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Psychological and Socio-Demographic Predictors of Sexual Function in Women with Premature Ovarian Insufficiency: A Cross-Sectional Study

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ABSTRACT

Background & Objective: Sexual function significantly affects the quality of life in women with premature ovarian insufficiency (POI). This study aimed to identify predictors of sexual function considering psychological and socio-demographic factors.

Materials & Methods: The study was conducted in Tabriz, 2021, with 130 women who had POI. Data were collected using the female sexual function index (FSFI), perceived stress scale (PSS), Spielberger state-trait anxiety inventory (STAI), Rosenberg self-esteem scale (RSES), Beck depression scale (BDI), and socio-demographic characteristics questionnaire. The Pearson correlation test was used to determine the correlation between psychological variables and the total sexual function score. Additionally, the general linear model was used to identify the predictors of sexual function.

Results: The mean (SD) score of sexual function was 13.8 (6.7). There was a significant negative correlation between stress (r=-0.22, p=0.018), state anxiety (r =-0.13, p=0.153), trait anxiety (r=-0.26, p=0.005), depression (r=-0.39, p<0.001) with total sexual function score. On the other hand, self-esteem had a positive correlation (r= 0.34, p<0.001) with sexual function score. Moreover, variables such as desire to pregnancy and type of pregnancy were predictors of sexual function. Sexual function score was significantly higher in women who wanted to become pregnant than in ones who did not (p=0.012) and in women who became pregnant naturally than in women who became pregnant through assisted reproductive techniques (ART) (p=0.002).

Conclusion: The study findings indicate that the sexual function of women with POI is influenced not only by psychological factors but also by their desire to become pregnant and the type of pregnancy they have. Given the intricate interplay between psychological and physical factors and sexual function among infertile women, further research is warranted in this area.

Keywords: Premature Menopause, sexual function, Stress, Anxiety

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1. Introduction

Premature Ovarian Insufficiency (POI) refers to the early cessation of ovary function, accompanied by an increase in follicle-stimulating hormone (FSH) levels above 40 mIU/mL (1), and a decrease in estradiol levels in women under 40 years of age (2). The main symptom of this disease is primary or secondary amenorrhea (3).

The primary type occurs before age of 20, accompanied by the complete depletion of ovarian follicles (4). In the secondary type, follicular structures are preserved in the ovaries, allowing for the possibility of induced or spontaneous return of ovarian function (5). Women with POI face major difficulties with fertility and conception (6). The prevalence of this disease is 0.01% in women under 20, 0.1% under 30, and 1-2% under 40 (7). Low levels of estrogen can cause a range of symptoms such as vaginal dryness, hot flushes, night sweats, hair loss, dry skin, and weakness (8). Additionally, it can have serious health consequences, including autoimmune diseases, osteoporosis, cardiovascular diseases (9), psychological distress, neurological effects, and sexual dysfunction (10). Sexual dysfunction is one of the common symptoms of this disease (11). It refers to difficulty in any stage of the

sexual response cycle (12) or pain during intercourse (13). Various factors such as psychological, biological, and social factors can cause sexual disorders (14). Sexual dysfunction can negatively affect a person's mood, self-centeredness, and self-confidence (15). A meta-analysis conducted in Iran revealed that almost half of women in the general population experienced sexual dysfunction (16). A recent study also showed that women with POI had lower scores in all areas of sexual function and quality of life compared to the control group (15). This disease can lead to high stress, low life satisfaction, and emotional and social limitations (17, 18). Additionally, women with this condition may feel less feminine, older, and sexually unattractive (19). Previous research indicates that women with POI, regardless of their hormonal levels, experience mental distress, such as depression, social anxiety, low self-esteem, and reduced self-confidence (20, 21).

Despite the significant impact of POI on women's lives, no study has yet investigated the relationship between psychological issues and sexual function in Iran. Therefore, this study aims to identify the psychological and socio-demographic factors that affect sexual function in women with POI.

2. Materials and Methods

2.1 Search Protocol

We conducted a cross-sectional study on 130 women with POI who were referred to the Al-Zahra educational center and private clinics in Tabriz city between February and May 2021.

The inclusion criteria for the study were women under 40 years old with confirmed POI in their medical records, ability to communicate, and minimum literacy.

Women with mental or motor disabilities were excluded from the study. Based on the findings of a previous study by Benetti et al. (22) on sexual function, where the mean score was 24 and the standard deviation was 5.7 with alpha level of 0.05, power at 90%, and effect size of 0.06, the required sample size was calculated to be 122. However, to account for possible dropouts, we examined a total of 130 women in our study.The study was initiated after receiving confirmation from the ethics committee of Tabriz University of Medical Sciences (ethics code: IR.TBZMED.REC.1400.413). The sampling was carried out on a purpose-based approach. The list of women with POI was extracted from the files available in the centers. They were contacted and explained the research process, inclusion and exclusion criteria, and conditions. If they were interested in participating, they were scheduled to meet with the research team at the clinic at a specific time. During the meeting, the research team explained the objectives and methods of the project in detail. After that, the participants completed and signed the informed consent form. The researcher conducted interviews to complete the questionnaires of socio-demographic characteristics, PSS, STAI, BDI, RSES, and FSFI. To show appreciation, a free counseling session was offered to the participants. Sexual health issues were discussed during this session following the completion of questionnaires. Data were collected using socio-demographic characteristics questionnaire, FSFI, PSS, STAI, BDI, and RSES.

2.2 Socio-demographic characteristics questionnaire

The questionnaire included various items such as age, education, job, pregnancy type, history of childbearing, and having frozen eggs. It was evaluated by Tabriz University of Medical Sciences faculty members for content and face validity. Based on the feedback received, necessary corrections were made to enhance its quality.

2.3 Perceived Stress Scale (PSS)

The Cohen Perceived Stress Scale (PSS) is a tool that measures a person's general stress levels over the past month, including their thoughts and emotions. This study used the 14-item version, where each item is rated on a 5-point Likert scale ranging from "never" (0) to "very high" (4). The total score ranges from 0 to 56, with a cut-off of 21.8; A higher score indicates more stress. This tool has been validated psychometrically in Iran (23).

2.4 Spielberger State-Trait Anxiety Inventory (STAI)

The STAI scale consists of 40 self-report items on a 4-point Likert scale. It measures two types of anxiety: state anxiety and trait anxiety. State anxiety evaluates one’s current emotional state, with options ranging from very low (1) to very high (4). Trait anxiety measures general emotions and offers options from rarely (1) to almost always (4). Higher scores indicate higher levels of anxiety. The Persian version of the STAI scale is a valid and reliable tool (24).

2.5 Beck Depression Inventory (BDI)

The BDI is a self-report inventory consisting of 21 items that measure the severity of depression. The inventory assesses affective, cognitive, somatic, and vegetative symptoms. Each item is scored on a scale of 0 to 3, providing four options. A higher score on the scale indicates a more severe depression. The total score of the inventory ranges from 0 to 63. The Persian version of the BDI has demonstrated appropriate internal consistency (25).

2.6 Female Sexual Function Index (FSFI)

The FSFI (Female Sexual Function Index) is a self-report scale consisting of six subscales, namely sexual desire, arousal, lubrication, orgasm, satisfaction, and pain. These subscales have a response range of 0 or 1-5. Each subscale score is multiplied by a subscale factor ratio and then added up to obtain the total FSFI score.

The total score ranges from 2.0 to 36.0, with higher scores indicating better sexual function. The optimal cut score for the FSFI's total score is 26.55. The reliability and validity of the questionnaire were evaluated using the Cronbach's alpha coefficient, which was found to be 0.70 (26).

2.7 Rosenberg Self-Esteem Scale

It is the most commonly used instrument to evaluate self-esteem.

The scale consists of 10 items that measure positive and negative feelings about oneself, and is answered using a 4-point Likert scale. The total score on this scale ranges from 0 to 10, where a score of less than 5 indicates low self-esteem. The Persian version of this scale has been validated in Iran (27). The psychometric properties of the questionnaires were validated by measuring internal consistency. The Cronbach's alpha coefficients for STAI, BDI, FSFI, and RSES were 0.780, 0.864, 0.965, and 0.710, respectively.

2.8 Statistical Analysis

The data analysis in this study was conducted using SPSS Statistics V24. Normality was measured using skewness and kurtosis. Pearson correlation was used to determine the relationship between variables of stress, anxiety, depression, and self-esteem with sexual function.

The study also investigated the association between socio-demographic characteristics and sexual function using one-way ANOVA, independent t-test, and Pearson correlation. The adjusted general linear model was then used to identify the significant predictors of sexual function and the impact of independent variables (stress, anxiety, depression, self-esteem, and socio-demographic characteristics) on the dependent one (sexual function). A P-value less than 0.05 was considered significant.

3. Results

A total of 130 women with POI were evaluated in this research. The majority of the participants (64%) were between 35-40 years old. Table 1 shows the socio-demographic characteristics.

The sexual function score of the participants had a mean (SD) of 6.7 (13.8) out of 2.0-36. The highest mean score was related to the subscale of desire [1.0 (2.8)]; the lowest was the subscale of pain [1.5 (2.1)]. There was a significant negative correlation between perceived stress (r=0.22, p=0.018), state anxiety (r=0.13, p=0.153), trait anxiety (r=0.26 r=0.005), and depression (r=0.39, p<0.001) with sexual function. On the other hand, there was a significant positive correlation between self-esteem (r=0.34, p<0.001) and sexual function. Please refer to Table 2 for more details.

The results of bivariate tests, including independent t-tests and one-way analysis of variance, indicate that there is a significant relationship between different variables such as job (p=0.028), desire to conceive (p=0.022), and type of pregnancy (p=0.001), as shown in Table 3. These variables, along with stress, state anxiety, trait anxiety, depression, and self-esteem, were examined in the adjusted general linear model. The findings suggest that the desire to conceive and the type of pregnancy are the predictors of sexual function, accounting for 41.1% of the variance. The sexual function score was significantly higher among women who wanted to conceive compared to women who did not (B=3.93; 95% CI: 6.97 to 0.89; P=0.012). It was also higher in women who got pregnant naturally than those who used ART (B=4.66; 95% CI: 7.49 to 1.84; P=0.002) (Table 4).

Table 1. Social-demographic characteristics of women with POI (n=130)* Standard Deviation; † Assisted Reproductive Technology

Characteristic	Number (Percent)	Characteristic	Number (Percent)
Age (Year)		**Husband's age** (Year)	
<25	4 (3.1)	<35	17 (13.2)
25-35	43 (32.9)	35-45	74 (56.8)
35-40	83 (64.0)	>45	23 (30.0)
Mean (SD*)	34.5 (5.1)	**Mean (SD*)**	39.3 (5.5)
Diagnosis age		**Husband's Education**	
<25	9 (6.9)	Under diploma	20 (15.4)
25-35	67 (58.7)	Diploma	38 (29.2)
35-40	54 (34.4)	University	56 (43.1)
Mean (SD*)	32.4 (4.9)	**Husband's job**	
Education level		Worker	20 (15.4)
Under diploma	32 (24.6)	Clerk	38 (29.2)
Diploma	26 (20.0)	Other	56 (43.1)
University	72 (55.4)	**Income sufficiency for living expenses**	
Job		Insufficient	39 (30.0)
Housewife	84 (64.6)	Somewhat sufficient	76 (58.5)
Employed	46 (35.4)	Completely sufficient	15 (11.5)
Gravida history		**Having child**	
Yes	56 (43.1)	Yes	56 (43.8)
No	74 (56.9)	No	73 (56.2)
Desire to conception		**Pregnancy type**	
Yes	82 (63.1)	Natural	31 (23.8)
No	32 (24.6)	ART†	26 (20.0)
Having frozen eggs		**Number of marriages**	
Yes	5 (3.8)	Once	104 (80.0)
No	124 (95.4)	Twice	12 (9.2)

Table 2. Status of stress, anxiety, depression, self-esteem, and sexual function and the correlation between psychological factors with sexual function in women with POI (n=130)

Characteristic	Mean (SD)	Obtained score range	Relationship with FSFI	
			R*	P
Stress	31.8 (4.5)	23.0 to 44.0	-0.22	0.018
State anxiety	48.3 (6.8)	35.0 to 79.0	-0.13	0.153
Trait anxiety	47.9 (7.4)	36.0 to 94.0	-0.26	0.005
Depression	19.8 (9.0)	1.0 to 39.0	-0.39	<0.001
Self-esteem	5.3 (2.5)	0.0 to 10.0	0.34	<0.001
Sexual function	13.8 (6.7)	2.0 to 28.80	-	-

Characteristic	R	P	Characteristic	Mean (SD)	P
Age (Year)	-0.04§	0.666*	**Husband's Education**		0.327‡
Diagnosis age	-0.02§	0.835*	Under diploma	12.1 (6.0)	
Husband's age	-0.14§	0.137*	Diploma	14.9 (6.7)	
	Mean (SD)	**P**	University	13.6 (6.9)	
Education level		0.237‡	**Husband's job**		0.737‡
Under diploma	12.0 (6.0)		Worker	12.4 (5.2)	
Diploma	13.7 (6.8)		Clerk	14.2 (7.4)	
University	14.6 (6.9)		Other	13.7 (6.4)	
Job		0.028†	**Income sufficiency for living expenses**		0.465‡
Housewife	14.7 (6.3)		Insufficient	14.9 (6.3)	
Employed	11.7 (7.2)		Somewhat sufficient	13.3 (6.7)	
Gravida history		0.735†	Completely sufficient	12.9 (7.7)	
Yes	14.0 (6.4)		**Number of marriages**		0.401†
No	13.5 (7.0)		Once	14.0 (6.8)	
Desire to conception		0.022†	Twice	12.2 (5.7)	
Yes	14.8 (6.2)		**Having Frozen egg**		0.691†
No	11.1 (7.4)		Yes	14.9 (4.8)	
Having child		0.821†	No	13.7 (6.8)	
Yes	13.9 (6.4)				
No	13.6 (6.9)				
Pregnancy Type		0.001†			
Natural	16.7 (5.4)				
ART	11.0 (6.1)				

Table 3. The relationship between socio-demographic characteristic with sexual function in women with POI (n=130)

Table 4. Predictors of sexual function in women with POI through logistic regression test (n=130)

Variables	β (95% CI*)	P
Desire to conception		
Yes	3.93 (0.89 to 6.97)	0.012
No	0	
Pregnancy type		
Natural	4.66 (1.84 to 7.49)	0.002
ART	0	
Job		
Housewife	1.49 (-1.62 to 4.60)	0.341
Employed	0	
Stress	0.01 (-0.47 to 0.50)	0.957
State anxiety	0.01 (-0.25 to 0.26)	0.958
Trait anxiety	-0.13 (-0.51 to 0.24)	0.479
Depression	-0.17 (-0.44 to 0.09)	0.192
Self-esteem	0.69 (-0.24 to 1.63)	0.145

4. Discussion

The results of the study indicate that women with POI have lower-than-average sexual function scores. Among the different aspects of sexual function, the desire subscale scored the highest, while the pain subscale scored the lowest. The desire to conceive and the type of pregnancy were found to be predictors of the sexual function score.

In this study, it was found that women with POI had a lower sexual function score than the average. The lowest mean score was related to the subscale of pain. In the study by Yela et al. on 80 women with POI, the women in the study group had a lower mean score in various subscales of sexual function as compared to the control group (women of the same age with normal ovulation cycles). Furthermore, they reported experiencing more pain during intercourse than the control group (28). A study conducted by Deeks et al. in 2011 found that women with POI experienced less sexual arousal than the control group due to dyspareunia and pain during intercourse (29). Another study conducted by Benetti-Pinto et al. in 2011 found that women with POI had a lower mean physical health score than the control group and experienced more sexual pain (30).

The results of the present study are consistent with the findings of previous studies. Reduced ovarian activity caused by a deficiency of both androgens and estrogen leads to a decrease in sexual arousal, vaginal dryness, and painful intercourse. This can result in a lack of self-esteem and a negative body image. Sexual satisfaction is mainly determined by painless intercourse (31). In this research, the total score of sexual function had a significant correlation with the psychological factors of

stress, anxiety, depression, and self-esteem. A study conducted by Abedi et al. in 2015 found that stress has an adverse effect on different aspects of sexual function and the number of sexual intercourses (32). Similarly, in different research, it was reported that stress, anxiety, and depression are negatively associated with sexual function, with depression being the most significant factor (33). Epidemiological research has found that women who experience vulvodynia, a condition where they feel pain during intercourse, often suffer from higher levels of anxiety and depression. Neuropathic mechanisms are involved in the pathophysiology of this pain. Furthermore, there is strong evidence that links anxiety and depression to neuroplastic changes in the central nervous system. This can lead to central sensitivity, which can cause more pain (34).

Recent research has shown that depression, anxiety, and pain are common in the areas of the cerebral cortex, biological neural networks, and neurotransmitters such as serotonin and noradrenaline (35).
The study conducted by Wischmann et al. in 2014 revealed that there is a significant relationship between self-esteem and sexual function in women who suffer from infertility (36). Sexual self-esteem refers to a person's self-evaluation as a sexual individual, which is associated with their perceived sexual competence, and plays a crucial role in both their psychological and sexual adaptation. Self-esteem, as a social criterion, determines the degree of acceptance or rejection of a person by others, and this can be severely affected in infertile women (37).
In this study, women who experienced natural pregnancy reported better sexual function compared to those who underwent ART. A study conducted by Smith et al. in 2015 found that women who received IVF (In Vitro Fertilization) treatment reported lower scores in all subscales of sexual function compared to the control group.

The lowest scores were observed in the subscales of desire and orgasm (38). In a cross-sectional study by Wang et al. (2021), lack of self-esteem negatively affected the sexual function of women undergoing IVF (37). Infertile women may experience a decrease in sexual satisfaction as a result of ART, leading to a decline in self-esteem and quality of life. Infertile women tend to see sex as a chore rather than a source of satisfaction. Women who are undergoing IVF treatment may need to monitor their ovulation frequently; it guides their sexual life and sexual activity becomes a necessary matter to be done at a specific time. After being diagnosed with infertility, social isolation can intensify. Infertility can cause stigma and distress, which can make sexual activities feel meaningless. Moreover, women experiencing infertility may be at a higher risk of experiencing different forms of sexual violence (39).
In this study, women who were trying to conceive had a better sexual function score compared to those who were not trying to get pregnant. This could be attributed to the fact that couples who are trying to conceive tend to focus more on their sexual relationship and may receive better sexual education. The research also identified a strong correlation between the desire to have a baby and sexual function. ART treatments can have a significant impact on the psychosexual health of couples (40).

The available research is limited in this field; further studies are needed to establish a comprehensive conclusion.
The relationship between psychological factors and sexual function can be complex. It is difficult to determine whether unhealthy psychological factors like stress, anxiety, or depression have caused sexual dysfunction, or if the opposite is true. Sexual function is affected by both physical and psychological factors, making it a multifaceted issue. A combination of integrated medicinal methods and cognitive approaches is the best way to address this problem.
Strengths and limitations

In our research, we utilized standard and valid questionnaires. However, due to the rarity of the disease among women, we were unable to use random sampling as the statistical population was too small. Therefore, we used the convenience sampling method which was one of the limitations of this study. Additionally, the statistical population was limited to women referred to infertility clinics. As this was a cross-sectional study, the relationships found between stress, anxiety, depression, and self-esteem with sexual function do not necessarily indicate a causal relationship.
Future studies should explore the relationship between FSH and estradiol, depression, anxiety, sexual dysfunction, and the possibility of spontaneous pregnancy.

5. Conclusion

The study found that a woman's desire to conceive and the type of pregnancy (natural or using ART) have a direct relationship with her sexual function score if she has POI.
This indicates that there is a complex interplay between psychological and physical factors affecting the sexual function of infertile women. Given the prevalence of infertility and the importance of sexual health in a woman's mental health, it is crucial to conduct further research on interventions for younger women. This will help identify effective treatments and improve the quality of sexual function through psychological and pharmaceutical interventions.

6. Declaration

6.1 Acknowledgments

The authors express their gratitude for the help and cooperation of the study participants.

6.2 Authors' Contribution

The authors contributed equally. All of them read and approved the final manuscript.

6.3 Conflict of Interest

The authors declare no conflict of interest.

6.4 Funding

Tabriz University of Medical Sciences.

6.5 Ethics Approval

The study was done with permission from the ethics committee of Tabriz University of Medical Sciences Ethics code: IR.TBZMED.REC.1400.413

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