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Quality of life among infertile PCOS patients

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Abstract

Objective To investigate whether quality of life differs between PCOS and non-PCOS infertile women.

Study design Two questionnaire forms of quality of life (PCOSQ, SF-36) were given to 238 women. Patients were asked to answer all of the questions in both of the questionnaires. Of these 238 women, only 49 infertile PCOS patients, 47 infertile non-PCOS patients and 62 fertile PCOS patients filled the forms completely.

Results Both PCOSQ and SF-36 scores are lowest in infertile PCOS group. Although total PCOSQ score of infertile non-PCOS group was better than non-infertile PCOS and fertile PCOS groups; there was trend for lower scores when infertility is added on PCOS status.

Conclusion The quality of life is lowest among infertile PCOS women. Both PCOS and infertility as individual factors may have negative impact in quality of life of reproductive age women.

Keywords PCOS · Quality of life · Infertility · PCOSQ

Introduction

Polycystic ovary syndrome (PCOS) is the most common endocrine disorder among women of reproductive age, causing anovulatory infertility, hirsutism, and hyperandrogenism. 6–8% of all women are affected by the syndrome. The diagnosis is done when two of the following three criteria according to Roterdam 2003 consensus are present: oligo- and/or anovulation, clinical and/or biochemical hyperandrogenism, and polycystic ovaries on ultrasound [1].

According to the World Health Organization (WHO), quality of life is defined as "the individual's perception of their position in life in the context of the culture and value systems in which they live and in relation to their goals". Health-related quality of life (HRQoL) is a multi-dimensional and dynamic concept that examines the impact of a specific disease or its treatment on physical, mental, emotional, and social functioning [2, 3].

PCOS-related problems such as infertility, subfertility, hirsutism and oligo/amenorrhea may lead to significant reduction in a woman's quality of life and her self-perception of body shape [4–6]. PCOS per se or infertility status and fertility treatment itself could affect the women's quality of life. Hence determining the quality of life of may be beneficial for choosing right treatment and evaluating the clinical response to those treatments. General surveys such as 36-item short form health survey (SF-36) and disease-specific surveys has been used for quantifying quality of life.

SF-36 is a patient-reported survey of one's own health and it evaluates 8 aspects of health such as vitality, physical functioning, bodily pain, general health perceptions, role functioning/ physical, role functioning/emotional, social functioning and mental status [7]. The advantage of disease-specific surveys to general surveys is that they provide more detailed information about the specific disease and they are more sensitive to changes in quality of life related to treatment. Polycystic Ovary Syndrome Questionnaire (PCOSQ) is a health-related quality-of-life (HRQoL) questionnaire, which was developed for women with PCOS [8]. PCOSQ includes 26 items evaluating five domains of quality of life

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(namely, concerns about body hair, emotion, weight, infertility, and menstruation).

In this study we evaluated whether quality of life differs between PCOS and non-PCOS infertile women using two different measurements of HRQoL (SF-36 and PCOSQ).

Materials and methods

A total of 238 patients who admitted to Marmara University affiliated Research and Training Hospital were included. The flow chart of participants is shown in Fig. 1. Of these 238 women, only 49 infertile PCOS patients, 47 infertile non-PCOS patients and 62 fertile PCOS patients filled the forms completely. The study was approved by the local ethics committee of Marmara University School of Medicine and was carried out in accordance with the Declaration of Helsinki. The the registry number to Marmara University Institutional Review Board (IRB) was 09.2011.0059. All subjects gave informed consent before participation.

Infertility was defined as not achieving conception after 12 months of regular sexual intercourse [9]. PCOS was diagnosed according to the 2003 Rotterdam criteria. Polycystic ovary was defined as the presence of 12 or more follicles in either of the ovaries measuring 2–9 mm and/or increased ovarian volume (> 10 mL) [10, 11]. Demographic characteristics of all patients were recorded.

The height and weight of each patient were obtained with them wearing indoor clothing and no shoes. Systolic blood pressure and diastolic BP were measured twice on both arms using a calibrated aneroid sphygmomanometer after the subject had been resting in supine position for at least 5 min; the average of two measurements was used in analysis [12].

Venous blood samples of the participants were taken during early follicular phase between the 3rd and the 5th days of their spontaneous or gestagen-induced menstrual cycles. Serum FSH, LH, Testosteron, DHEA-S, TSH, Prolactin and insulin levels were analyzed by electrochemiluminesence immunoassay (ECLIA) (Elecsys systems 1010/2010/modular Analytics E170 (Elecsys module), Roche Diagnostic Gmbh, D-68298, Mannheim/ Germany) method; estradiol levels were analyzed with immulite chemiluminesence competitive immunoassay (DPC, Los Angeles) method. Glucose levels were analyzed via spectrophotometric method (Roche Diagnostic Gmbh, D-68298). 75 g oral glucose tolerence test (OGTT) was applied to all patients.

Ovarian ultrasonography was assessed using 10-MHz vaginal or 6-MHz abdominal probe (Mindray: DC—T6; Shenzhen Mindray Bio-Medical Electronics Co., Ltd.; Shenzhen, China).

All the patients were requested to fill PCOSQ and SF-36 forms at the time of admission. Patients with any systemic, metabolic and endocrinologic diseases and patients over 35 years of age were excluded from the study. After the power analysis, the number of participants was calculated to be 65 for each group. With the arbitrary additional 50%, the intension was to collect approximately 95 cases for each group.

To detect the difference between short form 36 scores of 70 and 45, 75 patients were needed in one arm and 75

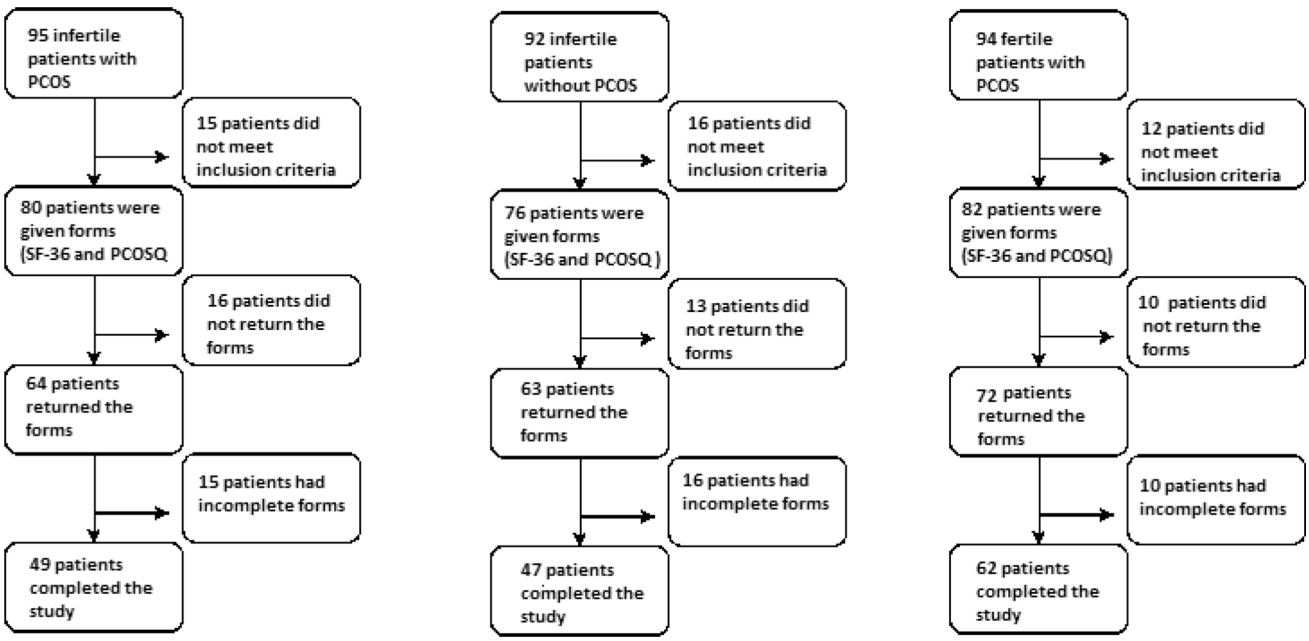

Fig. 1 The flow chart of participants

patients in the other arm, by a calculation accepting the type I error as 0.05 with the power of 88%. Likewise, 75 patients were needed in one arm and 75 patients in the other arm by a calculation accepting the type I error as 0.05 with the power of 89% to detect the difference between PCOSQ scores of 75 and 50. On the other hand, 65 patients in one arm and 65 patients in the other arm were needed by a calculation accepting the type I error as 0.05 with the power of 83% to detect the difference between short form 36 scores of 70 and 45. In addition, to detect the difference between PCOSQ scores of 75 and 50, 65 patients in one arm and 65 patients in the other arm were needed by a calculation accepting the type I error as 0.05 with the power of 85%.

For descriptive analyses; median, standard deviation, mean, ratio and frequency and for analyzing distribution of the data Kolmogorov–Simirnov tests were used. ANOVA (Tukey test), and Kruskal–Wallis (Mann–Whitney *U* test) were used in analyses of quantitative data and Chi-square test was used in analyses of qualitative data. For correlation analyses Spearman correlation was used. $p < 0.0167$ (according to Bonferroni correction; 0.05/3 = 0.0167) was accepted for the statistical significance. IBMM SPSS Program version 21 was used for statistical analyses.

Results

Patient characteristics are shown in Table 1. Mean values of weight, waist and hip circumference of infertile PCOS patients were significantly higher than the non-infertile PCOS patients. BMI of infertile PCOS patients was significantly higher than the other groups. The hormonal and biochemical parameters are also shown in Table 1.

The distribution of SF-36 and PCOSQ scores is shown in Tables 2 and 3. Both PCOSQ and SF-36 scores are lowest in infertile PCOS group. Although total PCOSQ score of infertile non-PCOS group was better than non-infertile PCOS and fertile PCOS groups; there was trend for lower scores when infertility is added on PCOS status.

Table 1 Patient characteristics

	Infertile (+) PCOS (−) (*n* = 47)	Infertile (+) PCOS (+) (*n* = 49)	Infertile (−) PCOS (+) (*n* = 62)	*p* value
Age	28.6 ± 4.2	27.9 ± 3.4	23.7 ± 4.4*♯	0.001
Height (cm)	162.4 ± 6.9	160.0 ± 6.2	162.0 ± 5.2	0.115
Weight (kg)	68.7 ± 13.8	76.1 ± 17.2	65.0 ± 15.4♯	0.002
BMI (kg/m^2)	26.1 ± 4.8	29.8 ± 6.6*†	24.7 ± 5.4	0.001
Waist circumference (cm)	85.6 ± 12.8	91.7 ± 13.4	83.2 ± 12.3♯	0.004
Hip circumference (cm)	106.4 ± 10.8	109.7 ± 13.8	100.8 ± 12.4♯	0.001
Systolic blood pressure (mmHg)	119.4 ± 8.2	121.0 ± 9.7	114.0 ± 11.8*♯	0.001
Diastolic blood pressure (mmHg)	71.5 ± 8.0	72.4 ± 8.0	72.0 ± 9.2	0.864
FSH (mIU/ml)	6.8 ± 2.2	6.0 ± 1.7	5.7 ± 1.6*	0.008
LH (mIU/ml)	4.6 ± 3.1♯†	8.1 ± 5.2	8.6 ± 5.4	0.001
TSH (mIU/ml)	2.2 ± 1.3	2.2 ± 1.4	2.0 ± 1.0	0.779
E2 (pg/ml)	40.2 ± 19.4	44.1 ± 25.4	56.1 ± 38.7	0.310
T (ng/ml)	0.4 ± 0.4	0.5 ± 0.3	0.6 ± 0.4	0.767
DHEA-S (mcg/dl)	166.0 ± 73.2	220.1 ± 102.4	216.9 ± 82.0	0.381
PRL (ng/ml)	19.2 ± 10.3	16.2 ± 6.7	16.3 ± 8.5	0.164
Ogtt 0 (mg/dl)	87.4 ± 8.5	90.0 ± 8.8	85.6 ± 8.4	0.057
Ogtt 1 (mg/dl)	109.0 ± 23.4	130.6 ± 28.4	111.1 ± 35.1	0.067
Ogtt 2 (mg/dl)	96.9 ± 31.2	100.5 ± 18.9	94.1 ± 21.0	0.488
Insulin (μU/ml)	12.9 ± 6.2	13.1 ± 7.1	12.6 ± 11.6	0.978

BMI body mass index, *FSH* follicule stimulating hormone, *LH* luteinizing hormone, *TSH* thyroid stimulating hormone, *E2* estradiol, *T* testosterone, *DHEA-S* dehydroepiandrosterone sulphate, *PRL* prolactin, *OGTT* oral glucose tolerance test

ANOVA (Tukey test)

p values < 0.0167 are statistically significant

*$p < 0.0167$ difference between group infertile (+) PCOS (−)

♯$p < 0.0167$ difference between group infertile (+) PCOS (+)

†$p < 0.0167$ difference between group infertile (−) PCOS (+)

Table 2 Short form 36 scores of study groups

	Infertile (+) PCOS (−) ($n=47$)	Infertile (+) PCOS (+) ($n=49$)	infertile (−) PCOS (+) ($n=62$)	p
Physical functioning	83.1 ± 16.9	69.5 ± 23.2*†	81.4 ± 20.1	0.001
Role functioning/physical	70.2 ± 33.5	51.7 ± 41.4	64.5 ± 41.3	0.078
Bodily pain	68.7 ± 21.9	60.9 ± 26.9	63.6 ± 23.0	0.304
General health	62.9 ± 19.5♯†	49.7 ± 18.1	54.8 ± 20.3	0.002
Vitality	60.4 ± 20.8	48.0 ± 18.2*	54.0 ± 20.5	0.012
Social functioning	77.1 ± 17.4♯†	65.6 ± 19.2	65.0 ± 23.8	0.006
Role functioning/emotional	70.2 ± 33.5	51.7 ± 41.4	64.5 ± 41.3	0.078
mental health	60.8 ± 15.9	53.4 ± 16.4	57.0 ± 18.1	0.055
Physical component	50.0 ± 7.6	44.4 ± 8.4*†	48.3 ± 8.6	0.003
Mental component	45.1 ± 11.0	40.0 ± 9.2*	42.4 ± 9.2	0.016

Kruskal–Wallis (Mann–Whitney U test)

p values < 0.0167 are statistically significant

*$p < 0.0167$ difference between group infertile (+) PCOS (−)

♯$p < 0.0167$ difference between group infertile (+) PCOS (+)

†$p < 0.0167$ difference between group infertile (−) PCOS (+)

Table 3 PCOSQ scores of study groups

	Infertile (+) PCOS (−) ($n=47$)	Infertile (+) PCOS (+) ($n=49$)	Infertile (−) PCOS (+) ($n=62$)	p
Total	69.3 ± 17.0♯†	36.5 ± 14.9	44.9 ± 17.3	0.001
Body weight	63.0 ± 32.1	29.7 ± 26.1*†	49.7 ± 32.3	0.001
Body hair	82,1 ± 24.6♯†	43.3 ± 31.4	38.0 ± 30.3	0.001
Emotion	76.2 ± 18.7♯†	40.3 ± 16.6	46.3 ± 18.1	0.001
Infertility	56.2 ± 24.6	33.8 ± 20.8*†	55.8 ± 26.0	0.001
Mensturation problems	60.7 ± 22.6♯†	31.5 ± 18.4	33.5 ± 18.8	0.001

ANOVA (Tukey test)

p values < 0.0167 are statistically significant

*$p < 0.0167$ difference between group infertile (+) PCOS (−)

♯$p < 0.0167$ difference between group infertile (+) PCOS (+)

†$p < 0.0167$ difference between group infertile (−) PCOS (+)

Discussion

Infertility is a global health problem that is affecting 49–72 million couples with a prevalence of 9–12% worldwide [13]. One of the major causes of female infertility is anovulation and only 7–18% of PCOS patients are ovulatory [14]. PCOS is a complex syndrome including clinical, endocrine and metabolic disorders which may lead to infertility [15].

The management of PCOS symptoms is complaint-oriented. Beside the infertility problem, all those complaints that might affect the patient's HRQoL should be dealt with on individual basis. With regard to the fertility treatment options, no study has yet been designed to propose the best therapy option for infertilite PCOS women. However, lifestyle modifications such as regular exercise and diet for achieving the right BMI for the woman are the initial steps for any PCOS women seeking to become pregnant [16]. Furthermore, it was shown that moderate energy-restricted diet in overweight and obese women with PCOS improved depression and HRQOL scores [17].

There are various fertility treatment options for the induction of ovulation in PCOS women including clomiphene citrate, metformin, gonadotrophins, inositols and laparoscopic drilling [18]. The possible benefits of different types of fasting and the addition of inositols to diet are being investigated recently as complementary therapeutic options for PCOS [19, 20]. Since there are different PCOS phenotypes regarding the different combinations of the diagnostic criteria [21], drug metabolism in each of the possible phenotypes may be different. Hence individualization of the therapy on the basis of these differences could be important for the success of the treatment of choice [22].

Initially Cronin et al. introduced disease-specific quality of life survey PCOSQ in 1998 with five domains [8]. Afterwards Barnard et al. modified PCOSQ including 30 items with one additional domain, acne [23]. Later Amiri et al. devoloped a more comprehensive instrument to assess HRQoL in PCOS [24]. While the clinical outcomes of any treatment for improving fertility have been widely investigated, one study has incorporated a HRQoL questionnaire in their research which has specially focused upon infertility treatment [25].

Generic surveys such as SF-36 may not be sufficient for evaluating every aspect of the quality of life in PCOS women. Nevertheless Coffey et al. reported that SF-36 and total PCOSQ scores were significantly lower in patients with PCOS compared to healthy control group [26]. In accordance with that data, a meta-analysis reported by Yanan Li et al. showed that the patients with PCOS had lower scores in all of SF-36 subscales than those of the healthy subjects [27].

In a systematic review on HRQoL in infertility, Chachamovich et al. found that infertile women had lower scores [28]. In our study PCOSQ and SF-36 were performed to three different patient groups. The infertile PCOS patients had the lowest mean PCOSQ and SF-36 score. The PCOSQ score of non-infertile PCOS patients was significantly lower than the non-PCOS infertile group, whereas there was no significant difference between these two groups in terms of SF-36 scores. These results show that both infertility and PCOS have a negative impact on the quality of life. Infertility seems to have an additional negative impact on quality of life in women with PCOS.

Infertility and the fertility therapies could be traumatic for the couples which might lower the QoL and quality of the interpersonal relationship between couples. Accordingly, psychological support can and should be a part of fertility treatment to improve the QoL [29].

Jones et al. performed PCOSQ and SF-36 surveys to patients with PCOS and concluded that the body weight and infertility had the lowest mean scores; whereas, body hair had the highest mean score. Infertility and body weight were the two subscales with the highest negative impact on quality of life. Regarding the SF-36 survey, the mean score was highest in physical functioning and emotional role functioning subscales; however, vitality had the lowest mean score [30]. McCook et al. reported that the order of main PCOSQ subscales effecting quality of life in patients with PCOS was body weight, menstrual symptoms, infertility, emotion and body hair [31].

In our study the distribution of PCOSQ sub-scale scores from the lowest to the highest in infertile PCOS patients was body weight, menstrual symptoms, infertility, body hair and emotion. In the contrary, the distribution of these scores was as menstrual symptoms, body hair, emotion, weight and infertility, in non-infertile PCOS patients. In our study the distribution of subscale scores was different from the previous studies. This difference could be due to the fact that our PCOS groups were either fertile or infertile. Furthermore, the perception of quality of life may differ among women from different ethnic backgrounds.

In the previous studies body weight was the subscale with the lowest score. This could have been due to the selection of obese and overweight PCOS patients in those studies. It is not surprising that in our study the sub-scale of menstrual symptoms had the lowest score, since 62% and 48% of the patients had oligomenorrhea and hyperandrogenism, respectively. There are different PCOS phenotypes. Hence variations in the score between studies might have been caused by the enrollment of different phenotypes into each study.

Ethnicity and socio-cultural factors may affect the perception of quality of life in different societies [32]. Moreover, Schmid et al. underlined the importance of the effect of ethnicity and different religious belief on quality of life in PCOS [33]. Community-based studies with larger sample sizes might give better insight to this issue.

Jones et al. assessed the construct validity of PCOSQ in their study and found that the emotion scale of the PCOSQ was correlated with the role functioning-emotional and mental health domains of the SF-36 [30]. In our study emotional scale of the PCOSQ was associated with the mental components summary domain of the SF-36 in infertile non-PCOS patients, the general health and mental health domains of the SF-36 in fertile PCOS patients and none of the SF-36 domains in infertile PCOS patients.

Coffey et al. reported a high construct validity for PCOSQ and showed the correlation of mental component summary with the other PCOSQ scales (convergent validity) [26]. In our study mental component summary of the SF-36 was not correlated with any PCOSQ scales either among infertile non-PCOS patients, fertile PCOS patients or infertile PCOS patients. Moreover Coffey et al. concluded no significant correlation between body weight and body hair scales of PCOSQ and physical component summary domain of SF-36 (divergent validity) [26]. In our study there was no association between body weight and body hair scales of PCOSQ, and any of the PCOSQ scales neither among infertile non-PCOS patients, nor fertile PCOS patients. Body weight was correlated with role functioning-emotional domain of SF-36 in infertile PCOS patients.

Ching et al. reported that all of the eight domains of the SF-36 were significantly correlated with all of the five domains of the PCOSQ [34]. In our study there were weak associations between SF-36 and PCOSQ in all of the study groups. Role functioning/physical and general health domains of SF-36 were correlated with emotional and menstrual symptoms scales of PCOSQ in infertile non-PCOS patients. In infertile PCOS patients there were correlations

between the role functioning/physical and the role functioning/emotional domains of SF-36, and infertility and menstrual symptom scales of PCOSQ. In short, weak or moderate correlations were observed in all the relationships.

There are some limitations to our study. First of all, since there are different PCOS phenotypes, the PCOS patients included in our study might have not been homogenous in terms of the phenotype. Hence generalization of perception of life quality for each phenotype under one type of questionnaire may not be quite rational. Second the number of patients in each group is limited due to low return of completely filled questionnaire forms.

PCOS may result in physical and social dysfunction and also physical and emotional role restriction by various symptoms. It is of great importance to evaluate the quality of life of PCOS infertile women before any fertility treatment and advise supportive help and life style changes to ease them through stressful treatment journey. Since perception of quality of life may be variable in different ethnicity and societies, community-based studies with large sample sizes should be designed. Last but not least PCOSQ must be validated in all of the different PCOS phenotypes and different cultural domains before wide usage.

Author contributions TY conceptualized and suggested a plan for the study. The data collection and input were carried out by PA and KA. The data analysis and manuscript writing was done by PA and KA. The manuscript was edited and finalized by TY.

Compliance with ethical standards

Conflict of interest The authors declare that they have no conflict of interest.

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