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The Impact of Age on Female Fertility, Patient Prospective

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Abstract

Objectives: Delaying parenthood is prevalent among women in high-income countries, with the average age of childbirth being 30 in Europe. Factors like finding a compatible partner, education, and professional advancement contribute to this issue. Lack of knowledge about fertility potential and aging affect fertility. Understanding the age-related relationship is crucial for informed decision-making. The purpose of this study was to determine how well-informed women were about the efficacy of assisted reproductive technologies in treating infertility, as well as how aging affects fertility.

Methods: A cross-sectional study was conducted in infertility clinic at king Salman Bin Abdulaziz medical city with patients in in Al Madinah City, Saudi Arabia. A validated questionnaire was used to interview the women. The total knowledge score (TKS) is the sum of two scores: knowledge and awareness of the effects of aging on fertility advanced maternal age, or (AMA) and pregnancy outcomes when using assisted reproductive technology (ART). The questionnaire also includes socio-demographic information. The availability of the data was enabled by women who answered a questionnaire and gave their informed consent.

Results: There were estimated to be 85 women (41.9%) in the age group ≤ 35. The women reported having been infertile for three to five years was (38.0%). Women who answered the questionnaire stated that ovulatory (29.1%), unexplained (22.2%), and male factors (12.3%) were the most common causes of infertility. Of the participants, 45.3% had completed their university education, while 43.4% reported making less than 5,000 SAR. Their doctors (26.6%) and the Internet/TV (25.1%) were their primary sources of fertility-related information. The (TKS) mean was 34.8%, the (AMA) was 39.0%, and the (ART) was 30.6%. Fertility knowledge was found to be low.

Conclusions: The study highlights a lack of information on aging's impact on fertility and the potential benefits of assisted technology. It suggests that women should have more knowledge about reproduction to prevent infertility and improve preconception health. Fertility health education should be integrated into health promotion programs, focusing on social media and healthcare settings.

Keywords: TKS; AMA; ART; Fertility; Age; Awareness

Introduction

Delaying parenthood is prevalent among women in high-income countries, with the average age of childbirth being 30 in Europe. Factors like finding a compatible partner, education, and professional advancement contribute to this issue. Lack of knowledge about fertility potential and aging affect fertility. Understanding the age-related relationship is crucial for informed decision-making. The purpose of this study was to determine how well-informed women were about the efficacy of assisted reproductive technologies in treating infertility, as well as how aging affects fertility [1].

The total fertility rate reflects the number of children that a woman would have if she lived to the end of her reproductive years and had children in line with the age-specific fertility rates of the given year as shown in figure 1. In kingdom of Saudi Arabia the fertility rate in 1990 was 5.8 comparing to 2021 fertility rate which is 2.4 [2]. Saudi Arabia's current fertility rate in February 2024 is 2.148 births per woman, representing a 0.027 decrease from 2023. in 2023 was 2.175 births per woman, a 0.033 decrease from 2022. And in 2022 was 2.208 births per woman, a 0.192 decrease from 2021 [3].

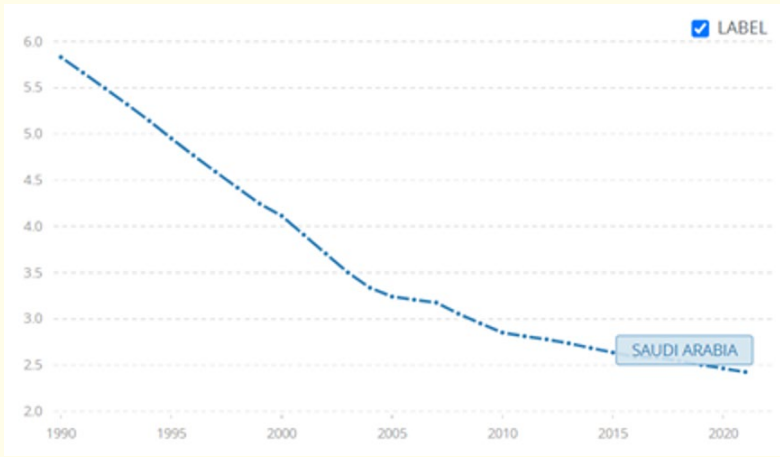

Figure 1: Fertility rate in Saudi Arabia.

Declining in fertility rate among these years due to many factors. A study about Fertility in Saudi Arabia reveals a strong relationship between the average number of children and age at first marriage, with a correlation coefficient of -0.31, indicating a significant relationship between fertility and age at first marriage. The duration of marriage also plays a role in fertility, with women who stay in marriage for 25 years having an average of more than 8 children compared to those who stay only 10 years.

Education is also strongly related to fertility, with illiterate women having a larger number of children than those with higher levels of education. The higher the husband's education, the smaller the number of children a woman has. The number of children-ever-born varies based on work status, with working women having about three children on average and non-working mothers having nearly five children. There are differences in fertility levels between rural and urban areas, with rural areas having higher average numbers of children compared to urban areas [4].

In high-income nations, delaying parenthood has become more common among women; in Europe, the average age at which a woman gives birth to her first child is 30 years old [5]. There are other explanations, such as challenges in finding a compatible companion and issues with schooling and professional advancement. Higher-educated women are more likely to delay childbearing. Delaying motherhood has increased the number of women who are having trouble getting pregnant and increased their risk of complications during pregnancy and childbirth [6].

An 85% likelihood of becoming pregnant in a year is present for women under 30 [7]. A 75% likelihood of getting pregnant in the first 12 months is there when one is 30 [8]. At 35, this probability drops to 66%, and at 40, it drops to 44%. Ovarian aging is the cause of this [9]. Furthermore, miscarriages are more common in older women than in younger women [10].

About half of all live babies in the UK were born to mothers 30 years of age or older in 2013, with the average age of mothers at first birth being 28.3 years, compared to 26.6 years in 2001 [11]. Couples reportedly comprehend the fundamentals of fertility-related issues, but many are unaware of how aging affects a woman's ability to conceive [12]. Lack of knowledge about one's own fertility potential is one of the main causes of postponed childbirth and rising rates of sub-fertility. The decision of whether, when, and how to get pregnant should be left up to the individual or couple. Nonetheless, making educated decisions about fertility requires a clear understanding of reproductive realities. Globally, there is currently little knowledge regarding fertility [13].

Studies on the awareness of fertility have revealed a general lack of understanding of the age-related relationship between the risk of infertility and an overestimation of the success rates of IVF as well as the fecundity of older women [14]. Although many people have been able to fulfill their ambition of becoming parents thanks to readily available assisted reproductive technologies (ART), such as in vitro fertilization (IVF), they are unable to completely make up for the age-dependent loss of fertility.

Women are far more affected by infertility than men are in terms of their psychological and social well-being [14]. Therefore, it is crucial to uncover information gaps before planning and having a child, including common believes and misconceptions, attitudes, and habits among women of reproductive age. Additionally, recognizing the ways in which women obtain information regarding reproductive health can point to areas in which improved communication and information sharing are possible.

Methodology

Study rationale

To the best of our knowledge, there is not enough collected data about the level of knowledge and awareness of the effect of age on fertility among women in Al Madinah city.

Aim of the study

This study aims to assess the level of knowledge and awareness of the effect of age on fertility among women in Al Madinah city.

Study objectives

- To determine the level of knowledge and awareness of the effect of age on fertility among women in Al Madinah city.
- To investigate females' knowledge about the effectiveness of assisted reproductive technologies for treating fertility.

Methods: A cross-sectional study was conducted to estimate knowledge and awareness of the effect of age on fertility among women in Al Madinah, Saudi Arabia.

Study population: married infertile women aged between 21 and 44 years.

Study period: August 2023 to December 2023.

Study Tools: A questionnaire paper and web based survey conducted interviews with patients using a validated questionnaire. A questionnaire with nine items comprised the interview. Following each question, the patients have to select the appropriate response from the list of possibilities. The topics covered included the age-related decline in fertility, the menstrual cycle's fertile period, the relationship between oral contraceptive pill use and fertility, the time frame for consulting a fertility specialist after attempting pregnancy, and fertility options for women over 40. The questionnaire also asks about participant perceptions of the influence of motherhood on life, knowledge about fertility concerns, important circumstances for the decision to have children, future intention to have children, and seven additional topics. *According to Sarría-Santamera et al*. (2020) [15].

Ethical consideration

All participants who consented to participate in the study were guaranteed confidentiality. The goals and purpose of the study were briefly explained to the respondents.

Statistical analysis

Data was inputted into MS Office 2010 (Excel). SPSS 22.0 was the version of software used to analyze the data. Percentages and frequencies were calculated as part of the descriptive analysis. Chi-square likelihood ratio tests made comparisons of proportions between questions of knowledge score. P <0.05 was considered to be statistically significant. Measurement knowledge questions were computed by adding together all of the correct answers, dividing that total by the total number of questions according to the score of the correct answers to be measured, and then multiplying the result by 100%. The knowledge score was utilized to categorize the results into three groups: good to outstanding knowledge (>70%), intermediate knowledge (40-70%), and low knowledge (0%-39.99%).

Results

A total of 203 women participated in the study and completed the questionnaire and provided informed consent. 85 women (41.9%) were reported to be under 35 years old. In regard to women who reported that they have been infertile for three to five years the percentage was (38%). The most prevalent causes of infertility reported by women who completed the questionnaire were ovulatory (29.1%), unexplained (22.2%), and male factor (12.3%). Some of participants claimed having a bachelor's degree or more (45.3%), whereas (43.4%) reported earning less than 5,000 SAR. Their physicians (26.6%) and the Internet/TV (25.1%) were the primary sources of fertility information. Table 1 shows sociodemographic information as well as these women's clinical characteristics.

The results of Table 2 describe the lifestyles of the survey's female respondents. It is worth noticing the percentage of people who claimed that they don't practice exercise at all (40.4%) and have no practicing yoga (49.8%). While the other (19.7%) of participants exercised for one to three hours per week, while (23.6%) of women worked out for less than an hour. However, women who did smoke was highly prevalent with percentage of (46.3). as demonstrated regarding smoking (29.6%) of participants had been smoking for more than 5 years. In regard to weight the results was 32% is overweight which was (22.2%) had overweight and (9.8%) is obese. Furthermore, it was reported that half of the participants never having had acupuncture (51.2%). Regarding usage of the phones, It was demonstrated that (37%) stated that they used their phones on a frequent basis.

Parameter		*Frequencies*	*%*
Age	<35	85	41.9
	35–37	44	21.7
	38–40	30	14.8
	41–42	22	10.8
	>43	22	10.8
Duration of infertility	<3 Years	62	30.6
	3–5 Years	77	38.0
	>5 Years	67	31.4
Fertility diagnosis	Age factor	19	9.4
	Endometriosis	17	8.4
	Male factor	25	12.3
	Ovulatory	59	29.1
	Tubal	17	8.4
	Uterine	21	10.3
	Unexplained	45	22.2
Education	Elementary	8	4.0
	High school	78	38.4
	Bachelor	92	45.3
	Master/doctorate	25	12.3
Income	<5000	88	43.4
	5000-10000	54	26.5
	>10000	60	30.1
Source of information on fertility and pregnancy	Doctor	54	26.6
	Internet /Television	51	25.1
	Newspapers	12	5.9
	Family/friends	26	12.8
	More than one	60	29.6
When started planning pregnancy	<25	87	33.0
	26–30	60	29.6
	30–35	44	21.7
	>35	32	15.8

Table 1: Socio-demographic characteristics of participants.

Behaviour and Lifestyles Variables		***Frequencies***	***%***
Exercise	No exercise	82	40.4
	<1 hour a week	48	23.6
	1–3 h a week	40	19.7
	>4 hours a week	33	16.3
Yoga	No exercise	101	49.8
	Once a week	40	19.7
	2–6 times a week	32	15.8
	Seven days a week	30	14.8
Rest after	Normal activity	111	54.7
	Limiting strenuous activity and exercise	92	45.3
Rest before	Normal activity	114	56.1
	Limiting strenuous activity and exercise	89	43.9
Acupuncture	Yes	99	48.8
	No	104	51.2
Weight	Underweight	38	18.7
	Normal weight	100	49.3
	Overweight	45	22.2
	Obese	20	9.8
Cellular phone	Limited use	34	16.7
	Regular use	94	46.3
	Frequent use	75	37.0
Smoking	Not smoking	109	53.7
	<5 years	34	16.7
	>5 years	60	29.6

Table 2: Behavior and lifestyles of participants.

Table 3 summarizes participants understanding of AMA's influence on ART and pregnancy outcomes. These data indicate that women were unaware of the risks connected with AMA and ART. Overall, 39.0% of women correctly answered all AMA-related questions. The question with the highest proportion of correct answers (48.8%) was: Women are healthier during pregnancy because they have reached a higher age of maturity. The question with the lowest percentage of correct answers was: Miscarriage rates are greater (32.0%) after infertility treatment (Figure 1). Overall, 30.6% of women answered each ART-related question correctly. After infertility treatment, the number of twins and triplets increases (41.4 %). This question had the highest percentage of accurate answers. The following questions received the lowest number of correct answers (19.7%): Infertility therapy increases the baby's chance of genetic problems (Figure 2). The quantitative statistics for the answers indicated that the TKS mean was 34.8%.

Knowledge Score		***Yes***	***No***	***I don't know***	***P-value***
1.	Miscarriage is less after 35 common after 35 years old	70 (34.5%)	79 (38.9%)*	52 (25.6%)	0.001
2.	Women are healthier during pregnancy because they are more mature after 35 years old	67 (33.0%)	99 (48.8%)*	35 (17.3%)	0.001
3.	It is harder to get pregnant after 35 years old	79 (38.9%)*	75 (36.9%)	47 (23.2%)	0.001
4.	Cesarean section is more common after 35 years old	71 (35.0%)*	73 (36.0%)	57 (28.0%)	0.001
5.	Stillbirths/fetal deaths are less common after 35 years old	40 (19.7%)	90 (44.3%)*	71 (35.0%)	0.001
6.	The risk of genetic problems in the baby is higher after 35 years old	75 (36.9%)*	53 (26.1%)	73 (36.0%)	0.001
7.	Women have more medical problems during pregnancy after 35 years old	76 (37.4%)*	64 (31.5%)	61 (30.1%)	0.001
8.	After infertility treatment, miscarriage rates are higher	65 (32.0%)*	56 (27.6%)	80 (39.4%)	0.001
AMA= 39.0%					
1.	Women have fewer problems like diabetes and high blood pressure after infertility treatment	43 (21.2%)	72 (35.4%)*	88 (43.4%)	0.001
2.	Cesarean section is more common after infertility treatment	62 (30.5%)*	58 (28.6%)	83 (40.9%)	0.001
3.	Stillbirths/fetal deaths are more common after infertility treatment	53 (26.1%)*	58 (27.6%)	92 (45.3%)	0.001
4.	There are more twins and triplets after infertility treatment	84 (41.4%)*	52 (25.6%)	67 (33.0%)	0.021
5.	The risk of genetic problems in the baby is higher after infertility treatment	40 (19.7%)*	60 (29.6%)	103 (50.8%)	0.001
ART= 30.6%					
TKS= 34.8%					

AMA: Knowledge of the effect of Advanced Maternal Age on pregnancy outcomes; ART: Knowledge of the success of Assisted Reproductive Techniques; TKS: Total knowledge score; Note: *Refers to the correct answer.

Table 3: Knowledge about reproductive and fertility technologies.

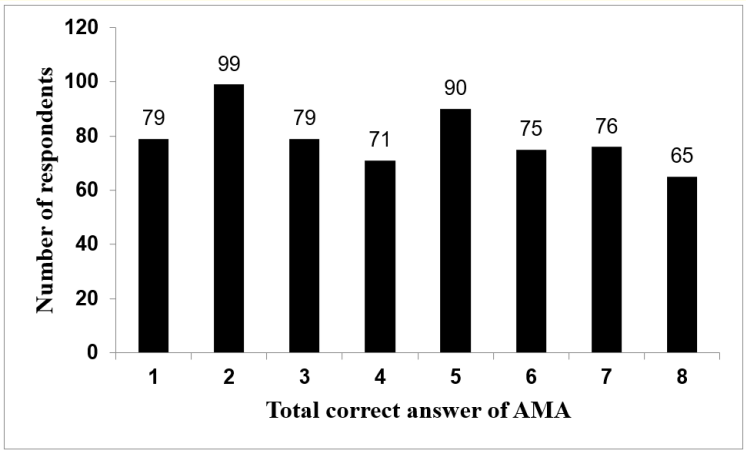

Figure 2: Total scores for knowledge of the effect of advanced maternal age on pregnancy outcomes (AMA). Eight multiple-choice general knowledge questions about fertility were given to respondents in the fertility knowledge survey (Supplementary Figure 1). The graph (n = 203) shows each respondent's total score for all right answers to the questions.

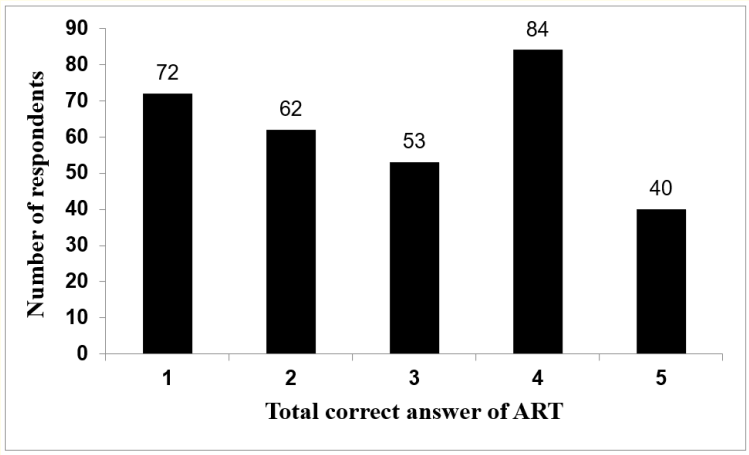

Figure 3: Total scores for knowledge of the success of assisted reproductive techniques (ART). Five multiple-choice general knowledge questions about fertility were given to respondents in the fertility knowledge survey (Supplementary Figure 1). The graph (n = 203) shows each respondent's total score for all right answers to the questions.

Discussion

Making correct choices about whether, when, and how to get pregnant requires women and couples to have a thorough understanding of reproductive issues. To maximize reproductive and pregnancy outcomes, it is critical to identify knowledge gaps among women of reproductive age, including common myths and beliefs, attitudes, and practices, when planning and having children [16]. Similarly, identifying how women obtain information regarding reproductive health can point to ways in which improved communication and information sharing could occur.

According to the presence data, 41.9% of the population comprises fertile women; most women fall into younger age groups (the average age is lower than 35 years). This result was agreed with Sarría-Santamera et al., who reported that 62.1% of women were younger than 35 years [17].

Women's health knowledge was low and needed improvement concerning labor, delivery, and reproductive health. Additionally, previous research indicates that women need to be better informed on how aging affects fertility decline and the reduced chance of conception at older ages [19]. Making educated decisions is severely constrained by this need for more knowledge.

In this study, two socioeconomic level variables were considered: income and education. A major global health issue affecting millions of people in high, middle, and low-income nations is infertility. In our study, 43.4% of the participants reported income levels <5000, and 45.3% had at least a university degree. It has been suggested that delaying marriage and having children is a normal demographic reaction to societal changes and economic problems.

Clinical investigations on the link between smoking status and infertility in females are limited and controversial. Three studies found a substantial link, with smokers at 1.85 times more likely to experience infertility. However, the relationship varies by current smoking status and varies across race and age groups. Some evidence suggests smoking may impact natural female fertility by affecting reproductive function elements. In our study, smoking was prevalent among fertile age women, indicating a risk factor and a key factor in infertility cases [20].

Based on their replies on the AMA score, women in this study have a low understanding of the impact of older age on infertility. It's interesting to note that women with specific infertility diagnoses [21, 22] knew more about ART [23].

Delayed childbearing among women in high-income countries has increased over the past decades, with the average age of having a first child being 30 years in Europe. This delay is more common among women with higher education and has led to increased pregnancy problems and higher risks for pregnancy and childbirth complications. Women under 30 have an 85% chance to conceive within 1 year, while older women are more likely to experience a miscarriage. Advanced maternal age is associated with prolonged time to conceive, and postponed parenthood may affect the desired family size. A computer simulation program by Habbema et al. calculated the recommended age to start a family for women, depending on the number of children desired and the extent women were prepared to undergo fertility treatment. The model predicts that couples with a desire for a one-child family should start at the latest at age 32, two-child families at age 27, and three-child families at age 23 [6]. This varies in Saudi Arabia due to cultural variances, educational levels, and a lack of understanding about advanced age and pregnancy outcomes.

There are certain limitations on our work because of their location. Our sample, which consists mainly of women who participated in the survey, a convenience sample that is likely biased due to the participant group's higher educational and socioeconomic status, cannot be regarded as typical of all Saudi women. A further constraint is the absence of data regarding the ethnic origin and place of residence of women. The analyzed data were limited, and the patient sample size was small. Since our results may not apply to the entire population in Saudi Arabia.

Conclusion

The study highlights a lack of information on the impact of aging on fertility and the potential benefits of assisted technology. It suggests that women need more information about reproduction to prevent infertility and improve preconception health. Fertility health education should be part of comprehensive health promotion programs, encouraging healthy lifestyle choices like a balanced diet, exercise, and folic acid prenatal vitamins. These interventions should be integrated across hospitals and care levels for timely follow-up and ongoing patient communication.

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Authors declaration

Authors declare that there is no conflict of interest.

Ethical approval

Ethical approval was obtained with institutional review board no. 23-061 at king Salman bin Abdulaziz medical city.

Authors contributions

RAS has been doing Conceptualization, Methodology, Writing-Reviewing and Editing of the manuscript. DKA has been responsible for Data curation. KAB conduct Data analysis. MAA wrote discussion. RMA Wrote Original draft and edited the final draft. AMH Supervised the research team, Reviewed and Edited the research.

All authors have critically reviewed and approved the final draft and are responsible for the content and similarity index of the manuscript.

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