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Original Research Article

Fertility awareness and oocyte cryopreservation among obstetrics and gynecology physicians

Abdulmohsen E. Almulhim[1], Renad S. Al Subaie[1], Saleh A. Almakhaytah[1], Saleh K. Alsheraiwi[1], Waad A. Alduraywish[1], Fatimah H. Alkhamis[2]*

[1]Department of Medicine, King Faisal University, Al Ahsa, Saudi Arabia
[2]Department of Obstetrics and Gynecology, College of Medicine, King Faisal University, Al Ahsa, Saudi Arabia

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***Correspondence:**
Dr. Fatimah H. Alkhamis,
E-mail: Drfatimah7070@hotmail.com

ABSTRACT

Background: Fertility awareness, including the natural decline in fertility with age and fertility preservation through oocyte cryopreservation, is vital for reproductive health. OB/GYN physicians play a crucial role in educating women on these topics, yet their knowledge and attitudes in Saudi Arabia are underexplored. This study assessed OB/GYN physicians' perceptions, knowledge, and attitudes regarding fertility awareness and oocyte cryopreservation, focusing on their understanding of age-related fertility decline and integration into patient discussions.
Methods: A cross-sectional survey of 100 OB/GYN physicians in Saudi Arabia was conducted from April to July 2024, using stratified random sampling. The survey evaluated their knowledge of fertility issues, attitudes towards preconception planning, and views on incorporating oocyte cryopreservation discussions in practice. Data were analyzed using descriptive statistics and ANOVA.
Results: Most physicians showed substantial knowledge of fertility decline, with 71% recognizing a slight decline at 35-39 years and 57% a marked decline at 45-49 years. Nearly all (96%) supported OB/GYN-initiated discussions on preconception planning, and 95% endorsed discussing age-related fertility decline. Additionally, 78% favoured discussing oocyte cryopreservation, with 63% supporting its inclusion in routine visits. Concerns about discussion frequency and potential emotional distress were noted by a minority.
Conclusions: OB/GYN physicians in Saudi Arabia are generally aware of fertility issues, but knowledge gaps persist, particularly among less experienced physicians. While there is broad support for proactive fertility discussions, some reservations remain, highlighting the need for targeted educational initiatives.

Keywords: Fertility awareness, Fertility preservation, Oocyte cryopreservation, Reproductive health

INTRODUCTION

Fertility awareness is a cornerstone of reproductive health, encompassing a deep understanding of a woman's fertility potential and the profound impact that age has on reproductive outcomes. Central to this concept is the process of oogenesis, the maturation of female reproductive cells known as germ cells. Oogenesis begins before birth, peaking at approximately 6 to 7 million germ cells by the fifth month of gestation.[1] At birth, this number declines to an estimated 600,000 to 800,000, and by puberty, only about 40,000 remain, with fewer than 500 being released during a woman's reproductive lifespan.[2] The quantity of germ cell follicles is the most reliable indicator of a woman's natural fertility or her ability to conceive and produce offspring.[3]

The decline in germ cell follicles begins subtly after a woman's mid-20s but accelerates significantly by age 40, leading to a marked decrease in fertility and an increased

risk of infertility.[4] Despite historically having a higher total fertility rate than many developed countries, women in Saudi Arabia have experienced a notable decline in fertility rates over the past decades. The total fertility rate dropped from 7.17 in 1980 to 4.10 in 2000 and further to 2.27 in 2020, representing a 45% decrease in the last two decades and a reduction of more than two-thirds over the last four decades.[5,6] This dramatic shift in fertility patterns is largely attributed to increased educational and employment opportunities for women in the Saudi community, which have led to delays in marriage and a subsequent postponement or limitation of childbirth.[7-9]

Most women desiring children report that their healthcare provider is their preferred and most reliable source of information about reproductive health.[10-14] Nevertheless, women frequently postpone seeking fertility and conception advice from healthcare providers until they are older, at which point their fertility might already be compromised. Moreover, many healthcare providers may lack the knowledge or confidence to effectively counsel patients on age-related fertility decline, leading to a relatively small proportion of patients receiving timely and accurate reproductive health information directly from their healthcare providers.[13]

Primary care physicians, particularly obstetricians and gynecologists (OB/GYN) in both hospital and general practice settings, hold a vital role in informing patients about the connection between age and fertility. They are also uniquely positioned to explain the implications of oocyte cryopreservation, covering aspects such as cost, associated risks, and the estimated number of eggs necessary to give women a chance of achieving pregnancy.[15] Access to accurate information about the impact of age on fertility and the success rates of assisted reproductive technologies (ARTs) and fertility preservation is essential for women of childbearing age. This empowers them to make knowledgeable reproductive choices.[16]

Recent studies indicate that both physiological and pathological factors contribute to ovarian aging, thereby limiting female reproductive potential.[17] Oocyte cryopreservation (OC) represents an advancing frontier within reproductive medicine, increasingly utilized by women seeking to preserve their fertility potential.[18,19] By freezing and preserving their oocytes, women can extend their reproductive potential into later years, safeguarding their fertility against the natural decline associated with aging.[20,21] With the recent legalization of medical fertility cryopreservation for females in Saudi Arabia, it is vital to establish patient selection criteria and ensure proper staff training before integrating this service into clinical practice.[20] The future quality of life for cancer patients diagnosed during their reproductive years is significantly influenced by their ability to preserve fertility before undergoing potentially sterilizing treatments.[22] Infertility is a frequent and distressing consequence of effective cancer therapies.[23] Therefore, fertility preservation measures for cancer patients are strongly recommended prior to the initiation of treatment.[24] However, numerous studies have documented a significant gap in awareness among healthcare practitioners, including oncologists, regarding fertility preservation options available to patients prior to cancer treatment.[25-27] The Saudi Ministry of Health (MOH) mandates that patients be fully informed about the potential risk of infertility as a result of cancer treatments, along with its adverse consequences, and be referred to a fertility specialist before commencing cancer therapy.[28-30] Additionally, approximately half of the women diagnosed with endometriosis encounter infertility issues and face a reduction in ovarian reserve, a condition linked to the pathophysiological processes of the disease. These women may consider oocyte cryopreservation as a viable option to preserve fertility.[31,32]

The aims of this study were to assess OB/GYN physicians' perceptions and attitudes toward fertility awareness, including the natural decline in fertility due to aging and the potential for oocyte cryopreservation. Specifically, it sought to evaluate the level of knowledge and attitudes among OB/GYN physicians across different levels of training and professional experience regarding these critical fertility issues. The study also explored the extent to which OB/GYN physicians believe these topics should be part of routine patient discussions and their views on the timing and frequency of such discussions.

METHODS

Study design and setting

This study employed a cross-sectional design between April and July 2024 to assess public perceptions and OB/GYN physicians' attitudes toward fertility awareness, the natural decline in fertility due to aging, and the use of oocyte cryopreservation.

Participants and sampling

Target population

The target population included OB/GYN physicians actively practicing in Al-Ahsa Maternity and Children Hospital in Saudi Arabia. Both residents and consultants were included to capture a comprehensive view of the medical community's knowledge and attitudes toward fertility awareness and oocyte cryopreservation.

Sampling method

A stratified random sampling technique was used to ensure a representative sample of OB/GYN physicians across different levels of training and professional experience.

Level of Training: R1, R2, R3, R4, R5, and consultant/specialist.

Professional plans: family planning, general practice, gynecologic oncology, maternal fetal medicine, reproductive endocrinology and infertility, urogynecology, and other fellowships.

Sample size calculation

The sample size was calculated using OpenEpi®, considering a 95% confidence level and a 5% margin of error. Assuming a 50% response rate among OB/GYN physicians to maximize the sample size, a minimum of 100 participants was determined to be necessary to provide sufficient statistical power for the study.

Recruitment process

Participants were recruited through professional networks and institutional email lists. The survey link was distributed via email and WhatsApp groups targeting OB/GYN physicians in Saudi Arabia

Inclusion and exclusion criteria

The inclusion criteria for the study are limited to OB/GYN physicians who were actively practicing in Saudi Arabia and who were willing to provide informed consent. The exclusion criteria disqualify non-OB/GYN physicians, physicians practicing outside of Saudi Arabia, and participants who either did not consent or withdrew consent during the study.

Data collection

Questionnaire development

The questionnaire was developed based on a comprehensive review of the literature related to fertility awareness, age-related fertility decline, and oocyte cryopreservation.[16] It included sections on demographic information, knowledge assessment, attitudes toward fertility discussions, and perceptions of oocyte cryopreservation.

Data collection period

Data were collected over two months, from April to June 2024. The survey was administered online to ensure accessibility and convenience for the participants.

Ethical considerations

This study was conducted in compliance with ethical standards and received approval from the Institutional Review Board (IRB) at King Faisal University (approval number KFU-REC-2024-JAN-ETHICS1914). Informed consent was obtained electronically from all participants, who were informed of their rights, the purpose of the study, and the confidentiality of their responses. Participants were assured that their involvement was voluntary and that they could withdraw from the study at any time without penalty.

Statistical analysis

Data from the online survey were processed using SPSS (version 23). Initially, the characteristics of the study participants were summarized using descriptive statistics. Following this, descriptive analyses were carried out to explore issues related to fertility awareness, preconception planning, and oocyte cryopreservation. To assess OB/GYN physicians' knowledge of fertility issues, analyses of variance (ANOVAs) were utilized to determine if knowledge levels varied according to the physicians' year of training. Gender differences were not analyzed due to the limited number of male physicians in the sample.

RESULTS

A total of 100 participants were included in the study (Table 1). The age distribution indicates that nearly half of the participants are aged 26-30 years (48%), followed by those aged 31-35 years (28%). Smaller age groups include participants aged 36-40 years (8%), 41-45 years (13%), and a minor proportion aged 18-25 years (3%). The gender distribution reveals a significant majority of female participants (73%), with males comprising 27% of the sample. In terms of the level of training, the distribution is as follows: R5 participants constitute the largest group (28%), followed by consultants/specialists (21%). Other levels include R1 (14%), R2 (15%), R3 (11%), and R4 (11%). Professional plans among the participants are varied. A substantial proportion are interested in gynecologic oncology (22%) and reproductive endocrinology and infertility (22%). General practice is the career path for 21% of participants, followed by maternal-fetal medicine (14%), urogynecology (12%), other fellowships (7%), and family planning (2%).

Table 2 presents OB/GYN physicians' attitudes toward discussing preconception planning and fertility. The vast majority of physicians (96%) believe that OB/GYNs should initiate discussions about preconception planning with patients, while only 4% disagree. Similarly, 95% of physicians support initiating discussions about age-related fertility decline, with just 5% opposing. When considering the importance of discussing the natural decline in fertility, 84% of physicians agree it is important, while 16% do not. Among those who support these discussions, 48% believe it helps women make informed reproductive decisions, 39% want to provide comprehensive health education, and 32% think women should be aware of the relationship between fertility and age. For those who oppose, reasons include the belief that discussing this issue annually is too frequent (14%), concerns about being perceived as pushing childbearing (8%), fear of causing emotional distress (8%), the desire to fully respect patient choices (5%), not seeing it as their primary responsibility (1%), and time constraints (4%).

Table 1: Characteristics of the participants.

Category	Sub-category	Counts	% of total
Age	18-25	3	3.0
	26-30	48	48.0
	31-35	28	28.0
	36-40	8	8.0
	41-45	13	13.0
Gender	Female	73	73.0
	Male	27	27.0
Level	Consultant/specialists	21	21.0
	R1	14	14.0
	R2	15	15.0
	R3	11	11.0
	R4	11	11.0
	R5	28	28.0
Professional Plans	Family planning	2	2.0
	General practice	21	21.0
	Gynecologic oncology	22	22.0
	Maternal-fetal medicine	14	14.0
	Other fellowship	7	7.0
	Reproductive endocrinology and infertility	22	22.0
	Urogynecology	12	12.0

Table 2: OB/GYN physicians' attitudes toward discussing preconception planning and fertility.

Questions	Counts	% of total
Do you believe that an OB/GYN should initiate discussions with patients about their potential childbearing intentions?		
No	4	4.0
Yes	96	96.0
Should an OB/GYN initiate discussions about age-related fertility decline with patients?		
No	5	5.0
Yes	95	95.0
Do you think discussing the natural decline in fertility with age should be part of a well-women annual exam with a gynecologist?		
No	16	16.0
Yes	84	84.0
Reasons for yes responses		
Educating women about this helps women make informed reproductive decisions	48	48.0
I want to provide comprehensive health education to my patients	39	39.0
Women should be aware of the correct relationship between fertility and age	32	32.0
Reasons for no responses		
Bringing this issue up annually is too frequent, but I am not opposed to discussing this issue with patients every three to four years	14	14.0
I don't want to be perceived as pushing childbearing on patients	8	8.0
Bringing up this issue annually may lead to emotional distress in my patients	8	8.0
I want to be able to fully respect patient choices	5	5.0
It is not my primary responsibility	1	1.0
I don't have enough time	4	4.0

OB/GYN physicians' awareness of fertility issues is demonstrated in Table 3. When asked about the age at which they believe there is a slight decrease in women's fertility, 3% of physicians identified ages 15-24, 2% identified ages 25-29, 24% identified ages 30-34, and the majority (71%) identified ages 35-39. Regarding the age at which there is a marked decrease in women's fertility, 3% selected ages 25-34, 13% selected ages 35-39, 27%

selected ages 40-44, and 57% selected ages 45-49. In estimating the overall chance, on average, that a woman will conceive per menstrual cycle, 8% of physicians estimated a 0-19% chance, 35% estimated a 20-29% chance, 37% estimated a 30-39% chance, and 20% estimated a 40-100% chance.

Table 3: Obstetrics and gynecology (OB/GYN) physicians' awareness of fertility issues.

Question	Counts	% of total
At what age do you believe there is a slight decrease in women's fertility?		
15–24	3	3.0
25–29	2	2.0
30–34	24	24.0
35–39	71	71.0
At what age do you think there is a marked decrease in women's fertility?		
25-34	3	3.0
35-39	13	13.0
40-44	27	27.0
45-49	57	57.0
What do you estimate is the overall chance, on average, that a couple who undergoes treatment with in vitro fertilization will have a child after one treatment?		
0-19%	8	8.0
20-29%	35	35.0
30-39%	37	37.0
40-100%	20	20.0

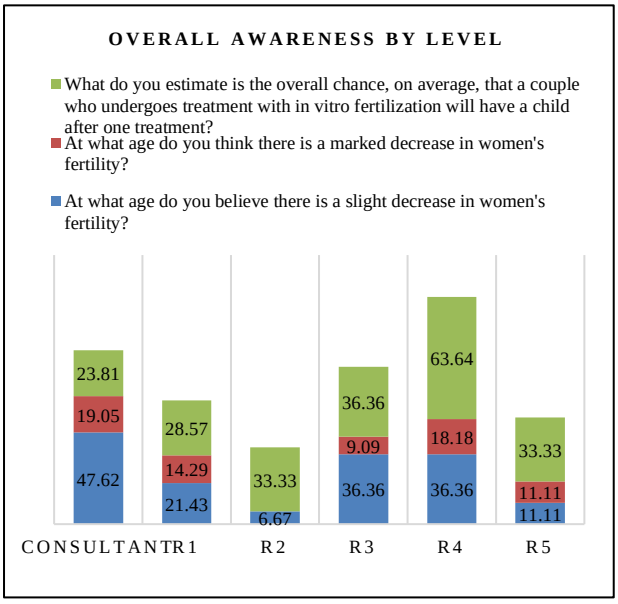

Figure 1: Overall awareness by level.

Figure 1 shows the responses of OB/GYN physicians, categorized by their residency year, regarding their awareness of women's fertility issues. Among consultants, 47.62% correctly identified the age at which there is a slight decrease in women's fertility, 19.05% correctly identified the age at which there is a marked decrease, and 23.81% estimated the overall chance that a couple would have a child after one IVF treatment. For R1 residents, 21.43% correctly identified the age for a slight decrease in fertility, 14.29% for a marked decrease, and 28.57% estimated the IVF success rate. Among R2 residents, 6.67% correctly identified the slight decrease in age, none identified the marked decrease in age, and 33.33% estimated the IVF success rate. For R3 residents, 36.36% correctly identified the slight decrease in age, 9.09% the marked decrease in age, and 36.36% estimated the IVF success rate. Among R4 residents, 36.36% correctly identified the slight decrease in age, 18.18% the marked decrease in age, and the highest IVF success estimate at 63.64%. Finally, for R5 residents, 11.11% correctly identified both the slight and marked decrease in ages, and 33.33% estimated the IVF success rate.

Table 4: Obstetrics and gynecology (OB/GYN) residents' attitudes toward the use of oocyte cryopreservation.

Question	Counts	% of total
Do you think an OB/GYN should initiate discussions regarding oocyte cryopreservation?		
No	22	22.0
Yes	78	78.0
Should discussing oocyte cryopreservation be part of a well-woman visit?		
No	37	37.0
Yes	63	63.0
Reasons for yes responses		
Educating women about this issue helps women make more informed reproductive decisions	63	63.0
Understanding the implications of oocyte cryopreservation increases women's childbearing choices	37	37.0
I want to provide comprehensive health education to all my patients	32	32.0
Reasons for no responses		
Bringing this issue up annually is too frequent, but I am not opposed to discussing this issue with patients every three to four years	21	21.0
I don't want to be perceived as pushing childbearing on patients	15	15.0
Bringing up this issue annually may lead to emotional distress in my patients	17	17.0

I want to be able to fully respect patient choices	14	14.0
It is not my primary responsibility	9	9.0
I don't have enough time	2	2.0

Table 4 presents the attitudes of OB/GYN residents toward the use of oocyte cryopreservation. A significant majority (78%) believe that OB/GYNs should initiate discussions regarding oocyte cryopreservation, while 22% do not. When asked if discussing oocyte cryopreservation should be part of a well-woman visit, 63% responded affirmatively, and 37% did not. Among the reasons for supporting these discussions, 63% believed that educating women about this issue helps them make more informed reproductive decisions, 37% thought that understanding the implications of oocyte cryopreservation increases women's childbearing choices, and 32% want to provide comprehensive health education to all their patients. For those who oppose these discussions, 21% believed that bringing up this issue annually is too frequent but are not opposed to discussing it every three to four years, 15% do not want to be perceived as pushing childbearing on patients, 17% fear that bringing up this issue annually may lead to emotional distress in patients, 14% want to fully respect patient choices, 9% do not see it as their primary responsibility and 2% feel they do not have enough time.

DISCUSSION

Primary care physicians, particularly OB/GYNs, play a crucial role in educating patients about the relationship between age and fertility, including the advantages and risks associated with oocyte cryopreservation.[15] This study aimed to evaluate OB/GYN physicians' perceptions and attitudes regarding their role in fostering fertility awareness, investigating whether these discussions should be routinely integrated into medical exams, and assessing their views on the timing of fertility decline and the proactive discussion of oocyte cryopreservation.

The study revealed that the majority of OB/GYN physicians possess substantial knowledge regarding the critical ages at which female fertility begins to decline, with 71% accurately identifying the age range of 35-39 years for a slight decline and 57% recognizing the marked decline between 45-49 years. However, up to 29% of respondents, particularly those who are younger and less experienced, demonstrated gaps in this knowledge. Furthermore, 96% of physicians believe they should initiate discussions on preconception planning, and 95% support discussions concerning age-related fertility decline with patients. While most physicians consider these discussions essential, a minority expressed concerns about potential negative impacts, such as causing emotional distress or being perceived as pressuring patients. In terms of oocyte cryopreservation, 78% of physicians agree that it should be discussed during consultations, and 63% believe it should be a routine part of well-woman visits. Nevertheless, some physicians remain hesitant, citing concerns about the frequency of such discussions and the potential for emotional distress or perceived pressure on patients. These findings underscore the overall strong awareness and proactive stance among OB/GYN physicians regarding fertility discussions while highlighting the need for tailored communication strategies to navigate the complexities and sensitivities associated with these topics.

Numerous studies, including those by Smith et al. and Jones et al., have explored fertility knowledge among the general population and OB/GYN residents, consistently revealing significant gaps in understanding age-related fertility decline and oocyte cryopreservation.[16,33-35] These findings indicate a widespread lack of knowledge on critical reproductive health issues, not only among the public but also within the healthcare community, including specialists in obstetrics and gynecology. A noteworthy study by Tsai et al highlighted that OB/GYN residents' understanding of fertility-related topics was comparable to that of residents in other medical specialties, irrespective of their level of training or postgraduate year.[36] This is particularly alarming, as it implies that even within a specialty focused on fertility, substantial knowledge deficiencies remain, unaffected by additional training or clinical experience. Similarly, in our study, while 71% of OB/GYN physicians correctly identified the age range of 35-39 years as the period when fertility begins to slightly decline, there was still a notable variation in responses, particularly among less experienced physicians.

In a study conducted by Yu et al, significant gaps were identified in residents' knowledge regarding the ages at which female fertility declines.[16] Specifically, one-third of the residents overestimated the age when fertility begins to decline, and nearly half (46.5%) overestimated the age at which fertility declines markedly. Notably, these misconceptions did not vary significantly based on the year of residency. In contrast, while our study showed a general proactivity among OB/GYN physicians in addressing fertility-related issues, the findings still underscore the need for improved education and training to address existing knowledge gaps.

Additionally, several studies have highlighted the overestimation of oocyte cryopreservation pregnancy rates, likely due to common misconceptions about the success at each stage, from oocyte survival and fertilization to clinical pregnancy. Although data show that 90-97% of oocytes survive warming and 71-79% are fertilized, the actual clinical pregnancy rate per thawed oocyte is only 4.5-12%.[37-39] In our study, 78% of OB/GYN physicians supported initiating discussions on oocyte cryopreservation during patient consultations, with 63% advocating for its inclusion in routine well-woman visits. However, 22% of physicians opposed routine discussions, citing concerns about the frequency of these conversations and the potential for emotional distress. These findings underscore the need to address misconceptions and ensure that discussions about oocyte cryopreservation are

informed by accurate data and are conducted with sensitivity to patient concerns.

Examining the attitudes and knowledge of physicians regarding fertility preservation is critical, as highlighted by several international studies. For example, in Germany, a survey of 120 oncologists revealed that while nearly all physicians acknowledged the importance of fertility preservation, only half felt they had a thorough understanding of it, and only 40% routinely discussed it with patients.[40] Similarly, a study of breast cancer specialists in Japan found that those with more positive attitudes toward fertility preservation were more likely to engage in discussions with patients, leading to calls for improved interdisciplinary communication between physicians and infertility specialists to enhance patient care.[41]

The study's relatively small sample size of obstetrics and gynecology physicians poses a limitation. A larger sample could have provided a more comprehensive understanding of fertility awareness and opinions on oocyte cryopreservation across a broader spectrum of healthcare providers. This small sample size may limit the generalizability of the results to all OB/GYN physicians or other professionals involved in reproductive health counselling. Additionally, the study's reliance on self-reported data gathered through an online questionnaire introduces potential biases, such as social desirability bias and recall inaccuracies, which could undermine the reliability of the findings.

CONCLUSION

In conclusion, this study underscores the critical role of OB/GYN physicians in promoting fertility awareness, particularly regarding age-related fertility decline and oocyte cryopreservation. While most physicians possess a solid understanding of fertility decline, significant knowledge gaps remain, especially among less experienced practitioners. While there is general support for discussing fertility preservation, some concerns about potential emotional distress and perceived pressure on patients persist among some physicians. These findings highlight the need for targeted educational initiatives to address these gaps and ensure that discussions are both consistent and sensitive. By improving physician education in this area, healthcare providers can better guide patients through informed reproductive decisions, ultimately enhancing outcomes in fertility preservation.

Recommendations

Future research should aim to recruit a larger and more diverse sample of OB/GYN physicians to enhance the generalizability of the findings. This could involve reaching out to a broader range of healthcare institutions or incorporating multi-center collaborations. Additionally, employing mixed-methods approaches, such as in-depth interviews or focus groups alongside questionnaires, could provide more nuanced insights and help to cross-validate the findings. To address the potential biases inherent in self-reported data, future studies should consider incorporating objective measures, such as clinical practice data or peer evaluations, to corroborate self-reported responses.

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