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Original Article

Comparison of Mental Health Status in Infertile Women with or without Polycystic Ovary Syndrome

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Abstract

Background: The aim of this study was to evaluate mental health disorders in infertile women with Polycystic Ovary Syndrome (PCOS) compared to the infertile women without PCOS.

Methods: These two parallel case series studies were conducted during a 12-months period from June 2020 to march 2022 at Arash Hospital affiliated to Tehran University of Medical Sciences (TUMS). A total of 69 PCOS and 69 non-PCOS women diagnosed with infertility were recruited into the study. The Symptom Checklist-90 (SCL-90) containing of nine main domains: somatization, obsessive-compulsive, interpersonal sensitivity, depression, anxiety, hostility, phobic anxiety, paranoid and psychoticism was filled out by the participants. The independent t-tests and logistic regression analysis were implemented for comparative analysis.

Results: The prevalence of depression was approximately 34% among the infertile women with PCOS which did not significantly differ from non PCOS group (32%). It was shown that phobic anxiety even after adjusting for age was significantly lower in infertile group with PCOS than non-PCOS group. After entering phobic anxiety as independent variable in the model, the odds of having any psychiatric morbidities were significantly lower in infertile women with PCOS than non-PCOS group.

Conclusion: The results demonstrated that some mental health disturbances can be observed among infertile women regardless of the etiology of their infertility. Hence, physicians should pay more attention in early diagnosing and managing of psychiatric disorders in these patients.

Keywords: Depression, Female, Infertility, Mental health, Polycystic ovary syndrome, Prevalence

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Introduction

Polycystic Ovary Syndrome (PCOS) is one of the common endocrine disorders that occurs in 5-10% of women during their reproductive age (1). Its classical presentation consisted of menstrual abnormalities, biochemical or clinical hyperandrogenism, and the appearance of polycystic ovaries on ultrasound. Clinical hyperandrogenism is characterized by hirsutism, acne, and alopecia. Moreover, PCOS is one of the primary causes of infertility, all of which diminish the quality of life in the patients (2).

There is some evidence showing that specific features of PCOS patients including infertility (3), hirsutism (4) and acne (5) are associated with mental health disturbances among these populations. On the other hand, it has been reported that symptoms of depression and anxiety in PCOS patients are associated with their high Body Mass Index (BMI) and waist to hip circumference ratio (6,7). Several studies have shown that physical changes due to hyperandrogenism in women with PCOS would affect their female identity and is also culturally undesirable (8).

Moreover, their isolation from society due to the negative self-image and low self-esteem caused by infertility are major risk factors for developing depression and anxiety disorders (9). It has been shown that high prevalence of mood swings and depression in these population can be attributed to the direct effect of elevated androgen levels (10), and most PCOS symptoms may contribute to anxiety (11,12). Tan *et al* (13) from China found that the prevalence of depression and anxiety was 27.5% and 13.5% among PCOS patients, respectively that was significantly higher than healthy controls. A study conducted on women with PCOS in Sweden found higher prevalence of sympathetic neuronal activity induced by high testosterone concentrations when compared with controls (14).

In a study conducted by Li *et al* (15), it was revealed that the prevalence of depression, obsessive-compulsive, interpersonal sensitivity, and hostility symptoms are significantly higher in infertile women with PCOS than those without PCOS. Researchers also found that acne has a negative effect on mental health and plays an important role in developing mental disorders in PCOS patients.

According to the numerous studies conducted in the field of mental health in PCOS patients without infertility and the presence of infertility as an important factor in mental health disorders, the authors decided to conduct a mental health examination in the PCOS with infertility group in comparison with the non-PCOS infertile group

Material and Methods

These two parallel case series studies were conducted during 12-months period June 2020 to march 2022 at Arash Hospital affiliated to Tehran University of Medical Sciences (TUMS). The sample size was determined according to 2 mean comparison formulas, considering power 0.8 and alpha 0.05. The mean (standard deviation) of General Symptom Index (GSI) in PCOS and normal group was considered as 0.5 and 0.24, respectively. The sample size was estimated to be 69 subjectsPer group Infertility was defined as not getting pregnant after one year of having normal sex without taking contraceptives. PCOS was diagnosed according to the Rotterdam criteria (16): 1) oligo- and/or anovulation (oligomenorrhea or amenorrhea), 2) clinical or biochemical signs of hyperandrogenism, 3) the appearance of polycystic ovaries on ultrasound (presence of 12 or more follicles in each ovary measuring 2-9 *mm* in diameter, and/or increased ovarian volume (>10 *ml*). PCOS was confirmed in the presence of two above-mentioned criteria besides the exclusion of other etiologies such as congenital adrenal hyperplasia, androgen-secreting tumors, hyperprolactinemia, and Cushing's syndrome, resulted in the confirmed diagnosis of PCOS. The control group consisted of 69 infertile women due to other etiologies such as endometriosis, reduced ovarian reserved, hypogonadotropic hypogonadism, tubal factor, male factor, and idiopathic condition. The exclusion criteria in the participants consisted of history of psychological disorders, taking psychiatric medications, chronic disorders, and taking contraceptive drugs during the past 2-month.

The patients' records including demographics data (age, BMI, duration of infertility, and level of education in patients and their husbands), past medical history, and physical examination (clinical hyperandrogenism) observations were gathered in predefined questionnaires.

SCL-90 questionnaire, grading, and interpretation

The Symptom Checklist-90 (SCL-90) was filled out by the participants. The test was developed by Derogatis *et al* (17) and consisted of 90 items that evaluates various aspects of psychological problems. It has been frequently applied all over the world, and has been validated and translated among Iranian population by Mirzai *et al* (18). The SCL-90 items consist of nine main domains: somatization, obsessive-compulsive, interpersonal sensitivity, depression, anxiety, hostility, phobic anxiety, paranoid and psychoticism. The answers to each of the questions is a 5-point scale ranging from zero (never) to 4 (very much) that indicate the degree of discomfort. To calculate the GSI, the total scores that obtained from the 9-dimensional symptoms and additional questions were calculated, then the obtained number was divided by the number of 90 test questions. Mean scores of 1 and above was indicative of morbidity and higher than 3 indicated psychotic condition.

Statistical analysis

The distribution of quantitative variables was examined by Kolmogorov–Smirnov test. Continuous variables are presented as the mean±standard deviation (SD) and the categorical data as number and percentage. The Independent t-test was used to compare the means and Chi-Square test was used to compare categorical data. To examine the influencing factor in qualitative- or quantitative outcome, logistic regression analyses or ANCOVA test was performed, respectively. Data were analyzed using SPSS version 22 statistical software. All $p<0.05$ were supposed as statistically significant.

Ethical considerations

The study protocol was reviewed and confirmed by the Ethics Committee of Tehran University of Medical Sciences. The purpose, optionality, and confidentiality of the study were explained individually separately to each patient and written informed consent was obtained from all the participants.

Results

Patients' characteristics

Baseline characteristics of the study participants are presented in table 1. The infertile women with PCOS were younger, had lower age of menarche, and had higher rates of acne and hirsutism than the infertile group without PCOS. The mean scores obtained from the questionnaire are presented in table 2. According to SCL-90, no significant difference was observed between the two study groups regarding symptomatic morbidities; except phobic anxiety that was significantly higher in infertile group without PCOS (0.46±0.58 *vs*. 0.23±0.29, p=0.004).

Prevalence of different psychiatric morbidities among the study population are shown in table 3. There was no

Table 1. Baseline characteristics of the study participants

	Infertile women with PCOS (n:69)	Infertile women without PCOS (n:69)	p-value
Age (years)	30.79±5.22	34.72±5.41	<0.001
BMI (kg/m^2)	26.98±4.94	25.57±3.63	0.058
Duration of infertility (years)	4.90±3.28	4.52±3.43	0.499
Age of menarche (years)	12.66±1.55	13.14±1.22	0.047
Level of education			
Illiterate	1(1.4)	0	0.524
Under diploma	15(21.7)	8(11.6)	
Diploma	18(26.1)	22(31.9)	
Associate degree	6(8.7)	5(7.2)	
Bachelor	23(33.3)	24(34.8)	
MA	6(8.7)	9(13)	
Upper than MA	0	1(1.4)	

Contd. table 1.

Husband's level of education			
Illiterate	2(2.9)	0	
Under diploma	9(13)	13(18.8)	
Diploma	32(46.4)	24(34.8)	
Associate degree	3(4.3)	6(8.7)	
Bachelor	18(26.1)	18(26.1)	0.390
MA	5(7.2)	8(11.6)	
Upper than MA	0	0	
Signs			
Acne	33(47.8)	13(18.8)	<0.001
Hirsutism	41(59.4)	7(10.1)	<0.001

Data are presented as mean ± SD or number (%). BMI; body mass index, MA; Master of Arts.

Table 2. Results of SCL-90 score in infertile group with PCOS and infertile group without PCOS

Variable	Infertile women with PCOS (n:69)	Infertile women without PCOS (n:69)	p-value
GSI	0.63±0.54	0.71±0.60	0.369
Somatization	0.73±0.65	0.76±0.65	0.747
Obsessive-compulsive	0.69±0.55	0.80±0.65	0.285
Interpersonal sensitivity	0.61±0.63	0.70±0.70	0.429
Depression	0.81±0.75	0.88±0.74	0.571
Anxiety	0.55±0.63	0.65±0.67	0.384
Hostility	0.59±0.64	0.57±0.59	0.856
Phobic anxiety	0.23±0.29	0.46±0.58	0.004*
Paranoid ideation	0.82±0.83	0.86±0.78	0.740
Psychoticism	0.43±0.58	0.53±0.70	0.395

GSI: Global Severity Index. * p-value <0.05.

Table 3. Frequency of different psychiatric morbidities among the study participants

Psychiatric disorders	Infertile women with PCOS (n:69)	Infertile women without PCOS (n:69)	p-value
Overall	12(17.4)	15(21.7)	0.520
Somatization	17(24.6)	20(29.0)	0.564
Obsessive-compulsive	18(26.1)	19(27.5)	0.848
Interpersonal sensitivity	15(21.7)	19(27.5)	0.429
Depression	23(33.3)	22(31.9)	0.856
Anxiety	11(15.9)	16(23.2)	0.283
Hostility	15(21.7)	12(17.4)	0.520
Phobic anxiety	2(2.9)	11(15.9)	0.009*
Paranoid ideation	22(31.9)	25(36.2)	0.590
Psychoticism	8(11.6)	14(20.3)	0.163

Data are presented as number (%).

significant difference regarding morbidities between the two study groups, except phobic anxiety that was significantly higher in infertile group without PCOS as compared to case group (15.9 *vs*. 2.9%, p=0.009).

In logistic regression analysis after adjustment for age, the odds of having any psychiatric morbidities were lower in infertile women with PCOS than control group; however, this difference was not significant [OR=0.690 (95%CI: 0.280-1.703), p=0.421]. After entering phobic anxiety as an independent variable in the model, the odds of having any psychiatric morbidities were significantly lower in infertile women with PCOS than control group [OR=0.067 (95%CI: 0.012-0.377), p=0.002].

For comparing the GSI score between the two study groups, after adjusting for age, no significant difference was detected regarding mean GSI score between groups (p=0.215). Finally, after adjusting for age, the mean score of phobic anxiety was significantly lower in infertile group with PCOS than control group (p<0.001).

Discussion

Polycystic ovary syndrome is one of the most common endocrine disorders in women of reproductive age, which is associated with the increased risk of insulin resistance, type 2 diabetes, dyslipidemia, infertility, and atherosclerosis. Women with PCOS commonly suffer from mental health disturbances (19).

In this study, the mean score of the SCL-90 questionnaire and its domains were not significantly different between two study groups, except phobic anxiety that was higher in infertile women without PCOS. Non PCOS infertile group was older and clinical hyperandrogenism was significantly higher in PCOS infertile group. After entering phobic anxiety as an independent variable in the model, the odds of having any psychiatric morbidities were significantly lower in infertile women with PCOS than non PCOS group.

In a case-control study by Ahmadi *et al* (20) from Iran, mental and personality disorders among 400 infertile women with and without PCOS was evaluated. Based on Millon Clinical Multiaxial Inventory (MCMI-III) test, the score of the majority mental and personality disorders were higher in infertile women with PCOS than in women without PCOS. Researchers suggested that clinicians should consider identifying and treating psychological disorders of infertile women with PCOS. These differences raised in this study may be due to different methods to evaluate the presence of psychiatric disorders.

In a study by Hussain *et al* (21) from India, about 23% of the patients in the PCOS group had major depressive disorder compared to 7.5% in the control group. About 15.5% of the patients with PCOS had anxiety disorder, and 52.7% of these patients had one of the psychiatric disorders. In the current study, 33% of the patients in the group of infertile women with PCOS and 32% of infertile women without PCOS had depressive symptoms according to the SCL-90 questionnaire. This difference between the two groups was insignificant, unlike Hussain *et al*'s study, since as mentioned, it may be due to our research in the PCOS infertile group. Moreover about 16% of the patients in the group of infertile women with PCOS had anxiety disorders.

In another study by Rassi *et al* (22) from Brazil, the prevalence of psychiatric disorders among 72 women with PCOS was evaluated using DSM-IV criteria. They found that nearly 57% of the participants presented at least one psychiatric disorder. The most prevalent disorder was major depression (26.4%) followed by bipolar disorder (11.1%). In line with their finding, it was observed that depression was the most common morbidity in infertile women with PCOS (33.3%) and those without PCOS (31.9%).

Li *et al* (15) investigated psychiatric disorders among 103 infertile women with PCOS compared to 110 infertile women without PCOS using SCL-90 questionnaire. They found that somatization, anxiety, interpersonal sensitivity, paranoid ideation, obsessive-compulsive, and hostility were significantly higher in infertile women with PCOS. Borghi *et al* (23) found that infertile women with PCOS had significantly higher scores of somatizations, anxiety, hostility, psychoticism, and overall psychological distress based on SCL-90 questionnaire than those without PCOS. Moreover, they reported that hirsutism was directly associated with anxiety. In the above two studies, the case and control groups were infertile. In the current study phobic anxiety was higher significantly in non PCOS infertile group, which may be due to older age in this group.

In this study, due to the limited number of fertile PCOS patients, the case and control groups were selected from the patients who referred to the infertility clinic; and infertility itself is a factor for mental health disorders. On the other hand, in infertile women with PCOS, it is difficult to diagnose whether the changes in mental health are due to infertility and desire for pregnancy or PCOS-related conditions. Hence, further studies with both infertile women with and without PCOS can better determine the role of fertility in the mental health status of PCOS patients. There are some limitations regarding this study. The SCL-90 checklist was used due to the limitations of conducting a clinical interview by a psychiatrist. The SCL-90 contains 90 questions for the evaluation of psychological symptoms and is answered by the patients. However, such questionnaires are not a good alternative to clinical interviews and patients may not be careful enough in filling out these questionnaires. Further studies with larger sample size, using the clinical interview method are needed to decide whether to offer psychiatric counseling to these patients to help improve the quality of life of the patients.

Conclusion

The results revealed that some mental health disturbances can be observed among infertile women regardless of the etiology of their infertility. Finally, it can be considered that early recognition and control of psychiatric disorders in these patients is one of the important aspects of disease management of these patients.

Ethics approval and consent to participate

The study protocol was reviewed and confirmed by the Ethics Committee of Tehran University of Medical Sciences (IR.TUMS.MEDICINE.REC.1398.685).
The purpose, optionality, and confidentiality of the study were explained individually separately to each patient and written informed consent was obtained from all the participants.

Conflict of Interest

Authors declare no conflict of interest.

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