Original Report

Psychiatric Disorders, Self-Esteem, and Quality of Life in Adolescents with Polycystic Ovary Syndrome

Özge Gizli Çoban MD [1,*], Özge Demircan Tulacı MD [2], Asli Sürer Adanır MD [1], Arif Önder MD [1]

[1] Department of Child and Adolescent Psychiatry, Akdeniz University School of Medicine, Antalya, Turkey
[2] Department of Child and Adolescent Psychiatry, Uşak University Research and Training Hospital, Uşak, Turkey

A B S T R A C T

Study Objective: To assess psychiatric disorders in adolescents with polycystic ovary syndrome (PCOS) and evaluate health-related quality of life and self-esteem in this group.
Design: Cross-sectional design. The survey was composed of validated measures and a semistructured interview.
Setting: University School of Medicine, Turkey.
Participants: Female adolescents aged 13-18 years.
Interventions and Main Outcome Measures: Assessment of psychiatric disorders through a semistructured interview (Schedule for Affective Disorders and Schizophrenia for School Age Children) conducted by a child and adolescent psychiatrist. Health-related quality of life was measured using the Pediatric Quality of Life Inventory (PedsQL) and self-esteem was measured using the Rosenberg Self-Esteem Scale (RSES).
Results: A total of 28 adolescent with PCOS and 31 age- and sex-matched healthy peers were recruited. The psychiatric diagnosis rate was higher in the PCOS group than in the control group ($P < .5$). In the patient group, 6 of 28 patients (21%) were diagnosed with depressive disorder and the most common single diagnosis was major depressive disorder. There were no significant differences in the PCOS and control groups in terms of RSES and PedsQL scores. There was no significant relationship between RSES scores and body image related to hirsutism, acne, and body mass index. Also, there was no significant relationship between PedsQL scores and hirsutism, acne, and body mass index.
Conclusion: Adolescents with PCOS frequently experience psychiatric disorders. Physicians should be aware that adolescents with PCOS are at a high risk for major depression and anxiety disorders.
Key Words: Polycystic ovary syndrome, Adolescent, Quality of life, Self-esteem, Depression, Anxiety

Introduction

Polycystic ovary syndrome (PCOS) is a common disorder that affects almost 7% of women in reproductive years around the world.[1] The characteristic clinical features include abnormal menstrual periods, and clinical or laboratory findings of elevated androgen levels.[2] The pathogenesis of PCOS is unclear, but it is believed that the syndrome is the result of interactions between environmental and genetic factors. Moderate heritability of PCOS was reported in studies of monozygotic and dizygotic twins.[3]

Its clinical features vary among individuals and depend on the age of the woman.[4] Chronic anovulation and hyperandrogenism typically develop during adolescence. Diagnosing PCOS in adolescence is complicated because of overlapping of normal adolescent physiology.[5] The early presentation of adrenarche might show the initial clinical feature of PCOS for some girls.[6] Adolescent girls with PCOS might present with irregular menses, hirsutism, and acne. Although there is no full agreement on how to diagnose PCOS in teenage years, hyperandrogenemia might be a more consistent marker for PCOS during adolescence.[7]

Hyperandrogenism, probably the most appropriate diagnostic finding of PCOS, can be biochemical (high serum androgen concentrations, including free T and sex hormone-binding globulin) or clinical (acne, hirsutism, and alopecia). The Ferriman-Gallwey score is applied to measure hirsutism, in which scores of 8-15 indicate mild, 16-24 moderate, and 24 as severe hirsutism.[8]

Acne is a common problem during adolesence and might also be encountered in adolescent girls with PCOS. Although acne is prevalent in adolescence, it is mostly temporary and might not be determinative of hyperandrogenism.[7] If an adolescent has acne that is unresponsive to topical dermatologic therapy, she should be evaluated for hyperandrogenism.[9]

Studies have investigated the physiological and biological aspects of PCOS. In addition to whole metabolic and endocrine long-term outcomes, an increased prevalence of psychological and behavioral disorders was reported in some studies.[10] In the literature, it was reported that body image-related factors such as obesity, acne, and hirsutism, as well as worries about infertility due to PCOS could lead to a deterioration in quality of life, interpersonal functioning, and negative effects on mood and psychological well-being.[11,12] It is also suggested that mood disorders are prevalent in women with PCOS. Further, several studies have reported that the prevalence of depression and anxiety are high in these women.[12,13]

The authors indicate no conflicts of interest.

* *Address correspondence to:* Özge Gizli Çoban, MD, Department of Child and Adolescent Psychiatry, Akdeniz University School of Medicine, Antalya, Konyaaltı 07200, Turkey; Phone +905336339909; fax: +902422496040
E-mail address: ozgegizli87@gmail.com (Ö.G. Çoban).

1083-3188/$ - see front matter
https://doi.org/10.1016/j.jpag.2019.07.008

Studies indicate that mood problems, together with insulin resistance and obesity contribute to psychological and reproductive symptoms. Also, some studies have indicated that depressive symptoms are associated with increased androgen levels in women with PCOS.[13]

Health-related quality of life (HRQoL) is a multidimensional concept that comprises domains of emotional, social, and physical aspects of a disease. Most studies have shown that women with PCOS have a decreased HRQoL.[14,15] Recently, the psychosocial effect of hyperandrogenic states as well as PCOS was studied in several patient groups; however, little attention was paid to adolescent and young women.[16] Some studies indicated that PCOS negatively affects HRQoL among adolescents.[17] Body weight issues and body mass index (BMI) seemed to have a potent effect on HRQoL.[17] Quality of life is also affected by hirsutism and acne, resulting in a decrease in self-esteem and image, also a lack of self-confidence.[5] Patients describe themselves as less feminine and less attractive than their peers. It significantly affects adolescent's emotions and well-being because adolescence is the phase in life in which girls expand their social group and start having relationships with boys.[8]

The aim of this study was to assess psychiatric disorders in adolescents with PCOS and evaluate HRQoL and self-esteem in this group.

Materials and Methods

Participants

The study group consisted of 28 adolescent female patients aged 13-19 years who had previously been diagnosed as having PCOS and who voluntarily agreed to participate in the study. The exclusion criteria were the lack of consent for the participation in the study and having difficulty in understanding the questionnaires.

The control group consisted of 31 adolescents who were age-matched with the adolescents with PCOS, chosen from a local high school. The inclusion criteria for the controls were as follows: absence of severe gynecologic and nongynecologic diseases, and history of regular menstrual bleeding.

The study was approved by the Ethics Committee of the University and informed consent was obtained from each adolescent female patient and their parents.

Measures and Instruments

Sociodemographic data: age, place of living, family income, parent's age, education, marital status, type of birth, the somatic development of the adolescents (weight, height, BMI), clinical variables of PCOS such as hirsutism, acne, menstrual irregularity, and oral contraceptive use were noted. BMI was calculated by dividing weight (in kilograms) by height (in meters squared). The Ferriman-Gallwey score was used to evaluate hirsutism and values greater than or equal to 8 are significant for hirsutism.

Schedule for Affective Disorders and Schizophrenia for School Age Children Present and Lifetime

The prevalence of past and current psychopathologies in the adolescents were evaluated using a semistructured diagnostic interview according to the Diagnostic and Statistical Manual of Mental Disorders fourth edition diagnostic criteria, namely the Schedule for Affective Disorders and Schizophrenia for School Age Children.[18] The schedule was adapted to the Turkish language by Gökler et al in 2004.[19] Each interview was administered by a child and adolescent psychiatrist, thereafter the diagnoses were revised in accordance with the Diagnostic and Statistical Manual of Mental Disorders fifth edition criteria.

The Pediatric Quality of Life Inventory

The Pediatric Quality of Life Inventory (PedsQL) was designed by Varni et al to assess HRQoL among children and adolescents aged 2-18 years.[20] The 23-item PedsQL encompasses the following: physical functioning, social functioning, emotional functioning, and school functioning. Each item has a 5-point response scale. The reliability and validity of the scale was studied by Cakin Memik et al.[21]

Rosenberg Self-Esteem Scale

Self-esteem was measured using the Rosenberg Self-Esteem Scale (RSES), which is a Likert-type self-rated scale consisting of 10 questions. The validity and reliability tests of the Turkish form were studied by Çuhadaroğlu.[22]

Table 1
Sociodemographic Characteristics of Participants

	PCOS Group (n = 28)	Control Group (n = 31)	*P*
Mother's mean age ± SD, years	42.17 ± 5.01	36.77 ± 8.25	**.04**
Father's mean age ± SD, years	46.00 ± 5.97	42.00 ± 6.06	**.014**
Father employed, n	28	29	1.00
Father not employed, n	0	1	
Mother employed, n	21	22	.777
Mother not employed, n	7	9	
Family income, n (%)			.417
Low	9 (32.1)	8 (25.8)	
Medium	11 (39.3)	9 (29.0)	
High	8 (28.6)	14 (45.2)	
Type of birth, n (%)			.91
Vaginal birth	17 (60.7)	12 (38.7)	
Cesarean section	11 (39.3)	19 (61.3)	
Mean body mass index ± SD	22.68 ± 5.21	20.06 ± 1.83	**.011**

Significant values are noted in bolded font.

Table 2
Psychiatric Diagnosis of Adolescents

Psychiatric Disorder	PCOS Group (n = 28), n (%)	Control Group (n = 31), n (%)
Major depressive disorder	6 (21)	1 (3)
Attention-deficit/hyperactivity disorder	2 (7)	2 (6)
Social anxiety disorder	5 (17)	1 (3)
Separation anxiety disorder	1 (3)	0
Generalized anxiety disorder	3 (10)	0
Panic disorder	1 (3)	0
Specific phobia	2 (7)	2 (6)
Obsessive compulsive disorder	2 (7)	1 (3)
Tic disorder	1 (3)	0
Anorexia nervosa	0	0
Bulimia nervosa	0	0

PCOS, polycystic ovary syndrome.

Statistical Analyses

The categorical variables included in the study are described using frequency and percentage, and numerical variables with mean and SD or median values. To determine the normality of distribution of continuous variables, the Shapiro-Wilk test was used. The independent samples *t* test was used for normally distributed variables and the Mann-Whitney *U* test was used for those with non-normal distribution. The relationship between categorical variables was analyzed using the χ^2 test and the relationship between numerical variables was analyzed using Spearman correlation analysis. The value of $P < .05$ was adopted as the level of statistical significance.

Results

A total of 28 adolescents with PCOS and 31 age- and sex-matched healthy peers were recruited. The sociodemographic data of the PCOS and control groups are summarized in Table 1. Adolescents with PCOS and healthy peers did not differ in most of the sociodemographic variables, including occupation rates among the mothers and fathers, type of birth (vaginal or cesarean section), family income, and marital status ($P > .5$). However, BMI was significantly higher in the PCOS group than in the control group ($P < .5$).

In the PCOS group, 6 of 28 patients had taken oral contraceptives for the past 1 year. Ten of 28 patients reported having acne. The mean BMI score was 22.68 ± 5.21. A total score of 8 or more is defined as clinical evidence of hirsutism and 24 of 28 patients met the criteria for clinical hirsutism.

Psychopathologic conditions as assessed using the Schedule for Affective Disorders and Schizophrenia for School Age Children are presented in Table 2. In the PCOS group, the psychiatric diagnosis rate was higher than in the control group ($P < .5$). Of the 28 adolescents in the study group, 14 (50%) had a past or current history of at least 1 psychiatric disorder, whereas it was 22.6% in the controls ($P < .05$). In PCOS group, there were single psychopathologies in 7 (25%) adolescents, and 7 (25%) had more than 1 psychiatric disorder. None of the 31 controls had multiple psychopathologies. In the patient group, the most common single disorder was major depressive disorder (21%); however, the sum of anxiety disorders (42%) was more than for depressive disorders. In the study group, depression rates were higher among adolescents who had taken oral contraceptives for the past 1 year ($P = .038$), but there was no significant relationship between anxiety disorders and oral contraceptive use.

Table 3
Self Esteem Scores

Group	Self Esteem Score	*P*
PCOS	1.19 ± 0.93	.166
Control	1.52 ± 0.93	

PCOS, polycystic ovary syndrome.

Table 4
PedsQL Scores of adolescents

PedsQL Scores	PCOS Group	Control Group	*P*
Physical function	72.32 ± 18.70	68.54 ± 22.15	.574
Psychosocial function	71.60 ± 19.58	71.98 ± 15.76	.934
Total	71.85 ± 17.93	70.79 ± 16.14	.811

PCOS, polycystic ovary syndrome; PedsQL, Pediatric Quality of Life Inventory.

There were no significant differences in the PCOS and control groups in terms of RSES scores (Table 3) and PedsQL scores (Table 4). However, in the PCOS group, adolescents with a diagnosis of at least 1 psychiatric disorder had lower total and psychosocial health scores. Also, total and psychosocial health scores and RSES were lower in adolescents who were diagnosed as having depression. No relationship was found between anxiety disorder diagnoses and self-esteem and health scores.

There was no significant relationship between self-esteem scores and body image related to hirsutism, acne, and BMI. Also, there was no significant relationship between PedsQL scores and hirsutism, acne, and BMI.

Discussion

The main finding of this study is that psychiatric disorders are more prevalent among adolescents with PCOS than in healthy controls. However, we found no differences between the groups in terms of quality of life and self-esteem.

In our study, there was a high prevalence of psychiatric disorders among adolescents with PCOS (50%); the most common psychiatric disorder in this study was major depressive disorder (21%). The second most common diagnosis was social anxiety disorder (17.8%). In our study, psychiatric diagnosis rates in adolescents with PCOS were found as high, consistent with previous studies. In the literature, most studies that evaluated psychiatric disorders concomitant with PCOS were conducted in adult populations; there are few studies involving small numbers of adolescents with PCOS. Meanwhile, the prevalence of psychiatric disorders has been reported between 56% and 67% in women with PCOS.[23,24] The prevalence of depression among women with PCOS ranges from 28% to 64%. Anxiety is another common disorder in women with PCOS, varying from 34% to 57%.[12]

Adolescent women with PCOS have a high risk for depression and anxiety disorders, which is related to weight gain, obesity, and clinical findings of hyperandrogenism. Psychologically predisposed girls with PCOS

could develop eating disorders such as bulimia and anorexia nervosa due to overvaluing the desire to lose weight. Further, it has been suggested that PCOS might initiate a bulimic attitude, and that androgens might increase appetite and might disrupt impulse control. Even so, in a study in which the relationship between eating disorders and policystic ovaries was assessed, symptoms of eating disorder and dieting were not detected as significantly higher in adolescents with PCOS than in those with normal ovaries.[25,26] Consistent with this, in our study we did not detect any eating disorders in the semistructured interviews.

The relationship between PCOS and mood disorders is likely complex, and the pathogenesis remains unclear. For this relationship, potential mechanisms might comprise psychological, neurobiological, and social aspects. Studies on the neurobiological mechanism in mood disorders in women with PCOS include neuroimaging and hypothalamic-pituitary-adrenal axis activity studies.[27,28] The relationship between elevated levels of circulating androgens and mood disorders was reported in some studies.[29,30] Clinical hyperandrogenism features such as hirsutism and acne, as well as metabolic and reproductive manifestations of PCOS such as obesity and infertility might challenge the patient's feminine identity and cause distress. Also, biochemical hyperandrogenism and its physiological outcomes might negatively affect mood and increase anxiety in patients with PCOS.[16]

In women with PCOS, higher rates of depression and other psychiatric disorders were shown to be associated with elevated inflammatory markers, insulin resistance, and endocrine abnormalities.[8] Women with PCOS show some sickness behavior symptoms, such as depressive mood, exhaustion, sleep disturbances, and social withdrawal, probably because of chronically elevated inflammatory markers. A potential mechanism is that cytokines induce degeneration of the blood-brain barrier, thus allowing inflammatory cells to gain access to the central nervous system. By leading to serotonin deficiency, inflammatory cytokines might affect mood by altering levels of some neurotransmitters involved in the etiology of depression.[8,31]

As we have already mentioned, women with PCOS might report symptoms of depression or anxiety as a result of body image alteration due to the disorder (eg, hirsutism, irregular menses, excessive weight gain, acne, hair thinning).[32] Also, the findings associated with PCOS might be a reason for concern for girls because self-esteem and body image are considerable factors that socially affect relationships with their peers.[18] PCOS itself or probably its consequences such as body image alteration might result in social phobia and depression.[8]

In our study, depression rates were higher in adolescents who had used hormonal contraceptives. In a study by Skovlund et al, the use of hormonal contraceptives was reported to be positively associated with depression, especially in adolescents.[33] In our study, the potential adverse effects of hormonal contraceptives on mood might have played a role in the emergence of anxiety disorders and depression.

In the present study, self-esteem scores in the PCOS group were lower in adolescents who were diagnosed as having depression. It is known that depression and low self-esteem are strongly related to each other.[34] However, the self-esteem scores of the PCOS group were similar to those in the control group. Moreover, we found no relationship between self-esteem scores and hirsutism, acne, and BMI in the PCOS group. It might be because the entire PCOS group was newly diagnosed and its members were young and therefore less exposed to the hyperandrogenic effect. For these reasons, our findings might not be consistent with previous studies. In the literature, Morotti et al also reported that moderate hirsutism and hyperandrogenism had no substantial influence on self-esteem and body image in lean women with PCOS.[35] In another study by Keegan et al, 53 women with PCOS were assessed in terms of the psychological consequences of perceived hirsutism, and no significant relationship was found between perceived hirsutism and distress.[36]

HRQoL might be especially crucial for adolescents with chronic disorders who have to cope with and manage their disorder for the long term. In one study, it was reported that patient's perception of illness severity correlated more directly with their quality of life, compared with the clinical assessment.[37] In the literature, most studies reported that PCOS had a negative effect on the HRQoL of patients with the condition.[12,17,38] The clinical features of PCOS could have a significant effect on an adolescent girl's quality of life because identity development and awareness of body image is important at this stage of their lives.[37] In a study of adult women with PCOS, it was reported that the most negative influences on quality of life were associated with infertility concerns (>25 years); hirsutism, especially in those aged younger than 25 years; and excessive weight. Contrary to previous studies, we observed no significant differences between the groups in terms of quality of life, and interestingly, we found no significant relationship between quality of life scores and hirsutism, acne, and BMI in the PCOS group. However, total and psychosocial health scores were lower in adolescents in the PCOS group who were diagnosed as having depression. In our study, adolescents were newly diagnosed as having PCOS. In the coming years, infertility concerns and extended exposure to hyperandrogenism might negatively affect the adolescent's quality of life. Therefore, it is important to follow and assess this population during transition to adulthood in terms of quality of life.

Although patients might feel relief after diagnosis, they might now feel that the physician has neglected to ask about their emotional symptoms.[17] Studies have reported that adolescents mostly are distressed at the diagnosis, related to the indefiniteness about the consequences of the disorder such as the effect of testosterone and fertility.[5] Moran et al reported that girls with PCOS were more likely to have fears related to infertility, weight gain, loss of sexuality, and femininity, compared with those without PCOS. All of these fears might negatively affect quality of life.[39] It was reported that adolescents with PCOS worried more about fertility than their healthy peers and this might have a negative effect on their quality of life.[40] Studies have

also shown that most adolescents with PCOS have relatively low levels of knowledge about their conditions.[5] We did not assess the knowledge of the adolescents about PCOS in our study; the adolescents were too young to worry and take fertility into account. This might explain why the quality of life scores did not differ between the PCOS group and the healthy controls in our study.

There are some limitations of our study. First, the sample size was relatively small and did not provide sufficient statistical power to evaluate associations with less common psychiatric disorders. Second, because of the cross-sectional design, causality cannot be concluded from the associations found. Longitudinal research is needed for female adolescents with PCOS to determine the consequences of diagnosis, patient education, and long-term quality of life. Third, we did not examine some variables that might influence psychological factors such as hormonal concentrations and insulin resistance. Finally, we did not investigate the adolescents' knowledge about their disease, which might affect their emotional state and concerns.

The strengths of our study is that every adolescent was assessed by a child and adolescent psychiatrist face to face and a semistructured interview was applied. This has important advantages for evaluating other psychiatric disorders beyond depression and anxiety disorders. Second, we also assessed quality of life, self-esteem, and their relationship with body image-related factors such as hirsutism and BMI. Finally, we also compared quality of life and self-esteem with a control group.

Conclusion

The results of our study suggest that adolescents with PCOS frequently experience psychiatric disorders such as depression and anxiety disorders. The psychosocial effects of the condition on adolescent patients are noteworthy and health professionals should take into account this point with their patients and assess their feelings for psychological support. If available, a multidisciplinary approach should be adopted, which comprises care by a pediatrician, endocrinologist, dietician, and psychiatrist. It would be helpful to provide PCOS support groups, to reduce isolation, and increase young people's knowledge of the disease.

References

1. Dunaif A: Polycystic ovary syndrome in 2011: genes, aging and sleep apnea in polycystic ovary syndrome. Nat Rev Endocrinol 2012; 8:72
2. Rotterdam ESHRE/ASRM-Sponsored PCOS Consensus Workshop Group: Revised 2003 consensus on diagnostic criteria and long-term health risks related to polycystic ovary syndrome. Fertil Steril 2004; 81:19
3. Ibáñez L, Oberfield SE, Witchel S, et al: An international consortium update: pathophysiology, diagnosis, and treatment of polycystic ovarian syndrome in adolescence. Horm Res Paediatr 2017; 88:371
4. Tsikouras P, Spyros L, Manav B, et al: Features of polycystic ovary syndrome in adolescence. J Med Life 2015; 8:291
5. Mani H, Potdar N, Gleeson H: How to manage an adolescent girl presenting with features of polycystic ovary syndrome (PCOS); an exemplar for adolescent health care in endocrinology. Clin Endocrinol 2014; 81:652
6. Oberfield SE, Sopher AB, Gerken AT: Approach to the girl with early onset of pubic hair. J Clin Endocrinol Metab 2011; 96:1610
7. Chang RJ, Coffler MS: Polycystic ovary syndrome: early detection in the adolescent. Clin Obstet Gynecol 2007; 50:178
8. Farrell K, Antoni MH: Insulin resistance, obesity, inflammation, and depression in polycystic ovary syndrome: biobehavioral mechanisms and interventions. Fertil Steril 2010; 94:1565
9. Witchel SF, Oberfield S, Rosenfield RL, et al: The diagnosis of polycystic ovary syndrome during adolescence. Horm Res Paediatr 2015; 83:376
10. Fauser BC, Tarlatzis BC, Rebar RW, et al: Consensus on women's health aspects of polycystic ovary syndrome (PCOS): the Amsterdam ESHRE/ASRM-Sponsored 3rd PCOS Consensus Workshop Group. Fertil Steril 2012; 97:28
11. Teede H, Deeks A, Moran L: Polycystic ovary syndrome: a complex condition with psychological, reproductive and metabolic manifestations that impacts on health across the lifespan. BMC Med 2010; 8:41
12. Podfigurna-Stopa A, Luisi S, Regini C, Katulski K, et al: Mood disorders and quality of life in polycystic ovary syndrome. Gynecol Endocrinol 2015; 31:431
13. Brutocao C, Zaiem F, Alsawas M, et al: Psychiatric disorders in women with polycystic ovary syndrome: a systematic review and meta-analysis. Endocrine 2018; 62:318
14. Rzońca E, Bień A, Wdowiak A, et al: Determinants of quality of life and satisfaction with life in women with polycystic ovary syndrome. Int J Environ Res Public Health 2018; 15:376
15. Panico A, Messina G, Lupoli GA, et al: Quality of life in overweight (obese) and normal-weight women with polycystic ovary syndrome. Patient Prefer Adherence 2017; 11:423
16. Guidi J, Gambineri A, Zanotti L, et al: Psychological aspects of hyperandrogenic states in late adolescent and young women. Clin Endocrinol (Oxf) 2015; 83:872
17. Kaczmarek C, Haller DM, Yaron M: Health-related quality of life in adolescents and young adults with polycystic ovary syndrome: a systematic review. J Pediatr Adolesc Gynecol 2016; 29:551
18. Kaufman J, Birmaher B, Brent D, et al: Schedule for affective disorders and schizophrenia for school-age children-present and lifetime version (K-SADS-PL): initial reliability and validity data. J Am Acad Child Adolesc Psychiatry 1997; 36:980
19. Gökler B, Ünal F, Pehlivantürk B, et al: Schedule for affective disorders and schizophrenia for school age children present and lifetime version: validity and reliability of the Turkish version. Turk J Child Adolesc Ment Health 2004; 11:109–16
20. Varni JW, Seid M, Rode CA: The PedsQL: measurement model for the Pediatric Quality of Life Inventory. Med Care 1999; 37:126
21. Cakin Memik N, Ağaoğlu B, Coşkun A, et al: The validity and reliability of the Turkish Pediatric Quality of Life Inventory for children 13-18 years old. Türk Psikiyatri Derg 2007; 18:353. [in Turkish].
22. Çuhadaroğlu F: Self-esteem in adolescents. Thesis. Ankara, Hacettepe University Faculty of Medicine Department of Psychiatry, 1986
23. Rassi A, Veras AB, dos Reis M, et al: Prevalence of psychiatric disorders in patients with polycystic ovary syndrome. Compr Psychiatry 2010; 51:599
24. Månsson M, Holte J, Landin-Wilhelmsen K, et al: Women with polycystic ovary syndrome are often depressed or anxious—a case control study. Psychoneuroendocrinology 2008; 33:1132
25. Bellver J, Rodríguez-Tabernero L, Robles A, et al: Polycystic ovary syndrome throughout a woman's life. J Assist Reprod Genet 2018; 35:25
26. Michelmore K, Balen A, Dunger D: Polycystic ovaries and eating disorders: are they related? Hum Reprod 2001; 16:765
27. Marsh CA, Berent-Spillson A, Love T, et al: Functional neuroimaging of emotional processing in women with polycystic ovary syndrome: a case-control pilot study. Fertil Steril 2013; 100:200
28. Mueller SC, Ng P, Sinaii N, et al: Psychiatric characterization of children with genetic causes of hyperandrogenism. Eur J Endocrinol 2010; 163:801
29. Weber B, Lewicka S, Deuschle M, et al: Testosterone, androstenedione and dihydrotestosterone concentrations are elevated in female patients with major depression. Psychoneuroendocrinology 2000; 25:765
30. Weiner CL, Primeau M, Ehrmann DA: Androgens and mood dysfunction in women: comparison of women with polycystic ovarian syndrome to healthy controls. Psychosom Med 2004; 66:356
31. Dunn AJ, Swiergiel AH, de Beaurepaire R: Cytokines as mediators of depression: what can we learn from animal studies? Neurosci Biobehav Rev 2005; 29:891
32. Blay SL, Aguiar JVA, Passos IC: Polycystic ovary syndrome and mental disorders: a systematic review and exploratory meta-analysis. Neuropsychiatr Dis Treat 2016; 12:2895
33. Skovlund CW, Mørch LS, Kessing LV, et al: Association of hormonal contraception with depression. JAMA Psychiatry 2016; 73:1154
34. Sowislo JF, Orth U: Does low self-esteem predict depression and anxiety? A meta-analysis of longitudinal studies. Psychol Bull 2013; 139:213
35. Morotti E, Persico N, Battaglia B, et al: Body imaging and sexual behavior in lean women with polycystic ovary syndrome. J Sex Med 2013; 10:2752
36. Keegan A, Liao LM, Boyle M: "Hirsutism": a psychological analysis. J Health Psychol 2003; 8:327
37. Trent ME, Rich M, Austin SB, et al: Quality of life in adolescent girls with polycystic ovary syndrome. Arch Pediatr Adolesc Med 2002; 156:556
38. Jones GL, Hall JM, Lashen HL, et al: Health-related quality of life among adolescents with polycystic ovary syndrome. J Obstet Gynecol Neonatal Nurs 2011; 40:577
39. Moran L, Gibson-Helm M, Teede H, et al: Polycystic ovary syndrome: a biopsychosocial understanding in young women to improve knowledge and treatment options. J Psychosom Obstet Gynaecol 2010; 31:24
40. Trent ME, Rich M, Austin SB, et al: Fertility concerns and sexual behavior in adolescent girls with polycystic ovary syndrome: implications for quality of life. J Pediatr Adolesc Gynecol 2003; 16:33