

About Fertility: Fertile and Infertile Women's Views on Fertility Awareness and Lifestyles

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Received: 2024-08-02.

Accepted: 2024-11-04.



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J Clin Med Kaz 2024; 21(6): 35–40

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Abstract

Background: Infertility is a widespread problem that has significant impacts on individuals, families, and society. It's known that low fertility awareness and lack of knowledge about lifestyle factors affect fertility.

Aim: To compare fertility awareness and healthy lifestyle practices among women with and without infertility.

Methods: Data were collected from 172 infertile and fertile women who received care at the Infertility Unit and the Antenatal Care Unit of a hospital in Turkey between November 2022 and January 2023. The study data were obtained using the Healthy Lifestyle Behavior Scale and Fertility Awareness Scale.

Results: Although there were variations between infertile and fertile women in characteristics such as marriage duration, frequency of exercise, smoking habits, history of depression and caffeine intake, these differences were not statistically significant. But, fertile women had a more positive lifestyle in terms of nutrition ($p < 0.001$). Additionally, fertile women had a higher fertility awareness than the infertile women. The main factor affecting fertility awareness in these women was cognitive and somatic awareness ($p < 0.001$).

Conclusions: There are distinct differences in healthy lifestyle behaviors and fertility awareness between fertile and infertile women.

Keywords: fertility; fertility awareness; healthy lifestyle; infertility.

Introduction

According to the World Health Organization (WHO), infertility is defined as "a reproductive system disorder characterized by the inability to achieve a clinical pregnancy after 12 months or more of regular, unprotected sexual intercourse." It is estimated that around 48 million couples and 186 million individuals globally are affected by infertility [1]. In Turkey, approximately 1.5 to 2 million couples are reported to experience fertility issues [2]. Infertility is a widespread problem that has significant impacts on individuals, families, and society. Achieving the necessary conditions for fertility is crucial for a healthy pregnancy, and these conditions encompass various factors such as

nutrition, physical activity, sleep, alcohol and tobacco use, work conditions, and medication use [3,4]. It is hypothesized that making lifestyle adjustments and increasing fertility awareness could potentially enhance fertility outcomes. The female reproductive system and fertility are influenced by various factors, including a woman's age and lifestyle choices. Among these lifestyle factors, aspects like nutrition, exercise, body weight, obesity, eating disorders, psychological health, substance use (such as smoking, alcohol, and drugs), caffeine intake, environmental and occupational exposures, and sexually transmitted infections can impact female fertility. While age is an unchangeable factor, lifestyle behaviors and habits are modifiable and

within an individual's control [5].

Research indicates that women experiencing infertility often have low fertility awareness and lack knowledge about how lifestyle factors affect fertility [6]. Lifestyle choices are crucial not only for fertility but also for overall health, reproductive health, and sexual health. These behaviors, which individuals can control and improve, can either positively or negatively influence reproductive health. Those who understand the impact of lifestyle on fertility are more likely to adopt healthy habits to preserve their fertility. To protect fertility and enhance fertility awareness, individuals should be encouraged to make healthy changes to risky lifestyle behaviors, such as quitting smoking, improving eating habits, and exercising regularly. Increasing fertility awareness among women, preventing infertility, and promoting healthy behaviors require a collaborative approach involving multidisciplinary teamwork [7,8]. In consequence, while research in the literature generally focuses on general fertility awareness, the differences between these two groups have not been sufficiently examined. In particular, determining the differences between infertile women's lack of knowledge and fertile women's awareness levels may help us better understand the impact of socio-cultural and economic factors. It is also important to consider the relationship between fertility awareness and healthy life behaviors. Individuals with fertility awareness are more likely to adopt healthy living habits such as healthy eating, regular exercise and stress management. In this context, developing an understanding of the factors that increase or inhibit fertility awareness in women experiencing infertility may both improve individuals' healthy living behaviors and increase the effectiveness of support and treatment processes.

This research aims to compare fertility awareness and healthy lifestyle practices among women with and without infertility. Given the lack of comparative studies in this area, the findings from this research are anticipated to provide valuable insights and contribute to the existing literature.

Material and methods

This study, which was descriptive, cross-sectional, and comparative in design, was conducted between November 2022 and June 2023. The research adhered to the guidelines set forth by the Strengthening the Reporting of Observational Studies in Epidemiology (STROBE).

Sample

The study population included both infertile and fertile women who received care at the Infertility Unit and the Antenatal Care Unit of a hospital in Turkey between November 2022 and January 2023. Sample size calculations were conducted using the G*Power (3.1.9.2) software, with a 0.05 significance level and 90% power. Based on an assumed medium effect size ($d=0.5$) for comparisons in independent groups, the calculations indicated that each group should include 86 participants, as determined using the chi-square test (Figure 1).

Inclusion criteria: The sample included infertile women, which consisted of primary infertile women receiving infertility treatment without any previous successful live births or pregnancies, and fertile women, which consisted of primiparous women between 32 and 40 weeks of gestation. The study included women aged 18 to 49 years who had at least a primary school education.

Exclusion criteria: Women with chronic disorders, diagnosed with obstetric or gynecological diseases.

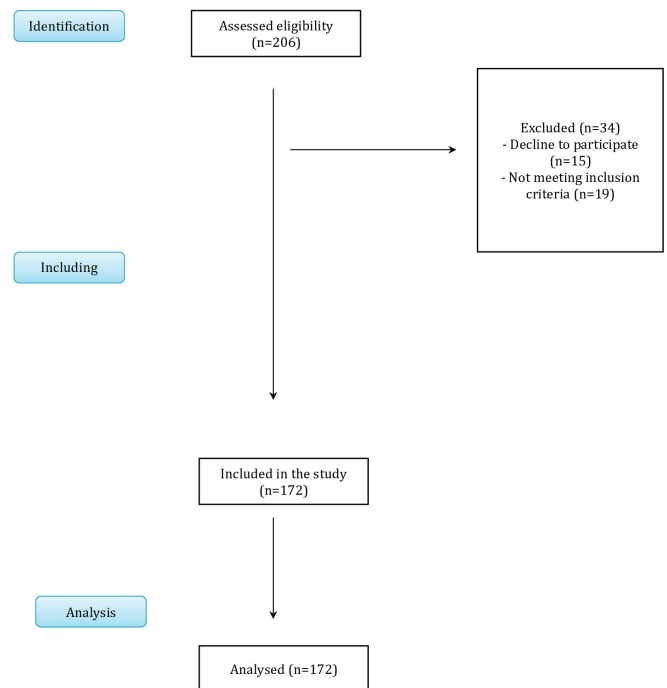


Figure 1 – Strengthening the Reporting of Observational Studies in Epidemiology (STROBE) flow diagram

Measurement tools

Measurement tools are given below.

Descriptive Information Form: The researchers developed this form following an extensive review of existing literature [9,10]. It comprised 13 questions designed to gather information about the characteristics of women experiencing infertility, including details such as age, level of education, spouse's age, length of marriage, duration of infertility treatment, types of treatments received, smoking habits, and other relevant factors.

Healthy Life Style Behaviour Scale II (HLSBS-II): The scale, initially developed by Walker et al. in 1987, is based on Pender's Health Promotion Model and was designed to assess health promotion behaviors [11]. It underwent revisions in 1996 and was subsequently renamed the Healthy Lifestyle Behavior Scale II (HLSBS-II) [12]. The Turkish version's validity and reliability were established by Bahar et al. in 2008. This scale comprises 52 items across six subscales: spiritual growth, interpersonal relations, nutrition, physical activity, health responsibility, and stress management. Higher scores on the scale reflect increased positive health behaviors. The original Cronbach's alpha coefficient was reported as 0.92 [13], while in this study, the coefficient was found to be 0.91.

Fertility Awareness Scale (FAS): Özşahin and Derya (2022) conducted the Turkish validity and reliability study of the scale. The scale consists of 19 items and two subscales, which are "Bodily Awareness" (consisting of 10 items) and "Cognitive Awareness" (consisting of 9 items). As the total score on the scale increases, the level of awareness also increases. When evaluating the total score on the scale, a score between 19 and 43 indicates low awareness, a score between 44 and 69 indicates moderate awareness, and a score between 70 and 95 indicates high awareness. The Cronbach's alpha coefficient for internal consistency of the total scale score is 0.887 [14]. In this study, the Cronbach's alpha coefficient was found to be 0.713.

Research Process

This study was conducted in an in vitro fertilization center in Turkey. The hospital provides important services in the field of reproductive health with its laboratories and specialized physician staff. In addition, the pregnancy outpatient clinic of the same hospital provides comprehensive support and follow-up services for women during pregnancy. These two units work in an integrated manner to meet the needs of patients in fertility treatment and pregnancy monitoring.

The fertility clinic of the hospital conducts new patient admissions on Mondays and Tuesdays. On these days, face-to-face interviews were held with women who were seeking services for the first time and had been diagnosed with primary infertility. During these interviews, the purpose of the study was explained in detail. Forms were filled out by researchers for infertile women who agreed to participate and met the inclusion criteria (BU, AY). Additionally, the hospital has an antenatal clinic on Thursdays and Fridays for pregnant women. In this clinic, face-to-face interviews were conducted with primiparous women between 32 and 40 weeks of gestation. During these meetings, the purpose of the study was explained to these women as well, and forms were filled out by researchers for fertile women who agreed to participate and met the inclusion criteria (RD, ED). The study is anonymous; therefore, the identities of the participants were kept strictly confidential. Participants were given detailed information about the process before participating in the study and their written informed consent was obtained. All data were recorded free of personal identifying information and was used for research purposes only.

Statistical analysis

Statistical analyses were conducted using the Statistical Package for the Social Sciences (SPSS) version 25.0. Continuous variables were reported as means (\bar{x}) and standard deviations (SD), whereas categorical variables were reported as frequencies

(n) and percentages (%). The Shapiro-Wilk test was employed to evaluate the normality of continuous variables. To compare continuous variables between groups, both the Student's t-test and Mann-Whitney U test were utilized. The Chi-square test was used for categorical variables. Additionally, Pearson correlation analysis was performed to examine relationships between different scales.

Ethics Approval

The study received ethical approval from Istanbul University-Cerrahpaşa Social and Humanities Ethics Committee (Ethics Committee Date: 11.08.2022, No: 347). All phases of the research adhered to the principles outlined in the Helsinki Declaration. Authorization was secured from the relevant institution for data collection, as well as from the owners of the measurement scales and the participating women.

Results

Table 1 displays the descriptive characteristics and comparative data for infertile and fertile women. The average age of women with infertility was found to be 32.5±5.18 years, while the average age of their husbands was 35±6.05 years. The average duration of marriage was 5.00±3.92 years, the average duration of infertility was 2.50±3.27 years, and the average sleep duration was 7.5±1.26 hours. In contrast, fertile women had an average age of 28.5±4.69 years, with their husbands averaging 32±5.29 years. The duration of marriage for fertile women was also 5.00±4.06 years, and their average sleep duration was 8.00±1.66 hours. Statistically significant differences were observed between the groups: infertile women were older ($p<0.001$), their spouses were older ($p=0.001$), and they had a shorter sleep duration ($p=0.031$). However, there were no significant differences between the groups concerning the duration of marriage, regular physical activity, smoking status, history of depression, or caffeine intake ($p>0.05$).

Table 1 Comparison of descriptive characteristics between groups

	Infertile Women (n=86)		Fertile Women (n=86)		Test	p
	\bar{x}	SD	\bar{x}	SD		
Age	32.50	5.18	28.5	4.69	t=4.639	<0.001*
Husband Age	35	6.05	32.0	5.29	Z=-3.432	0.001*
Duration of Marriage (year)	5	3.92	5	4.06	Z=-1.680	0.093
Duration of Infertility (year)	2.50	3.27	---	---		
Sleep Duration (hour)	7.50	1.26	8	1.66	Z=-2.151	0.031*
	N	%	N	%		
Regular Exercise						
Yes	17	19.8	22	25.6	$\chi^2=0.829$	0.363
No	69	80.2	64	74.4		
History of Depression						
Yes	15	17.4	15	17.4	$\chi^2=0.000$	1.000
No	71	82.6	71	82.6		
Smoking Status (per day)						
1-20	13	15.2	7	8.1	$\chi^2=4.487$	0.106
Never	73	84.8	79	91.9		
Caffeine Consumption						
Rarely	19	22.1	28	32.6	$\chi^2=5.301$	0.258
Sometimes	24	27.9	26	30.2		
Frequently	15	17.4	11	12.8		
Always	12	14.0	5	5.8		
Never	16	18.6	16	18.6		
Duration of Infertility Treatment (years)						
1-3	54	62.8	----	----		
4-6	20	23.3				
7+	12	14.0				
Infertility Treatment						
Intrauterine Insemination (IUI)	18	20.9	----	----		
In Vitro Fertilization (IVF)	68	79.1				
Cause of Infertility						
Female factors	32	37.2				
Both factors	26	30.2				
Unexplained	28	32.6				
Pregnancy						
Planned	----	----	66	76.7		
Unplanned			20	23.3		

X: Mean, SS: Standard deviation, t: Student-t Test, Z: Mann-Whitney U Test, χ^2 : Chi-square test

The data regarding the comparison of mean scores obtained from HLSBS-II for infertile and fertile women are shown in Table 2. According to our findings, the mean score of the Nutrition subscale was significantly higher in fertile

women compared to infertile women, indicating a high and very significant statistical difference ($p < 0.001$). There were no significant differences between the groups in terms of total scale score and other subscales ($p > 0.05$).

Table 2 Mean scores of infertile and fertile women on the HLSBS-II Scale and its subscales

Parameters	Infertile Women (n=86)	Fertile Women (n=86)	Test	p
	$\bar{x} \pm SD$	$\bar{x} \pm SD$		
HLSBS-II Subscales				
Physical Activity	11.50±5.24	14.00±4.86	Z=-1.589	0.112
Nutrition	22.00±4.55	26.00±4.31	Z=-4.345	<0.001*
Health Responsibility	24.00±4.63	24.00±4.44	Z=-0.286	0.775
Spiritual Growth	31.00±4.41	31.00±4.91	Z=-0.405	0.686
Interpersonal Relations	29.50±4.04	30.00±4.23	Z=-0.214	0.831
Stress Management	21.00±4.10	22.00±4.35	Z=-0.087	0.930
Total Score	140.00±19.96	150.00±20.22	t=-1.188	0.237

t=Student-t test, Z=Mann Whitney-U test, $p < 0.05$

The data regarding the comparison of mean scores obtained from FAS for infertile and fertile women are presented in Table 3. According to our findings, infertile women showed a moderate level of mindfulness, while fertile women demonstrated a high level of mindfulness (total scale score: infertile women: 64.50; fertile women: 71.00). The mean score of FAS was significantly higher in fertile women compared to infertile women, indicating a high and very significant statistical difference ($p < 0.001$). In the subscales of the scale, Cognitive Awareness total score ($p < 0.001$) and Somatic Awareness total score ($p = 0.005$) were higher in fertile women, and there was a significant difference between the groups.

Table 3 Mean Scores of infertile and fertile women on the FAS and its subscales

Parameters	Infertile Women (n=86)	Fertile Women (n=86)	Test	p
	$\bar{x} \pm SD$	$\bar{x} \pm SD$		
FAS Subscales				
Cognitive Awareness	26.50±5.49	30.00±6.03	t=-4.122	<0.001*
Bodily Awareness	39.00±6.51	42.00±5.54	Z=-2.800	0.005*
Total Score	64.50±10.07	71.00±9.68	t=-4.353	<0.001*

t=Student-t test, Z=Mann Whitney-U test, $p < 0.05$.

A weak positive correlation was observed between the average scale scores for infertile women ($P = 0.445$; $p < 0.001$), while a moderate positive correlation was found for fertile women ($P = 0.591$; $p < 0.001$) (Table 4).

Table 4 Relationship between HLSBS-II Scale and FAS scores

Category	Results	
	P	p
Infertile Women	0.445	<0.001
Fertile Women	0.591	<0.001

P=Pearson, $p < 0.05$

Discussion

This study was conducted to compare fertility awareness and healthy lifestyle practices between women with and without infertility. According to the findings of the current study, it was determined that fertile women had healthier eating behaviors and

had higher fertility awareness in general. It was determined that the main factor affecting fertility awareness in these women was cognitive and somatic awareness. Current studies often evaluate fertility awareness of infertile and fertile women separately. However, studies comparing fertility awareness of infertile and fertile women are limited in the literature.

The findings reveal differences in descriptive characteristics between the two groups, with fertile women and their partners being younger on average. It is well-documented that advanced maternal age can lead to a reduced ovarian reserve, while older paternal age is linked to diminished sperm quality and testicular function, both of which can contribute to infertility [15,16]. The elevated ages observed in the infertile group of this study align with existing literature on this issue. When examining sleep duration, it is observed that infertile women had shorter sleep durations, which was statistically significant. The literature suggests that healthy sleep has positive effects on fertility, while negative sleep habits are often found in infertile women. Additionally, infertility is known to have a negative impact on sleep [17]. Although caffeine consumption was similar between infertile and fertile women in the current study, studies in the literature have reported conflicting results regarding the effects of caffeine on fertility [18,19]. The uncertainty of caffeine's effects on fertility was also reflected in the data of this study. While physical activity and exercise are known to positively support fertility, a meta-analysis has indicated contradictory results [20]. The present study showed similar rates of regular exercise between the groups, which is in line with the literature.

Studies emphasize that diet may have an effect on fertility [21]. Yang et al. (2023) reported that the Mediterranean diet may have a positive effect on fertility [22]. Poor dietary habits are known to affect fertility adversely by contributing to metabolic disorders like obesity, diabetes, hyperlipidemia, and negatively impacting oocyte quality [23]. Nevertheless, studies report that the consequences of diet for fertility are unclear. In a study of women's reproductive awareness, it was reported that the majority thought there was an association between obesity and infertility [24]. In the present study, fertile women were found to have healthier eating behaviors. However, no study was found in the literature directly evaluating the nutritional habits of women according to their fertility status. A systematic review indicates that individuals experiencing difficulty in conceiving and those planning their pregnancies have higher fertility awareness [25]. In a study involving women admitted to hospital for infertility, it was determined that women had a high level of knowledge about

the causes of infertility. However, they were still reported to have low awareness about reproductive health [24]. Similarly, the current study showed that infertile women had lower awareness. It is believed that this lack of fertility awareness contributes to the development of infertility. However, in a study including fertile women and men, fertility awareness was again found to be low. In the study, it was reported that higher education levels positively affected fertility awareness [26]. As can be seen, there are studies on fertility awareness conducted with different populations in the literature. However, the findings on the level of fertility awareness of fertile or infertile women are controversial.

Conclusion

Infertility stands out as a significant public health problem. Many infertile women do not have sufficient information about reproductive health, fertility processes and treatment options. This lack of information leads to misunderstandings and disregard for healthy lifestyle choices. The findings of the study show that women experiencing infertility generally exhibit lower levels of healthy lifestyle behaviors and fertility awareness. This situation reveals that infertile women face problems such as lack of information affecting their health decisions and not adopting healthy lifestyle habits. At the same time, the difficulties brought by the infertility treatment process also negatively affect women's mental health. Uncertainty and anxiety during the treatment process make it difficult for them to adopt habits such as healthy nutrition, regular exercise and stress management. Women under stress may disregard healthy choices and this situation negatively affects their general health status and creates a vicious cycle regarding reproductive health. Therefore, addressing the lack of information and encouraging healthy lifestyle habits is of critical importance in the fight against infertility. In light of these results, it is recommended that midwives systematically collect information about women's pre-pregnancy lifestyle habits and fertility awareness. In addition, implementation of educational programs aimed at raising awareness of effective fertility management may be beneficial in addressing and improving these issues within the community. It is recommended that future research include longitudinal studies to monitor the long-term effects of lifestyle changes on fertility outcomes. Such studies should focus on the development and implementation of interventions aimed at promoting healthy lifestyle behaviors among infertile women. Thus, with the fertility awareness gained, women can adopt healthy lifestyle behaviors and improve their reproductive health.

Strengths and Limitations

One of the strengths of this study is that it conducts a comparative analysis among women in both the in vitro fertilization clinic and the antenatal care unit. This approach

allows for a more comprehensive understanding of the effects of healthy lifestyle behaviors on fertility awareness. By focusing on women's healthy lifestyle behaviors and health literacy, the study identifies potential intervention areas to enhance women's knowledge regarding reproductive health. However, there are some limitations to this study. The research is confined to women receiving care at a hospital's in vitro fertilization and antenatal clinics in Turkey, which may restrict the generalizability of the findings to other settings or populations. Additionally, the data were collected through self-reported questionnaires; this reliance on participants' self-disclosure may introduce response biases or inaccuracies. These factors should be considered when interpreting the results and applying them to broader contexts.

Author Contributions: Conceptualization, B.U., R.D., E.D. and A.Y.; methodology, B.U., R.D. and E.D.; validation, B.U., R.D. and E.D.; formal analysis, E.D. and A.Y.; investigation, B.U. and R.D.; resources, B.U., E.D. and A.Y.; data curation, B.U. and E.D.; writing – original draft preparation, B.U., R.D., E.D. and A.Y.; writing – review and editing, B.U., R.D. and E.D.; visualization, R.D. and E.D.; supervision, B.U.; project administration, B.U., R.D. and E.D.; funding acquisition, B.U., R.D., E.D. and A.Y.

Disclosures: There is no conflict of interest for all authors.

Acknowledgments: The authors extend their sincere gratitude to all the women who generously participated in this study. We especially appreciate the willingness of the women experiencing infertility to contribute their time and insights, despite the considerable stress and personal challenges they face. Engaging with individuals under such circumstances is not only demanding but also deeply rewarding. Their cooperation and openness have been invaluable to the success of this research. We are profoundly grateful for their dedication and the opportunity to learn from their experiences.

Funding: None.

Ethics approval: The study obtained approval from the Istanbul University Cerrahpaşa Social and Human Sciences Ethics Committee (Ethics Committee Date: 08.11.2022 No: 2022/347). All stages of the study were conducted in accordance with the Helsinki Declaration. Permission was obtained from the institution where the study data would be collected, the owners of the scales used, and the women participating in the study.

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