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Original Article

Clinical and Demographic Characteristics of Patients Diagnosed with Polycystic Ovary Syndrome: A Cross-Sectional Observational Study

Polikistik Over Sendromu Tanısı Alan Hastaların Klinik ve Demografik Özellikleri: Kesitsel Gözlemsel Çalışma

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Abstract

Objective: The aim of this study was to investigate the clinical and demographic characteristics of patients diagnosed with polycystic ovary syndrome (PCOS) who were followed up in our hospital.

Material and Methods: We conducted a retrospective, case-controlled observational study of patients treated at the PCOS Clinic of University of Health Sciences Etlik Zubeyde Hanim Women's Health Training and Research Hospital between November 2023 and January 2024. The gynecologic history, demographic characteristics, and biochemical parameters of each patient were obtained from the hospital records.

Results: The number of patients who presented to our PCOS outpatient clinic and were enrolled in the study was 48, and the mean age of the patients was 23±5.6 years. The mean body mass index was 26.1± 4.9 kg/m2. The most common reason for presentation to the PCOS outpatient clinic was irregular menstruation (83.3%). The most frequently observed phenotypic group was group A (47.9%). The preferred treatment was lifestyle modification (75.0%), the second most common treatment was oral contraceptives (45.8%).

Conclusion: PCOS is one of the most common endocrine disorders worldwide and can affect women of all ages. In our study, the most common phenotype in our clinic was found to be group A. In addition to oral contraceptives, which are the treatment of first choice, lifestyle changes are also among the treatments used in patients.

Keywords: Phenotype; polycystic ovary syndrome; adolescents; lifestyle changes

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Öz

Amaç: Bu çalışmada polikistik over sendromu (PKOS) tanısı alan ve hastanemizde takipli hastaların klinik ve demografik özelliklerinin değerlendirilmesi planlanmıştır.

Gereç ve Yöntem: Kasım 2023- Ocak 2024 tarihleri arasında Ankara Etlik Zübeyde Hanım Araştırma ve Eğitim Hastanesi PKOS Kliniğinde takip edilen hastalar üzerinde retrospektif vaka kontrollü gözlemsel bir çalışma gerçekleştirdik. Her hastanın jinekolojik öyküsü, demografik özellikleri, biyokimyasal parametreleri hastane kayıtlarından elde edilmiştir.

Bulgular: PKOS polikliniğimize başvurup, çalışmaya dahil edilen hasta sayısı 48'dir. Hastaların yaş ortalaması 23±5.6 yıldır. Vücut kitle indeksi ortalaması 26,1± 4.9 kg/m2'dir. PKOS polikliniğine en sık başvuru nedeni düzensiz menstrüasyondur (83.3%). En sık gözlemlenen fenotipik grup ise A grubudur (47.9%). Kliniğimize başvuran hastalar en çok yaşam tarzı değişikliği tercih etmiştir (75.0%), ikinci en sık tercih edilen tedavi oral kontraseptif kullanımı (45.8%) olmuştur.

Sonuç: PKOS tüm dünyada en sık görülen ve her yaştan kadını etkileyebilen endokrin bozukluklardan biridir. Çalışmamızda kliniğimizde en sık görülen fenotip A grubu olarak bulunmuştur. First line tedavi olan oral kontraseptiflerle birlikte, yaşam tarzı değişşiklikleri de hastalara uygulanan tedavilerimiz arasındadır.

Anahtar Kelimeler: Fenotip; polikistik over sendromu; adölesan; yaşam tarzı değişiklikleri

1. Introduction

Polycystic ovary syndrome (PCOS) is an important problem with a prevalence of 5-10% in women of reproductive age (1). It is an endocrine-metabolic disorder characterized by menstrual irregularities, anovulation, clinical and/or biochemical signs of hyperandrogenism (hirsutism and/or acne), micropolycystic ovaries and metabolic abnormalities (2). Some clinical and laboratory phenotypic features that are not included in the definition criteria for PCOS, but complement the clinical picture and influence the severity and morbidity of the disease, have also been defined (3,4). These include obesity, metabolic abnormalities (insulin resistance/hyperinsulinemia, glucose intolerance/type 2 diabetes mellitus, metabolic syndrome, dyslipidemia), sleep apnea, psychosocial problems and abnormalities in gonadotropin dynamics. The most important factors influencing the phenotype in PCOS are ethnic, racial and other cultural factors. These phenotypic characteristics have similar hereditary structures and cause similar morbidities (5,6). The severity of phenotypic traits also varies widely. Another important significance of phenotypic characteristics is that treatment needs, types of treatment and treatment options differ according to these characteristics. The ovarian dysfunction (OD)+hyperandrogenism (HA)+polycystic ovarian morphology (PCOM) phenotype is considered a complete (classic) phenotype according to the Rotterdam Classification and the highest rate is observed with this phenotype. Other phenotypes according to the Rotterdam criteria can be OD+HA (non-PCO phenotype), HA+PCOM (ovulation phenotype) or OD+PCOM (non-HA phenotype) (phenotype A: HA + OD + PCOM; phenotype B: HA + OD; phenotype C: HA + PCOM and phenotype D: OD + PCOM). According to the Rotterdam criteria (3), endocrine and metabolic abnormalities are lowest in the OD+PCOM group among these 4 different phenotypes. The prevalence and distribution characteristics of metabolic abnormalities (insulin resistance, metabolic disease pattern and glucose intolerance) between phenotypes are not significantly different between the 4 groups (7). Therefore, metabolic abnormalities and distribution characteristics are not used to distinguish the different clinical PCOS phenotypes.

In this group of patients, early diagnosis and treatment of metabolic abnormalities should be emphasized. A balanced diet with lifestyle changes, weight loss and regular exercise are very important for treatment. Antiandrogenic drugs, oral contraceptives and/or metformin, which increases insulin sensitivity, are the basic approaches to drug treatment.

Given this information, the aim of this study was to investigate the clinical and demographic characteristics of PCOS patients who were diagnosed and followed up in our hospital.

2. Material and Methods

We conducted a retrospective, case-controlled observational study of patients treated at the PCOS Clinic of University of Health Sciences Etlik Zubeyde Hanim Women's Health Training and Research Hospital in Ankara between November 2023 and January 2024. Approval from the Ethics Committee for Non-Interventional Studies of University of Health Sciences Etlik Zubeyde Hanim Women's Health Training and Research Hospital was obtained before the start of the study (Approval date: 28/02/2024 Issue No.: 02/12).

Inclusion criteria for patients in the study: The study group consisted of patients who presented to the PCOS outpatient clinic of our hospital and were diagnosed with PCOS.

The 2003 Rotterdam diagnostic criteria (chronic oligo-/anovulation, clinical/biochemical hyperandrogenism, morphologically multiple small cystic ovaries) were used to diagnose PCOS (8). PCOS was diagnosed if at least two of the three criteria were met.

For the definition of menstrual irregularity;

- Any cycle lasting longer than 90 days after menarche 1 year;
- A cycle of less than 21 days or more than 35 days or less than 8 menstrual cycles per year from the year after menarche 3 until perimenopause.

Menstrual cycles lasting longer than 45 days were termed oligomenorrhea and the absence of menstruation for 3 consecutive cycles was termed amenorrhea.

The severity of hirsutism was assessed using the modified Ferriman-Gallwey system (m FGS), which analyzes the distribution of body hair. Clinical hirsutism was assumed in women with an mFG score above 8.

Total testosterone above 0.75 ng/ml and 1,4-androstenedione above 3 ng/ml were considered biochemical hyperandrogenemia.

Ultrasonography (USG) using a transvaginal 5-megahertz and a transabdominal 3.5-megahertz transducer (Aplio 500; Toshiba, Japan-2015) was performed to diagnose PCOM. The presence of 12 or more follicles with a diameter of 2-9 mm and/or an enlarged ovarian volume (> 10 ml) in one or both ovaries on USG was considered as PCOM. When the exclusion criteria were removed during our follow-up, 48 PCOS patients whose data were accessible, whose consent was obtained and who became pregnant were included.

Identification of phenotype groups: PCOS was categorized into 4 phenotypes.

PHENOTYPE A: HA + OD + PCOM

PHENOTYPE B: HA+OD

PHENOTYPE C: HA+PCOM

PHENOTYPE D: OD+PKOM were grouped as OD+PKOM.

Exclusion criteria: Exclusion criteria for both groups:
1. Patients who were not willing to participate in the study
2. Patients with additional systemic diseases (connective tissue diseases, autoimmune diseases, severe neurological-cardiac and renal diseases, infectious diseases, etc.)
3. Patients taking medications that affect lipoprotein metabolism or insulin release/sensitivity (steroids, anti-inflammatory drugs, etc.)
4. Patients who have already undergone ovarian surgery for any reason
5. Patients with endocrine disorders such as diabetes, Cushing's syndrome, thyroid dysfunction, hyperprolactinemia
6. Foreign patients in order to rule out communication difficulties and ethnic differences

The gynecological history and demographic characteristics of each patient were recorded. A general physical examination and pelvic examination were performed on all patients. Age, body mass index (BMI), waist circumference, blood pressure, fertility characteristics, treatment status, menstrual cycle, Ferriman-Gallwey scores, fasting glucose and insulin levels, serum lipid levels were recorded.

Calculation of BMI: Height and body weight of the patients were measured using professionally calibrated devices. BMI was calculated using the formula BMI = weight (kg)/height (m)2.

Collection of serum samples: Blood samples were collected at the time of diagnosis when the PCOS patients were admitted to the PCOS outpatient clinic. C-reactive protein (CRP) (mg/dL), complete blood analysis, sex hormone-binding globulin (SHBG), free and total testosterone (ng/mL), 17-OH progesterone (mIU/mL), prolactin (ng/mL), thyroid stimulating hormone (TSH) (mIU/mL), androstenedione (mosm/kg), dehydroepiandrosterone sulfate (DHEA-S) (µg/dL), Total cholesterol (mg/dL), high-density lipoprotein (HDL) cholesterol (mg/dL), low-density lipoprotein (LDL) cholesterol (mg/dL), triglycerides (mg/dL), fasting blood glucose, 50 g screening test values were analyzed in the biochemistry laboratory of Ankara Health Sciences College Etlik Zuebeyde Hanım Women's Health Training and Research Hospital. A 'Roche Diagnostic/Cobas 6000e601 Hormone Analyzer', model 2017, was used to determine serum levels of total testosterone and insulin, and a 'Roche Diagnostic Cobas 6000c-5001 Biochemistry Analyzer', model 2012, was used to determine serum lipid, CRP and glucose levels. The Roche Diagnostics / Cobas 6000 eba 1 hormone analyzer (2017) was used to measure basal hormone levels and serum levels of insulin on day 3. Serum levels of DHEA-S, 17-OH-progesterone and testosterone were measured using the radiometric method. The blood count was measured using the Sysmex/XN-1000 i (2016) blood analyzer. Serum levels of DHEA-S, 17-OH-progesterone and free testosterone were measured using a radiomonassay. Serum lipid and glucose levels were analyzed using the AU680 Chemistry System (Beckman Coulter, Fullerton, CA, USA).

Calculation of insulin resistance: A fasting blood glucose level between 100-125 mg/dl was considered as 'impaired fasting glucose'. A Homeostatic Model Assessment Insulin Resistance (HOMA-IR) value of ≥2.5 was defined as insulin resistance. Insulin resistance was calculated using the formula of the

homeostatic model. [HOMA-IR= fasting glucose (mg/dl)xfasting insulin (mIU/mL)/405].

Statistical analysis

All statistical analyzes were performed with the package program SPSS 25.0 (SPSS Inc, Chicago, IL). The Shapiro-Wilk test was used to check the conformity of continuous numerical variables to the normal distribution. Quantitative variables were expressed as mean ± standard deviation, median (minimum-maximum) and qualitative variables as relative frequency (%). The Kruskal-Wallis test was used to compare non-normally distributed parametric variables. For normally distributed variables, a one-way ANOVA was performed between the groups. The Mann Whitney U-test and the Student t-test were used to compare parametric variables in two groups with and without normal distribution, respectively. The Pearson chi-square test was used to compare categorical variables between groups. The P value < 0.05 was considered statistically significant.

Power analysis was performed using the G*POWER 3.1 program to determine the sample size. The power analysis for sample size calculation was based on the previous study by Güngör et al. (9). Participants who met the inclusion criteria were included in the study. According to the 95% confidence (1-α), 95% test power (1-β) and one-tailed t-test analysis of effect size d= 0.9610740 for independent samples, the required sample size was set at 25. Since our number is above this sample size, we assume that the significance of the study is greater than 95%.

3. Results

The number of patients admitted to our PCOS outpatient clinic between November 2023 and January 2024 was 48. The mean age of the patients was 23±5.6 years. The most common applicant group was of reproductive age (18-40 years). The mean body mass index was 26.1± 4.9 kg/m2. These data are shown in Table 1, which describes the demographic characteristics. The most common reason for presentation to the PCOS outpatient

Table 1. Demographic characteristics of patients presenting to the PCOS outpatient clinic

	Study Group N=48
Age (years)	23.2±5.6
Body Mass Index (kg/m^2)	26.1±4.9
Classification by age group n(%)	
Adolescence	18 (37.5%)
Reproductive Age	30 (62.5%)
Menopause	0
Reason for applying n (%)	
Menstrual irregularity	40 (83.3%)
Increased hair growth	31 (64.5%)
Acne	16 (33.3%)
Child counselling	4 (8.3%)
Failure to lose weight	23 (47.9%)
Polycystic ovarian morphology n (%)	
Yes	28 (58.3%)
No	20 (41.6%)
Oligo/anovulation n (%)	
Yes	35 (72.9%)
No	13 (27.0%)
Phenotypes n (%)	
A	23 (47.9%)
B	18 (37.5%)
C	5 (10.4%)
D	2 (4.1%)
The Ferriman-Gallwey score	10.08±2.34

Table 2. Biochemical and laboratory test results of patients attending the PCOS outpatient clinic

Laboratuary measurements (Mean±SD)	Study Group n=48
FSH (m IU/ml)	5.2±2.2
LH (m IU/ml)	13.7±15.7
FSH/LH	0.53±0.3
E2 (pg/ml)	64.7±52.7
TSH (mIU/mL)	2.3±1.09
17-OHP (ng/mL)	0.35±0.23
PRL (ng/mL)	16.5±9.4
DHEAS (ng/L)	259.7±103.6
AMH (ng/mL)	8.1±4.9
Insulin	11.7±7.1
HOMA-IR	2.7±2.0

Mean±SD: Mean±standard deviation, *Student's t-test
FSH: Follicle stimulating hormone, LH: Luteinising hormone, E2: Estrodiol, TSH: Thyroid stimulating hormone, 17-OHP: 17-hydroxyprogesterone, PRL: Prolactin, DHEAS: Dehydroxyepiandrostenedione sulphate, SHBG: Sex hormone binding globulin, AMH: Anti-Müllerian hormone, FAI: Free androgen index.

Table 3. Preferred treatment modalities for patients treated in a PCOS outpatient clinic

	Study Group n=48
Lifestyle changes n (%)	36 (75.0%)
Use of oral contraceptives, n (%)	22 (45.8%)
Antiandrogenic therapy, n (%)	2 (4.1%)
Hair removal techniques, n (%)	4 (8.3%)
Inositol, n (%)	4 (8.3%)
Metformin, n (%)	10 (20.8%)

clinic was irregular menstruation (83.3%). The most frequently observed phenotypic group was group A (47.9%). 72.9% of patients had oligo/novulation and 58.3% had PCOM. The mean FGS score of the patients was 10.08 ± 2.34.

Table 2 shows the biochemical parameters of the included patients. Accordingly, the mean values of the patients were as follows: Follicle Stimulating Hormone (FSH)/Luteinizing Hormone (LH):0.53±0.3; Anti-Muellerian Hormone (AMH):8.1±4.9 ng/ml; Insulin: 11.7±7.1 ng/ml and HOMA-IR values: 2.7±2.0.

Table 3 shows the treatment modalities preferred by the patients according to their presentation at this clinic. Accordingly, the most preferred treatment modality was lifestyle modification (75.0%), the second most preferred treatment was oral contraceptives (45.8%). Treatment with inositol was initiated in four patients (8.3%) and treatment with metformin in 10 patients (20.8%).

4. Discussion

In our study, adolescent and adult PCOS patients were examined with regard to clinical and biochemical parameters. In summary, the incidence in the adolescent group is 37.5% and the most common reason for presentation of the disease is menstrual irregularity. In our outpatient clinic, patients are recommended lifestyle changes together with the contraceptive pill as the primary treatment method.

The Rotterdam criteria published in 2018 are used worldwide for the diagnosis of PCOS. However, it is very difficult to diagnose PCOS in adolescence. This is because PCOS findings resemble normal pubertal physiological changes (irregular menstrual cycles, acne, polycystic ovarian morphology) (10,11).

In 2020, an international consensus on the definition of diagnostic criteria for PCOS in adolescence was published (12). According to this consensus, unexplained persistent ovarian dysfunction (abnormal menstrual pattern according to age or gynecologic age and its persistence for 1-2 years) and clinical/biochemical findings of hyperandrogenism are sufficient for the diagnosis of PCOS in adolescence. Since ultrasonography of polycystic ovaries is very common in this age group, it is not recommended for the diagnosis of PCOS in adolescence (13). In the first 1-4 years after menarche, menstrual irregularities are observed in 25-40% of cases (14). However, since ovulatory dysfunction may persist for several years and hyperendrogenemia (especially acne and hirsutism) may be a finding of the adolescent period, these two criteria may not be sufficient.

In the meta-analysis published by Bozdag et al, hirsutism was found in 13%, hyperandrogenemia in 11%, polycystic ovaries in 28% and oligoanovulation in 15% of women with PCOS (15,16).

AMH levels are elevated in women with PCOS due to an increased number of preantral follicles, but a cut-off value that could serve as a marker for PCOS has not been defined (17,18). This increase could be due to the presence of anovulatory cycles other than PCOS in the adolescent group and the age-related high number of antral follicles.

In the study by de Medeiros et al. (19), acne was found in 45.2% and 39.9% of adolescent and adult PCOS patients, respectively, and hirsutism in 54.8% and 44.3%, respectively. Among the biochemical parameters, DHEAS was significantly higher in adolescent PCOS patients compared to adult PCOS patients (66% and 21.4%, $p < 0.001$). In addition, the mean testosterone level was found to be significantly higher in adolescent PCOS patients (71.9%) than in adult PCOS patients (41.1%). Yuce et al. (20) considered the age group of adolescents as under 18 years old and found that clinical and biochemical hyperandrogenism (free testosterone) was significantly higher in adolescent PCOS patients. Topçu et al. analyzed 25 adolescent PCOS and 25 adult PCOS patients under 18 years of age and found that total testosterone, free testosterone, LH and insulin levels were significantly higher in adolescent PCOS patients (21). In all three studies, AMH levels were not analyzed, PRL levels were similar, and hyperandrogenism was found to be higher in adolescent PCOS patients. In contrast to these studies, another study published in 2021 found no difference in LH/FSH ratio and free testosterone levels in adolescent and adult female PCOS patients (22). In contrast to other studies, our study also examined AMH levels and found that these were higher in adolescent PCOS patients. It is known that LH secretion is increased in PCOS patients due to impaired secretion of gonadotropin-releasing hormone (GnRH) (23). One study suggests that AMH causes an increase in GnRH-dependent LH secretion and thus may play

a role in the etiopathogenesis of PCOS (24). In our study, high AMH levels in adolescence may have caused PCOS to become symptomatic in the early phase.

In studies comparing adolescent and adult PCOS patients, no difference was found between the groups in terms of PRL levels (19-22). The literature reports that an elevated PRL level is not expected in PCOS patients and that if PRL levels> 25 ng/mL, testing for hyperprolactinemia should be performed (25,26).

It is known that 38-88% of women with PCOS are obese and overweight (27). Weight gain during adolescence has been shown to play an important role in the later development of PCOS (28). However, a study published in 2019 reported that an increase in BMI can cause PCOS, but PCOS has no effect on BMI (29). A systemic review and meta-analysis published in 2016 reported that obesity in women with PCOS is lower than assumed and that women with PCOS diagnosed incidentally and without hospitalization have the same prevalence of obesity as the general population (30).

The retrospective design and the fact that metabolic status could not be evaluated in more detail is one of the limiting features of the study, and the lack of grouping of comparative data by age group is a further limitation.

PCOS is one of the most common endocrine disorders worldwide and can affect women of all ages. Although many genetic, environmental and hormonal factors are thought to be responsible, the etiopathogenesis is still not fully understood. In our study, the most common group according to the phenotypic characteristics of the included patients was group A. Our results may shed light on the etiopathogenesis of PCOS. The development of PCOS in adolescence and adulthood could be due to different mechanisms and hormonal changes. Large prospective series of studies are needed to make a definitive statement on this topic.

Author contribution

Study conception and design: ÖBT; data collection: ONE; analysis and interpretation of results: ÖBT and YAR; draft manuscript preparation: ÖBT, ONE and YAR. All authors reviewed the results and approved the final version of the manuscript.

Ethical approval

The study was approved by the University of Health Sciences Etlik Zubeyde Hanim Women's Health Training and Research Hospital Non-invasive Studies Ethics Committee (Protocol no. 02-12/28.02.2024).

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Conflict of interest

The authors declare that there is no conflict of interest.

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