	88 (83.3)	15 (14.3)	2 (1.9)
9. Personal Discomfort	63 (60)	36 (34.3)	6 (5.7)
10. Disease progress (Stage)	89 (84.8)	12 (11.4)	4 (3.8)
11. Societal Perspective of sperm banking	58 (55.2)	34 (32.4)	13 (12.4)

Physicians' opinions toward sperm banking: The mean of the total physicians opinions score was calculated (12.78±3.35) out of 18. About 62% reported satisfactory opinions. The results showed that 80% of the physicians agreed that cancer patients are burdened with emotional, social and psychological consequences as a result of infertility. About 54% see that the process of sperm collection for banking could negatively affect the patient's decision for sperm banking (psychological domain), Nearly half of the physicians (49.6%) reported that cancer patients see infertility as a test of faith or God's will, which might affect their decision for sperm banking (religious domain). Moreover, most of the physicians reported that sperm banking causes moral panic for the public because it is challenging their cultural and religious beliefs (Social domain). (Table. 2)

Ethical reflection regarding fertility preservation: The mean of the total ethical perception score was calculated (21.51±3.63) out of 34. About 51% reported positive ethical perception. Seventy-two percent of the physicians reported that fertility preservation is in the best interest of the patients, and it was found that more than two-third (68%) of the physicians saw sperm banking as a positive right. Although 46.7% of the physicians considered withholding the option of sperm banking as harm, still 39% of them consider it not harmful. About 39% see it is not ethically reasonable to enable the reproduction of individuals whose lifespan may be reduced by illness. Fifty-four percent of the physicians say that it is up to the treating physicians to recommend fertility preservation or not. (Table. 3)

Table 6. Physicians practice and fertility preservation

Statement	Responses, n (%)		
	Yes	No	Don't know
▪ As a physician, do you have the enough time to discuss sperm banking adequately?	79 (76.7)	22 (21.4)	2 (1.9)
▪ Is it uncomfortable to discuss sperm banking with patients because it is such an emotional and intimate topic?	50 (47.6)	54 (51.4)	1 (1)
▪ Have you encountered patient's rejection of sperm banking?	59 (56.2)	38 (36.2)	8 (7.6)
▪ Does offering the option of sperm banking present a real challenge in your practice?	48 (45.7)	45 (42.9)	12 (11.4)
▪ Are you satisfied with the referral rate for fertility preservation for your patients?	12 (11.4)	85 (81)	8 (7.6)

Table 7. Multiple regression analysis of the predictors of satisfaction with the referral rate for fertility preservation

	Unstandardized Coefficients		Standardized coefficients	t	p
	B	Std. Error	Beta		
(Constant)	2.346	0.249		9.417	0
Profession	0.068	0.034	0.19	1.989	0.05*
Sex	-0.004	0.108	-0.003	-0.033	0.974
Age Group	-0.076	0.055	-0.211	-1.377	0.172
Nationality	-0.223	0.089	-0.254	-2.515	0.014*
Years of experience	0.03	0.059	0.075	0.506	0.614

*(F = 4.545, p = 0.001)

Physicians' knowledge about fertility preservation: The mean of the total knowledge score was (13.04±1.93) out of 18. About 66% reported a satisfactory knowledge. Thirty-seven percent of the physicians reported that sperm banking Facilities are not available, and 41.6% reported that sperm banking is not accessible. Interestingly, the majority of the physicians (91.4%) reported that they never received courses or training regarding fertility preservation. In addition, about 61% reported that they were not aware of the American society of clinical oncology-clinical practice guidelines for fertility preservation.

Furthermore, around 85% of their work facilities have never been involved in providing training (such as seminar and grand rounds) to oncology professionals in male fertility preservation. (Table. 3) Factors play a major role in offering the option of sperm banking: The mean of the total factors score was calculated (14.52±3.21) out of 26. Saying that, nearly 69% of the physicians were found affected by the negative determinant factors when deciding to offer the option of sperm banking. About 86% of the physicians take into account the survival rate of the patient as a negative determinant factor when offering the option of sperm banking. The availability of the sperm banking service was also found to be a negative determinant factor on physician's decision making among 90.5% of the physicians. Religion and societal perspective was found to be the least reported negative determinant factors that influenced the decision of offering the option of sperm banking, with 55.2% for both. (Table. 4) Physicians' practice and fertility preservation: About 45.7% reported that offering the option of sperm banking present a real challenge in their practice, however, about 56% of the physicians reported that they encountered patients' rejection to bank their sperm (Table. 5). The mean of the total satisfaction score was calculated (1.96 ± 0.437) out of 3. Interestingly, in their practice, about 81% of the physicians were not satisfied with the referral rate for sperm banking (Table. 5). The overall physicians' characteristics explained 14.8% of variance in their satisfaction, which was revealed to be statistically significant (F = 4.545, p = 0.001). An inspection of physicians characteristics predictors showed that nationality of participant (Beta = 0.223, p < 0.014) and profession (Beta = 0.068, p < 0.05) are significant independent predictors of the physicians satisfaction. (Table. 6)

DISCUSSION

The impact of new technology brought significant dilemmas in health care setting and affected patient-physician relationship. Such dilemmas, for example, focus on maintaining a balance between preserving cancer patient life and the patient's reproduction, as being two competing conflicts that can be simplified between patients' autonomy and physicians' non-maleficence. Our results showed that more than (82%) agreed that sperm banking should be offered to cancer patients, and this was consistent with another study (n=168) that showed 91% of the physicians agreed that sperm banking should be offered for all eligible men (Schover *et al*., 2002). On asking about the importance of sperm banking, about 80% of the physicians reported that sperm banking is important to cancer patients. This response rate was found better than in a study that was conducted in Saudi Arabia and published in 2011, which showed that around two-third of the physicians perceived sperm banking as very important (Arafa and Rabah, 2011). These finding revealed an improvement trend in the physicians' attitudes toward sperm banking among physicians in Saudi Arabia.

Another interesting result that undermines the principle of autonomy, patients' self- determination, and looming a paternalistic attitude among physicians is relying on their self-reasoning about patients need for information to make their informed decision and choices about sperm banking. This explained when the results showed that more than one-third of the physician's 38 (36%) disagree to offer sperm banking for the patient who have children or at least one child. These results are considered critical in comparison to another study (n=168) that revealed only about 13% of the physicians would less likely offer sperm banking for patients who have at least one child (Schover *et al*., 2002). Current evidence suggests that infertility among cancer patients are associated with psychological, emotional distress and impaired quality of life in areas of emotional well-being, sexuality, and relationship (Arafa and Rabah, 2011; Loren *et al*., 2013; Tschudin and Bitzer, 2009). This study is in line with the abovementioned evidence, as 80% of the physicians reported that Cancer patients are burdened with emotional, social and psychological consequences as a

result of infertility. The process of sperm collection among Muslim patients might be uncomfortable or embarrassing because of the religious beliefs, and could negatively affect the patient's decision for sperm banking, in the current study, more than half of the physicians supported this belief. It was found that infertility causes spoiled male identity and stigmatization among cancer patients. Within the social context, the feeling of socially devalued status could be referred to the recognition that sexual dysfunction and having a future child to this point is not possible. Furthermore, the study showed that sperm banking causes moral anxiety for the public since it challenges their culture and religious.

Despite the fact that sperm banking could delay commencing cancer treatment, and threaten patient life and the proportional lifespan of cancer patients, the majority of the physicians hold the moral belief that fertility preservation is in the best interest of the cancer patients. The concept of fatherhood as a function and humans right rendered their best interest in front of inequalities with normal people, because of the discharge from the role of a competent father and the possible early death. It was found that physicians were almost divided in their perception of whether fertility preservation is in the best interest of the future child or not. This could be contributed to the scientific merit of the anticipated cancer risk for the future child or the reasonable expected life of cancer patients.

The right to reproduce has long been considered a "negative right", and thus, meaning that the government should not interfere with an individual's ability to reproduce through denying access to fertility treatment (Shah *et al*., 2011). Almost half of the physicians do not consider fertility preservation as a negative right, and this ethical perception reflects an infringement to the right of respect of autonomy. Interestingly, those physicians who do not consider fertility preservation negative right were supporting offering sperm banking to the cancer patient. This prompts the questions whether the physicians are concerned about public utility in asserting the best resources allocation for other health care problems in terms of the greatest interest to the greatest number, or because of the cultural reaction to sperm banking.

Furthermore, person's positive right entails another's obligation to do something for that person (Beauchamp and Childress, 2009). In this case, the government should provide resources to support cancer patients' right to preserve their fertility and procreation. When possible, there is a duty to prevent damage or repair that which is damaged by the course of treatment, in this regard and according to the principles of non-maleficence, physicians have the duty to repair what is damaged by cancer treatment proactively by early referring for fertility preservation. In this study, more than two third of the physicians reported fertility preservation as a positive right, and more than half of them see it is the oncologist duty to repair what is damaged by cancer treatment, which shows a significant positive perception toward fertility preservation.

Fertility preservation as a concept is not newly developed right within the Islamic context; preservation of progeny thru preserving fertility is emphasized and considered imperative as one of the purposes of Islamic law (maqasid al shari'at) that recommended to be protected, as stated in the preservation of religion, life, progeny, mind and wealth (Kasule, 2004), accordingly, realization of fertility preservation for progeny protection considered a benefit (Maslaha) and removing the harm (Dharar) of neglecting this is recommended to fulfill the purposes of Islamic law. The absence of Islamic rules or texts (Fatwas) that legalize long term use of sperm banking for cancer survivors to protect their progeny, would affect physicians attitudes and practice. The absence of Islamic rules could be contributed to the anticipated harm (Dharar) from the risk of sperm samples mix up. An outstanding finding was that more than one-quarter of the physicians did not trust in the technology of sperm banking in controlling the samples from mixing. Moreover, as a constructive philosophy, Islam has a concern about the subject of genes mixing and enjoins the purity of genes and heredity (Serour, 2008); each child should be related to his biological father. Accordingly, we can argue that this conservative thought could be a conscience confounder ground that can be extended to the medical practice and sperm banking technology. It was also found that some of the physicians have no trust in the capacity and competency of staff working in sperm banking facilities. This could be a second confounder that leads the physicians to hold this conscience to be informative to their moral justification.

Respect for autonomy involves acknowledgment of person's right to hold views, make choices and take actions based on their beliefs and values (Beauchamp and Childress, 2009). In the account of fertility preservation, respect of autonomy involves informing patients about anticipated infertility as a side effect of treatment, and offering the option of sperm banking to make their choices. Our study showed a general physician's consensus in emphasizing that cancer should be informed sperm banking. To some extent, cancer disease exerts psychological distress and anxiety with cancer patients, which could lead to irrational decision making and jeopardize cancer treatment. This highlights the idea whether the physicians are privileged to withhold the option of sperm banking to an emotionally drained patient to protect them from extra anxiety burden, or it is considered maleficence. However, more than one-third of the physicians do not consider withholding the option of sperm banking as maleficence, and this reflects an infringement to the principles of autonomy and non-maleficence.

Interestingly, about 39% of the physicians believe that cancer patient should be offered the option of sperm banking and at the same time, they do not consider withholding this option as maleficence. Nevertheless, this moral conflict could be explained in that the physicians do not see offering sperm banking as an absolute right, rather than it is a relative right that needs to be outweighed against other factors. Another distinctive explanation of this moral conflict could be through the rule of double effect. The classical four elements of the rule of double effect must be sufficient to justify withholding the option of sperm banking. According to the proponents of this rule, physicians take the privilege of withholding information from the patient intended to protect the patient from the foreseen psychological distress at very stressful moments of cancer diagnosis, and to urgently commence cancer treatment with the purpose of cure or increase survival rate. If the proportionate reason compensates between saving patients life and infertility, then, it is permissible action that comes in accordance with Islamic rule in the preservation of life. Similarly, the principle of hardship in Islam presents a practical reasoning to overrides patients right from being informed about

sperm banking. The principle of hardship, endorses that medical interventions, that would otherwise be prohibited actions, are permitted under the principle of hardship if there is a necessity (Kasule, 2004). Accordingly, the necessity to ignore patients' right to be informed about the option of sperm banking, and commence cancer treatment to preserve patient life is allowed. In this case, preserving patient life does not violate the purposes of Islamic law. However, this action should not abrogate patients' right to be informed. Saying that, enabling the procreation of a child as a mean to justify patient right of procreation as an end creates ethical disputes, especially when the children are at increased risk of losing the father early in life or at the risk of cancer for them. Although the literature does not support an increase in the risk of cancer among the offspring of cancer survivors (Shah *et al*., 2011), another study found independent increase in the risk of major congenital abnormalities as being associated with a paternal history of cancer (Ståhl *et al*., 2011). The risk of child malignancy or congenital abnormalities should not be a reason to justify withholding the option of sperm banking. In response to the concern of leaving a child deprived of a parent because of the premature death, most of the ethicists consider this insufficient argument to deny cancer patients fertility treatment (Shah *et al*., 2011). On the basis of the reasonable welfare standard, the argument that procreation is morally acceptable only when the future child will have a reasonably happy life or not in less than ideal circumstances appears not to be a substantial argument to abandon fertility preservation for cancer patients (Pennings *et al*., 1999). In our study, about half of the physicians reported that it is morally acceptable only when the future child will have a reasonable happy life; and about 43% reported that patient can bring a child, not in less than ideal circumstances.

A critical finding was found when more than half of the physicians reported that it is up to the treating physician to preserve patient fertility by weighing up the risks and benefits. This perception is normatively considered a paternalistic act, when the physicians intentionally override patients' preferences and declines their self-determination; in such situations; this act is justified for preventing or mitigating anticipated risk. Although this process of reasoning assumes a good act, arbitrary jeopardizes patients' autonomy. It logically sounds that a strong physician's knowledge and evidence based-medicine may help in a clinically effective decision making. In our study about one-third of the physicians were found to be not aware of the availability of specialist facilities for fertility preservation, while nearly 45% were aware of these facilities. However, the current study showed improvement in the physicians' knowledge about the availability of sperm bank facilities when compared to a previous study, conducted in Saudi Arabia in 2011, which showed that only 23% of the research participants were aware of the availability of sperm bank facility. Serious findings were found that a significant high percentage of the physicians (91%) have never been involved in educational programs, course or even seminars or grand grounds about fertility preservation. More than two third of the physicians were not aware of the American society of clinical oncology (ASCO) Clinical Practice Guidelines for Fertility preservation, although the ASCO is a well-known reference and trusted source of cancer information worldwide (Somerfield *et al*., 2006). Moreover, Oncofertility as new evolving subspecialty was not familiar among more than two third the physicians. One study was conducted to assess the impact of formalized fertility preservation program by comparing the frequency of sperm banking before and after the implementation of the program, and this study showed a significant increase in the overall number and percentage of male cancer patients who received fertility preservation consultation and pursued sperm banking.

ASCO guidelines for 2013 recommended that no patient should be excluded from the consideration of fertility preservation for any reason, including age, prognosis and socioeconomic status (Loren *et al*., 2013). Accordingly, we tried to assess the influence of patients' factor in physicians' decision making on whether to offer sperm banking option or not in their practice. The age of the patient was found to be a significant negative determinant factor, with 93%, which was roughly in agreement with another study that showed the age as an influencing factor for 87% of the study sample. More than half of the physicians were constrained by the religion; this could be related to the absence of legalized Islamic rule in Saudi Arabia regarding the permissibility of long-term sperm banking. The number of existing children reported in the literature to be a negatively determinant influencing factor. In our study, about 79% of the physicians were negatively influenced by the number of existing children factor. However, it was found that the number of existing children affects only 6% of the physicians in a study conducted in MD Anderson and Cleveland clinics (Schover *et al*., 2002).

These factors found to be less influencing as the physician's years of experience increasing; this seems logically sound and attributable to the accumulated exposure to the number of patient and developing more mature decisions. Moreover, the non-Saudi physicians were less likely affected by these factors; this could be contributed to the higher mean years of experience for the non-Saudi physicians. The most striking finding is that 81% of the physicians were not satisfied with the referral rate for fertility preservation. Despite this, more than half of them reported patient's rejection of sperm banking. Moreover, feeling embarrassed to go to the sperm bank counted to be a common reason, which is in consistence with our finding that the process of sperm collection could negatively affect the patient's decision for sperm banking. Another reason found when the patient focused on cancer treatment only, not accepting sperm banking because of the religious standpoints was an occasional reason (Schover *et al*., 2002). However, it is difficult to generalize the abovementioned reason for patient refusal into a different religious and cultural context. The highest dissatisfaction rate was found among the hematologists and medical oncologists; this can be contributed the larger sample size of these two specialties. Finally, and according to the previous discussion, we found that fertility preservation process is facing challenges in Saudi Arabia. These challenges have ethical, religious and cultural implications. Eventually, the results of our study seem fit to be a nexus for evolving recommendations which include the following:

- it is imperative to preserve the fertility of male cancer patient, as it considered a natural right and emphasized by Islamic Rules.
- Incorporation of Oncofertility in the treatment planning process, and involving other multidisciplinary specialties if the risk of infertility is identified.

- Developing national guidelines for fertility preservation, that is consistent with Islamic rules, and patients' rights.
- Encourage awareness about Oncofertility programs for undergraduate medical students.
- Encourage in-service clinical education about fertility preservation.

Limitations of the study

The sample size may not be representative of the general population. However, the response rate was found to be close to a previous similar study. Moreover, the study design does not give an in-depth understanding of the physicians' attitudes and ethical perception. However, it shows the magnitudes of the problem and its dimensions for further in-depth investigation. The study aimed to assess physicians' attitudes and practice; we did not assess patients' attitudes, future researches would be recommended to assess patients' attitudes' and opinions.

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Conflict of Interest

The author confirms that no conflicts of interest exist in this study.

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