



The effect of male and female factor infertility on women's anxiety, depression, self-esteem, quality of life and sexual function parameters: a prospective, cross-sectional study from Turkey

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Abstract

Objectives Despite the development of diagnosis and treatment methods, the psychological effects of infertility on women were not adequately addressed. This study investigated the effect of male and female factor infertility on women's anxiety, depression, self-esteem, quality of life, and sexual function parameters.

Methods In this prospective, cross-sectional study, 480 women [$n = 234$, with male factor infertility (MFI) (MFI group) and $n = 246$, with female factor infertility (FFI) (FFI group)], who could not conceive despite unprotected intercourse for 1 year, and 242 fertile healthy women (control group) who had children within the last 1 year were included. Beck Anxiety Inventory (BAI), Beck Depression Inventory-II (BDI-II), Rosenberg Self Esteem Scale (RSES), Fertility Quality of Life (FertiQoL) and Female Sexual Function Index (FSFI) questionnaires were used for patients' evaluation.

Results RSES, BAI and BDI-II scores were significantly higher and FSFI score was significantly lower in the FFI group compared to other groups. RSES, BAI and BDI-II scores were also significantly higher and FSFI score was significantly lower in the MFI group compared to the control group. FertiQoL total score was significantly lower in the FFI group compared to the MFI group. RSES score was positively correlated with BDI-II and BAI scores; however, it was negatively correlated with FertiQoL and FSFI scores.

Conclusions The negative psychological effects of infertility are ignored by many centres, especially in the treatment process of infertility. Regardless of the infertility factor (male or female), we believe that psychological support should be given to all women to improve their life quality.

Keywords Anxiety · Depression · Female factor infertility · Male factor infertility · Self-esteem · Sexual function

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What does this study add to the clinical work

Infertility can affect women psychologically. Regardless of the cause of infertility, women need psychological support. However, this is more needed when the cause of infertility is the female factor.

Introduction

Infertility is defined as the absence of clinical pregnancy despite 12 months of regular and unprotected sexual intercourse [1]. It is assumed to affect 8–12% of couples of reproductive age [2]. 20–30% of infertility is caused by only male factor, 20–30% is caused by only female factor and up to 50% is caused by both male and female factors [2]. While endometriosis, premature ovarian failure, eating disorders, hormonal imbalances, uterine fibroid, hyperprolactinemia, hypothyroidism, polycystic ovary syndrome, pituitary tumors, and endometrial polyp are some causes of female factor infertility, causes such as varicocele, cryptorchidism, endocrine disorders, infections and trauma are some causes of male factor infertility [2–4]. There are many studies investigating the effects of infertility and its treatment on anxiety, depression, sexual function, quality of life and self-esteem in both men and women [5–15]. In a case–control study conducted by Bakhtiyar et al. with 180 infertile and 540 fertile women, it was shown that mental, physical and environmental health was found to be lower in the infertile group [6]. Moghadam et al. evaluated the quality of life in 450 women using the short form of quality of life-36 (SF-36) and found that the mental subtype of SF-36 in infertile women was lower compared with fertile women [12]. In a prospective study conducted by Terzioglu et al., State-Trait Anxiety Inventory and Beck Depression Inventory (BDI) were applied to 217 couples before and after embryo transfer. Anxiety and depression scores were found to decrease in those who underwent embryo transfer, resulting in pregnancy [5].

Shahraki et al. conducted a study with 78 women with primary infertility, 71 women with secondary infertility and 115 healthy fertile women using BDI, Female Sexual Function Index (FSFI), and sexual quality of life-Female (SQOL-F) questionnaires and found that women with primary infertility had significantly lower FSFI scores and healthy fertile women had significantly lower depression scores [10]. Potur et al. investigated the sexual functions of 316 infertile and 316 fertile women, and found that infertile women had lower sexual function scores compared with fertile women [11]. In a review, it was also reported that infertility treatment leads to changes in women's sexual self-esteem and sexual function [13].

In conclusion, although there are studies in the literature evaluating the effect of infertility on women's sexual life, anxiety, depression, self-esteem and quality of life, there is no study evaluating these interrelated parameters. In our study, we also differentiated the source of infertility (according to women and men) and examined the effect on the sexual and psychological functions of women and compared them with the control group. We believe that our study is the first and comprehensive study in the literature to examine the effects of male and female factor infertility on many factors such as psychological status, sexual life and quality of life of women.

Materials and methods

After local ethics committee approval and obtaining an informed consent form from the participants, we carried out this prospective, cross-sectional study between June 2021 and March 2022. The patients were divided into three groups; (1) Women with male factor infertility (MFI group), (2) women with female factor infertility (FFI group) and (3) healthy fertile women (control group).

Couples who applied to our infertility outpatient clinic because of primer infertility were examined in terms of male and female factors. Patients' demographic properties, infertility status, and education levels were recorded.

Patients with a history of psychiatric illness (schizophrenia, post-traumatic stress disorder, major depressive disorder, generalized anxiety disorder, bipolar disorder, and persistent depressive disorder), who did not want to fill out the questionnaires, who used any medication (fluoxetine, paroxetine, sertraline, bupropion, trazodone, nefazodone, olanzapine, and quetiapine) with psychological or sexual effects, who were under infertility treatment and who had co-morbid disease (diabetes, rheumatoid arthritis, cancer, lupus, and kidney or liver failure) were excluded from the study. To form the control group, fertile healthy women who gave birth in the last 1 year and had the same demographic characteristics as the patient groups were recruited. Based on a pilot study, we found that at least 193 patients in each group were required and we recruited 250 participants in each group considering to incorrect filling out of the questionnaires and drop out of study. After checking the questionnaires, 8 (3.2%) questionnaires in the control group, 16 (6.4%) questionnaires in MFI group and 4 (1.6%) questionnaires in the FFI group were excluded due to missing information.

Finally, we included the results of 234 participants in the MFI group, 246 participants in the FFI group, and 242 participants in the control group. All questionnaires were evaluated by a specialist psychiatrist. The questionnaires used in the study were as follows;

Rosenberg self-esteem scale (RSES)

RSES is a 63-question test that measures people's self-esteem. It was developed by Rosenberg in 1965 [16]. The reliability and validity study of RSES was done in Turkey by Cuhadaroglu [17]. Low scores indicate high self-esteem and high scores indicate low self-esteem.

Beck Anxiety Inventory (BAI)

BAI is a 21-item multiple-choice scale which was developed by Beck et al. in 1988 to measure the level of anxiety [18]. The reliability and validity study in Turkey was done by Ulusoy et al. [19]. High scores indicate high anxiety.

Beck Depression Inventory-II (BDI-II)

Beck et al. developed the first 21-item scale in 1961 to measure the level of depression and its revised version, BDI-II was published in 1996 [20]. The reliability and validity study of BDI-II was done in Turkey by Kapci et al. [21]. High scores indicate high depression.

Female Sexual Function Index (FSFI)

FSFI was developed to measure sexual function in women. The reliability and validity study of FSFI was done in Turkey by Oksuz et al. [22]. The scale has subdivisions such as desire, arousal, lubrication, orgasm, satisfaction, and pain. A Likert-type scaling is used and the raw scores are multiplied by the coefficients to obtain the final score. Higher scores indicate better sexual function.

Fertility Quality of Life (FertiQoL)

FertiQoL was developed to measure the quality of life of infertile women. The reliability and validity study of FSFI was done in Turkey by Cetinbas et al. [23]. The scale has 6 subtypes; (1) The emotional subtype shows the effect of negative emotions on quality of life; (2) The mind–body subtype shows the effect of infertility on physical, cognitive and behavioral health; (3) The relational subtype shows the effect of fertility problems on relationships; (4) The social subtype shows how social interactions are affected by fertility problems; (5) The environment subtype shows how accessibility to treatment affects the quality of life and (6) The tolerability subtype shows the extent of mental and physical symptoms because of fertility treatment and how it affects daily life. High scores indicate a high quality of life.

Statistical analysis

Based on a pilot study involving 15 participants, we found that at least 193 patients in each group were required in our power analysis using G* Power software version 3.01 (Franz Foul, Kiel, Germany) with a 95% confidence interval with type I error. Data for the pilot study was included in the final study. SPSS 23.0 (IBM, USA) software was used for data analysis. Compatibility of the data with the normal distribution was analyzed via the Kolmogorov–Smirnov test. Descriptive statistics were used for the study variables. ANOVA test was used to compare the groups in terms of RSES, FSFI, BDI-II, BAI. *T* test was used to compare MFI and FFI in terms of FertiQoL. Pearson's Correlation test was used to evaluate the correlation between variables. Statistical analysis performed at the 95% confidence interval, $p < 0.005$ was accepted as significant.

Results

There was no significant difference in terms of age, education level and duration of infertility between groups (Table 1). RSES, BDI-II and BAI scores were significantly higher in the FFI group than in both MFI and control groups ($p < 0.001$). These scores were also significantly higher in the MFI group than the control group ($p < 0.001$) (Table 2). In other words, women with female factor infertility showed the highest depression and anxiety scores and lowest self-esteem scores than other groups.

When compared the FFI group with the control group in terms of FSFI scores, the FFI group had significantly lower scores than the control group ($p < 0.001$). When compared FFI group with MFI group in terms of arousal, lubrication, satisfaction, and pain subtypes of the FSFI questionnaire, FFI group had lower scores than MFI group ($p < 0.001$). The FSFI desire and orgasm subtype scores were similar between the MFI and the FFI groups ($p = 0.640$ and 0.550 , respectively). When compared MFI group with a control group in terms of desire, arousal, orgasm, satisfaction, and pain subtypes, MFI group had lower scores than the control group ($p < 0.001$). The FSFI lubrication subtype score was similar between the control and MFI group ($p = 0.990$) (Table 3).

When compared to the FFI group with MFI group in terms of FertiQoL scores, the MFI group had higher scores than FFI group except for environmental subtype (Table 4). Since FertiQoL is a questionnaire evaluating the quality of life in infertile patients, this questionnaire was not filled in by the control group.

RSES scores were positively correlated with BAI and BDI-II scores but were negatively correlated with FSFI and FertiQoL scores. This correlation was found in

all groups. A significant positive correlation was found between depression and anxiety scores. FSFI total scores and FertiQol total scores showed a significant positive correlation in all groups. Correlation of questionnaires was given in Table 5.

Discussion

Having children is a human right, but infertility can hinder this [24]. In addition, infertility has some psychological effects. Infertility brings with it anxiety disorder, low self-esteem, depression, and social stigma [1]. In the present study, it was shown that both FFI and MFI negatively affect women's self-esteem, depression, anxiety, sexual function and quality of life parameters. And, if the cause of infertility is due to female factor, these values have been shown to worsen. In case of infertility, women can blame themselves [25]. Self-blame is associated with depressed mood, increased anxiety, and decreased self-esteem [26, 27]. The fact that the cause of infertility is the female factor increases self-blame and affects the quality of life even more negatively [28].

In a meta-analysis that included 32 studies higher depression scores was found in infertile women compared to the general population [29]. In most of the studies included in this meta-analysis, depression scaling was performed with the BDI. However, no comparison was made in terms of depression by classifying the cause of infertility. In addition, both secondary infertile and primary infertile patients were evaluated heterogeneously in studies in the systematic

review. In our study, depression scores were also found to be higher in the FFI and MFI groups compared to the control group. In addition, BDI-II scores in the FFI group were found to be significantly higher than in the MFI group.

In a study comparing 150 primary infertile women with 134 fertile women, infertile women showed decreased self-esteem and increased anxiety/depression [7]. Infertile women had higher depression and anxiety scores than fertile women, but the women in the study were not grouped by cause of infertility. Cui et al. found a high prevalence of psychological distress using the Fertility Problem Inventory (FPI), low self esteem using RSES and higher anxiety using HADS in infertile women. They also found a negative correlation between self-esteem and anxiety levels [8]. Cui et al. classified the causes of infertility as FFI, MFI, and unexplained. However, there was no control group of fertile women in the study. In our study, a negative correlation was found between self-esteem and depression/ anxiety. This correlation was also found in each of the FFI, MFI, and control groups.

The frequency of anxiety in infertile women has been reported to be increased compared to the general population [30, 31]. However, no classification was made according to the cause of infertility in these studies. Although there were no fertile women making up the control group in the studies, both secondary and primary infertile patients were included in the studies. In our study, BAI scores were found to be higher in the MFI and FFI groups compared to the control group. In addition, a higher BAI score was found in the FFI group compared to the MFI group.

Table 1 Demographic characteristics of the participants

	MFI group (<i>n</i> = 234) (mean ± SD)	FFI group (<i>n</i> = 246) (mean ± SD)	Control group (<i>n</i> = 242) (mean ± SD)	<i>p</i> value
Age (years)	32.1 ± 2.9	31.8 ± 2.8	32.2 ± 2.9	0.425
Education (years)	12.3 ± 3.9	12.5 ± 3.6	12.5 ± 3.8	0.109
Duration of infertility (months)	22.8 ± 6.6	23.8 ± 6.8	n.a	0.769

n.a not applicable

Table 2 Self esteem, depression, and anxiety scores of participants

	FFI group (<i>n</i> = 246) mean ± SD	<i>p</i> value ^a	MFI group (<i>n</i> = 234) mean ± SD	<i>p</i> value ^b	Control group (<i>n</i> = 242) Mean ± SD
RSES	2.7 ± 0.6	<0.001	2.2 ± 0.5	<0.001	1.9 ± 0.2
BDI-II	23.8 ± 6.5	<0.001	17.7 ± 6.4	<0.001	13.1 ± 4.3
BAI	16.9 ± 4.2	<0.001	13.0 ± 4.0	<0.001	10.2 ± 2.9

RSES Rosenberg self-esteem scale, BDI-II Beck depression inventory-2, BAI Beck anxiety inventory

^aPost-hoc Tukey between FFI and MFI groups

^bPost-hoc Tukey between MFI and control groups

Table 3 Female sexual function index subtype scores (mean \pm SD) of groups

	Desire	Arousal	Lubrication	Orgasm	Satisfaction	Pain	Total
FFI group ($n=246$)	3.4 \pm 0.6	2.9 \pm 0.7	3.3 \pm 0.7	3.9 \pm 0.6	3.5 \pm 0.9	3.4 \pm 0.7	20.4 \pm 2.2
p value ^a	0.640	<0.001	<0.001	0.550	<0.001	<0.001	<0.001
MFI Group ($n=234$)	3.4 \pm 0.5	3.5 \pm 0.7	4.1 \pm 0.6	3.8 \pm 0.8	4.2 \pm 0.9	3.9 \pm 0.8	22.9 \pm 2.4
p value ^b	<0.001	<0.001	0.990	<0.001	<0.001	<0.001	<0.001
Control group ($n=242$)	3.7 \pm 0.7	3.9 \pm 0.7	4.1 \pm 0.6	4.2 \pm 0.8	4.6 \pm 0.8	4.4 \pm 0.7	24.8 \pm 2.3

^aPost-hoc Tukey FFI and MFI groups^bPost-hoc Tukey MFI and control groups**Table 4** The fertility quality of life tool subtype scores (mean \pm SD) of groups

	MFI group ($n=234$)	FFI group ($n=246$)	p value
Emotional	63.9 \pm 11.9	56.6 \pm 12.9	<0.001
Mind–body	76.5 \pm 9.6	65.9 \pm 12.4	<0.001
Relational	78.8 \pm 8.4	76.7 \pm 9.7	0.011
Social	76.9 \pm 8.1	72.1 \pm 8.6	<0.001
Environmental	63.6 \pm 8.2	66.4 \pm 7.8	<0.001
Tolerability	73.8 \pm 10.5	66.1 \pm 12.8	<0.001
Total	71.8 \pm 4.2	66.8 \pm 4.5	<0.001

Table 5 Correlations among the questionnaires in all participants ($n=722$)

	RSES	BDI-II	BAI	FSFI	FertiQoL
RSES	1				
BDI-II	0.964*	1			
BAI	0.955*	0.998*	1		
FSFI	– 0.433*	– 0.419*	– 0.413*	1	
FertiQoL	– 0.603*	– 0.587*	– 0.587*	0.208*	1

*Correlation is significant at the 0.01 level (2-tailed)

Starc et al. published a systemic review on infertility and sexual dysfunction in 2019, and the included studies mentioned the negative effects of infertility on both male and female sexuality [15]. However, the studies included in this review had some limitations. Some of them had insufficient sample size, some did not include a fertile control group. In addition, the groups in the studies showed heterogeneous distribution and no classification were made according to the cause of infertility. In our study, sexual function was negatively affected by infertility in both FFI and MFI groups compared to the control group. In addition, all FSFI scores, except orgasm, were found to be significantly lower in the FFI group than in the MFI group.

There are many studies evaluating the quality of life of infertile patients, and it is predicted that the most appropriate scale to evaluate this would be FertiQoL [32–34]. These studies stated that the quality of life in infertile women

may change with factors such as age, educational status, and infertility period. In our study, there was no difference between the groups in terms of these factors, so the effect of infertility on quality of life in terms of FFI and MFI could be evaluated. FertiQoL total score was found to be significantly lower in the FFI group compared to the MFI group.

The high number of participants in our study, that the study group comprised only primary infertile patients, the control group comprised fertile women, and the homogeneity of the groups were the most important strengths of our study.

Limitations

Because the questionnaires we used for analysis in the research were not filled face to face, they were based on the answers of the participants. However, due to a large number of questionnaires and the length of the questionnaires, it was ensured that the participants were filled in by themselves. This study may not reflect different regions of Turkey, although the number of patients was high and the data were collected in several centres. As another limitation, considering that not only women but also men can be affected by infertility, evaluations could be made for spouses in terms of depression, anxiety and quality of life. Although infertility is associated with depression, anxiety and quality of life in men in the literature [35–38]. However, these studies did not make any assessment grouped according to the cause of infertility.

Conclusion

Infertility affects women negatively in terms of depression, anxiety, quality of life, sexual function and self-esteem. This effect has even more negative consequences when the cause of infertility is due to the female factor. This issue is ignored by many centres, especially in the treatment process of infertility. Regardless of the reason for infertility (male or female), we believe that psychological support should be given to these women who could not have children.

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Author contributions DK and TT: performed the study conception. BA, EO and NDG: contributed to the study design. Data collection was performed by DK, TT and NDG. The first draft of the manuscript was written by DK and TT. The manuscript was reviewed by BA, EO and NDG: under the supervision of DK. The project was administrated by DK, TT and BA. All authors read and approved the final manuscript.

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Data availability The datasets generated and/or analyzed during the current study are not publicly available because of our hospital policy, but are available from the corresponding author upon reasonable request.

Declarations

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

Ethical approval Ethical approval was obtained from the Ethics Committee of Fatih Sultan Mehmet Training and Research Hospital (FSMEAH-KAEK 2021/55). All methods were carried out under the relevant directives and regulations.

Consent to participate Informed consent was obtained from all subjects involved in the study at baseline consultation.

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