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RESEARCH ARTICLE / ARAŞTIRMA MAKALESİ

Investigation of Psychological Symptoms, Depression, and Anxiety Levels of Women with and without Polycystic Ovary Syndrome

Polikistik Over Sendromu Tanısı Alan ve Almayan Kadınların Psikolojik Belirti, Depresyon ve Anksiyete Düzeylerinin İncelenmesi

Merve Karafistan[1], Sözen İnak Gönyeli[2]

Abstract:

The study employed a causal comparison design to examine differences in psychological symptoms, depression, and anxiety levels between women diagnosed with PCOS and those without the diagnosis. The sample consisted of women aged 18–50 living in the TRNC, totaling 824 participants. Of these, 412 were women who reported having previously been diagnosed with PCOS by a physician, while 412 had no PCOS diagnosis. Due to limited access to the PCOS group, purposive sampling was used for this group, and convenience sampling was applied for the control group to facilitate participation. Data were collected using the Sociodemographic Information Form, Beck Depression Inventory, Beck Anxiety Inventory, and SCL-90-R. The data were analyzed with SPSS 26.0. Findings indicated that women diagnosed with PCOS had significantly higher levels of depression, anxiety, and overall psychological symptoms than those without PCOS. Model analyses showed that 66.9% of the variation in depression levels was explained by general symptom level, anxiety level, and PCOS diagnosis. Additionally, women with PCOS scored higher on the Beck Anxiety Inventory and on the somatization, obsessive-compulsive symptoms, interpersonal sensitivity, depression, anxiety, phobic anxiety, hostility, paranoid ideation, and psychoticism subscales of the SCL-90-R compared to the control group. Within-group effects and multiple comparison tests also demonstrated significantly higher depression levels among women diagnosed with PCOS. Overall, these findings suggest that PCOS has a notable impact on psychological well-being and highlight the need for further comprehensive research on this relationship.

Keywords: Polycystic ovary syndrome, Psychological symptoms, Depression, Anxiety.

[1]Cyprus American University, Faculty of Education, Department of Psychology, Nicosia, TRN, Cyprus.

[2]European University of Lefke, Faculty of Arts and Sciences, Department of Psychology, Lefke, TRN, Cyprus.

Address of Correspondence/Yazışma Adresi: Merve Karafistan, Cyprus American University, Nicosia- Güzelyurt Road, Alayköy, Nicosia, TRN Cyprus, E-mail: mervekarafistan@gmail.com.

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Öz:

Araştırma, PKOS tanısı alan ve almayan kadınların psikolojik belirti, depresyon ve anksiyete düzeylerini karşılaştırmak amacıyla nedensel karşılaştırma deseninde yürütülmüştür. Çalışmanın örneklemini KKTC'de yaşayan 18–50 yaş arası kadınlar oluşturmuş ve toplam 824 katılımcı araştırmaya dahil edilmiştir. Bunların 412'si, özbildirim yoluyla daha önce hekim tarafından PKOS tanısı aldığını belirten kadınlardan; 412'si ise PKOS tanısı olmayan kadınlardan oluşmaktadır. PKOS grubuna ulaşmanın güç olması nedeniyle bu grup amaçsal örnekleme yöntemiyle seçilmiş; kontrol grubu ise erişim kolaylığı sağlamak amacıyla elverişlilik örneklemesiyle belirlenmiştir. Veri toplama sürecinde Sosyodemografik Bilgi Formu, Beck Depresyon Envanteri, Beck Anksiyete Envanteri ve SCL-90-R kullanılmıştır. Toplanan veriler SPSS 26.0 aracılığıyla analiz edilmiştir. Bulgular, PKOS tanısı olan kadınların depresyon, anksiyete ve genel psikolojik belirti düzeylerinin PKOS olmayanlara göre belirgin şekilde daha yüksek olduğunu göstermiştir. Model analizlerine göre depresyon düzeylerindeki değişimin %66,9'unun genel belirti düzeyi, anksiyete düzeyi ve PKOS tanısı tarafından açıklandığı bulunmuştur. Ayrıca PKOS grubunun Beck Anksiyete Envanteri puanları ile SCL-90-R'ın somatizasyon, obsesif-kompulsif belirtiler, kişilerarası duyarlılık, depresyon, anksiyete, fobik anksiyete, hostilite, paranoid düşünce ve psikotizm alt ölçeklerinde kontrol grubundan daha yüksek puanlar aldığı belirlenmiştir. Grup içi etki ve çoklu karşılaştırma testleri de PKOS tanısı alan kadınlarda depresyon düzeylerinin anlamlı biçimde arttığını ortaya koymuştur. Genel olarak sonuçlar, PKOS'un psikolojik iyi oluş üzerinde önemli etkileri olduğunu ve bu ilişkinin daha kapsamlı biçimde araştırılmasına ihtiyaç olduğunu göstermektedir.

Anahtar Kelimeler: Polikistik over sendromu, Psikolojik belirti, Depresyon, Anksiyete.

Introduction

Polycystic ovary syndrome (PCOS), observed in women of reproductive age, is an endocrine disorder characterized by excess androgens, chronic ovulation disorder, and a polycystic appearance of the ovaries (Aydos et al., 2016). It is noted that in each menstrual cycle, the ovum that should rupture does not rupture, and within this unruptured ovarian tissue, cysts with a diameter of 3-10 mm form (Jonard and Dewailly, 2004). However, PCOS can affect not only reproductive health but also an individual's mental and metabolic state (Baykara et al., 2020). Nearly half of women diagnosed with PCOS have been reported to experience a psychiatric disorder alongside the condition (Baykara et al., 2020). The diagnosis of PCOS can have serious emotional effects on women. It is emphasized that feelings such as hopelessness, anxiety, and sadness are commonly experienced in these individuals (Baykara et al., 2020).

Although the exact causes of the psychological symptoms associated with PCOS are not yet fully understood, it is thought that increased androgen levels may have negative effects on mental health (Erol and Kadıoğlu, 2021). Various studies have also shown that excess androgen contributes to the development of certain mental illnesses (Subaşı Harmancı and Okray, 2021). Additionally, symptoms frequently accompanying PCOS, such as hirsutism, oily skin, acne, weight gain, and infertility, can undermine an individual's psychological well-being and femininity, thereby creating a foundation for the development of mental health issues (Erol and Kadıoğlu, 2021). Therefore, detailed information about the history of women who may have this syndrome should be obtained (Aydos et al., 2016). It is also stated that some negative experiences and illnesses during childbirth can predispose individuals to depression (Ocak Aktürk and Yılmaz, 2023). In this context, depression is defined as being deeply sad, feeling worthless, lacking motivation, feeling hopeless, and being slow in speech, movement, and thought (Helvacı Çelik and Hocaoğlu, 2016). It is already known that negative life events can cause significant distress and lead to multiple psychological disorders, primarily depression and anxiety (Helvacı Çelik and Hocaoğlu, 2016). In this context, the concept of anxiety is seen as a feeling of negative mood related to external or internal factors, and it is also described as a situation that threatens or is perceived as threatening the individual's future and life (Grupe and Nitschke, 2013).

Polycystic Ovary Syndrome (PCOS) is not only a hormonal disorder but also has serious effects on women's body perception, reproductive health, sexual life, and social roles; this situation can lead to an increase in psychological symptoms, depression, and anxiety levels. Especially the changes in appearance, infertility issues, and weight gain observed in women diagnosed with PCOS can negatively affect their social relationships, marital life, and self-perception. In this context, the main problem of the study is to compare the levels of depression, anxiety, and other psychological symptoms in women diagnosed with PCOS, considering sociodemographic characteristics, with those of women who are not diagnosed with PCOS.

Method

Research Model

The main purpose of this research is to examine the psychological symptoms, depression, and anxiety levels of women diagnosed with polycystic ovary syndrome and those without the diagnosis. In line with this aim, two groups—those diagnosed and those not diagnosed—were compared using a causal-comparative method. This method allows for the identification of possible cause-and-effect relationships between groups without intervention (Mazlum and Atalay Mazlum, 2020). However, an important limitation of this method is that the findings cannot establish a strong cause-and-effect relationship as in intervention studies. It should also be remembered that other uncontrolled variables may also influence the results.

Participants

The study population consists of individuals aged 18-50 living in the Turkish Republic of Northern Cyprus (TRNC). A total of 824 women were included in this study, with 412 women diagnosed with Polycystic Ovary Syndrome (PCOS) and 412 women without a PCOS diagnosis. The PCOS group was purposively selected, while the control group was selected through convenience sampling. Additionally, individuals with a PCOS

diagnosis were included based on self-report. Participants were asked whether they had previously been diagnosed with PCOS by a physician, and those who answered 'yes' were included in the PCOS group. The use of different sampling methods across groups may have introduced initial differences, which should be considered a factor limiting the study's internal validity. However, due to limited access to individuals diagnosed with PCOS, purposive sampling was preferred. In the control group, convenience sampling was used because it was easier to access a broader population.

Among the participants diagnosed with PCOS, 50% were aged 18-25, 39.32% were aged 26-33, 8.25% were aged 34-41, and 2.43% were aged 42 and above. Regarding education levels, 2.43% had primary education, 11.89% had high school education, and 85.68% had university education or higher. In terms of occupation, 19.66% were housewives, 37.62% worked in the private sector, 13.35% were civil servants, and 29.37% were students. Marital status showed that 42.48% were married, 50.49% were single, 4.85% were engaged, and 2.18% were divorced/separated. Family history revealed that 30.34% had a family member with PCOS, 32.52% did not, and 37.14% did not know whether their family had PCOS. Regarding medication use, 45.87% were taking medication, while 70.87% were not.

In the PCOS group, 29.13% used alcohol, and 70.87% did not. Additionally, 31.31% smoked, 60.44% did not, and 8.25% had quit smoking. Regarding physical activity, 17.23% exercised regularly, while 82.77% did not. Furthermore, 29.61% used herbal supplements specific to PCOS, whereas 70.39% did not.

In the non-PCOS group, 61.65% were aged 18-25, 17.23% were aged 26-33, 12.62% were aged 34-41, and 8.50% were aged 42 and above. Education levels included 3.40% with primary education, 10.92% with high school, and 85.68% with university education or higher. Regarding occupation, 8.01% were housewives, 30.83% worked in the private sector, 15.05% were civil servants, and 46.12% were students. Marital status showed 26.94% married, 62.38% single, 8.50% engaged, and 2.18% divorced/separated. Family history indicated that 11.41% had a family member with PCOS, 49.03% did not, and 39.56% were unsure. Medication use was reported by 21.36%, while 78.64% did not use medication.

In the non-PCOS group, 41.02% used alcohol, and 58.98% did not. Additionally, 29.13% smoked, 64.32% did not, and 6.55% had quit smoking. Regarding exercise, 26.21% exercised regularly, 73.79% did not, and 1.70% used PCOS-specific herbal supplements; 98.30% did not.

Data Collection Tools

In this study, data were collected online via Google Forms. While this method offers the opportunity to reach a wide range of participants quickly and at low cost, it has limitations regarding response accuracy, participant care, and clinical assessment.

To collect data for the study, participants were given a Socio-demographic Information Form prepared by the researcher, the Beck Depression Inventory (BDI), the Beck Anxiety Inventory (BAI), and the Symptom Checklist (SCL-90-R).

Socio-demographic Information Form

This form includes 11 questions assessing factors such as age, education level, occupation group, marital status, family history of polycystic ovary syndrome, and whether the participant has been diagnosed with polycystic ovary syndrome.

Beck Depression Inventory (BDI)

BDE, developed by Beck and colleagues (1961), was created to determine whether individuals exhibit depressive symptoms. This inventory consists of 21 items on a 4-point Likert scale, with scores ranging from 0 to 3. Items numbered “0” indicate no depressive symptoms, while higher numbers reflect increasing severity of depressive symptoms. It was adapted to Turkish culture by Erten and Hisli Şahin (1984), and its validity was confirmed on a clinical population. Subsequently, reliability and validity studies were conducted with university students (Hisli, 1988). Cronbach's alpha was reported as 0.80.

Beck Anxiety Inventory

The Beck Anxiety Inventory, developed by Beck and colleagues (1988), consists of 21 items that measure the severity of anxiety. Scoring is on a 4-point Likert scale: none (0), mild (1), moderate (2), and severe (3). Nesrin Hisli Şahin translated the text into Turkish, and the validity and reliability of this Turkish version were assessed by Ulusoy and colleagues (1998). The internal consistency coefficient (Cronbach's alpha) was reported as 0.93.

Symptom Screening List (SCL-90-R)

This inventory was developed by Derogatis and Cleary (1977), and its adaptation study was conducted by Dağ (1991). The Cronbach's alpha value is reported as 0.97. This inventory consists of 90 items and includes nine subscales: somatization, obsessive-compulsive, anxiety, depression, phobic anxiety, hostility, interpersonal sensitivity, paranoid thinking, and psychosis. Additionally, this inventory uses a 5-point Likert scale with the following options: none (0), very little (1), moderate (2), quite a lot (3), and severe (4).

Data Analysis

Statistical analysis of the research data was conducted using the Statistical Package for the Social Sciences (SPSS) version 26.0.

Cronbach's Alpha test was applied to the responses of the participants diagnosed with PCOS and those not diagnosed, for the Beck Depression Inventory, Beck Anxiety Inventory, and Symptom Checklist-90-Revised (SCL-90-R). The reliability coefficients were 0.919 for the Beck Depression Inventory, 0.929 for the Beck Anxiety Inventory, and 0.986 for the Symptom Checklist-90-Revised (SCL-90-R).

Before proceeding with data analysis, the dataset's skewness and kurtosis were examined. Scores for participants diagnosed with PCOS and those not diagnosed with PCOS on the Beck Depression Inventory, Beck Anxiety Inventory, and Symptom Checklist-90-Revised (SCL-90-R) were analyzed using the Kolmogorov-Smirnov test, and skewness and kurtosis were assessed. Since the skewness/kurtosis values were within ±1.5, parametric tests were used.

The scores of participants diagnosed with PCOS and those not diagnosed on the Beck Depression Inventory, Beck Anxiety Inventory, and Symptom Checklist-90-Revised

(SCL-90-R) were compared using an independent samples t-test. Pearson correlation analysis was applied to examine relationships between variables.

The socio-demographic characteristics of participants with and without PCOS were presented in cross-tabulations, and the two groups were compared using the Pearson chi-square test. Additionally, MANCOVA and regression analyses were also conducted.

Process

Necessary permissions have been obtained from the owners to use the inventories included in this research. Ethical approval to conduct the study was obtained from the Cyprus Health and Society Sciences University Ethics Committee (project code 2022/047) on 07/15/2022. The data collection process was carried out between November 2022 and April 2023. Due to the authors' academic/personal commitments and institutional changes, the submission process of this study was delayed by 2 years. However, it is believed that the relevant topic and findings remain current in the literature and make original contributions.

Questions were prepared via Google Forms and distributed online to participants. Before answering the questions, participants were provided with an informed consent form and a participant information form that outlined the purpose, scope, confidentiality, limitations, and voluntary nature of the study.

Findings

Table 1. *Comparison of the socio-demographic characteristics of participants with and without PCOS*

	PCOS Present		PCOS Absent		X^2	p
	n	%	n	%		
Age						
18-25	206	50,00	254	61,65	58,206	0,000*
26-33	162	39,32	71	17,23		
34-41	34	8,25	52	12,62		
42 and above	10	2,43	35	8,50		
Education						
Primary school	10	2,43	14	3,40	0,837	0,658
High school	49	11,89	45	10,92		
University	353	85,68	353	85,68		
Occupation						
Housewife	81	19,66	33	8,01	38,718	0,000*
Private sector	155	37,62	127	30,83		
Government employee	55	13,35	62	15,05		
Student	121	29,37	190	46,12		
Marital status						
Married	175	42,48	111	26,94	23,576	0,000*
Single	208	50,49	257	62,38		
Engaged	20	4,85	35	8,50		
Divorced/Separated	9	2,18	9	2,18		
Family member with PCOS						
Yes	125	30,34	47	11,41	49,450	0,000*
No	134	32,52	202	49,03		
I don’t know	153	37,14	163	39,56		
Medication use						
Yes	189	45,87	88	21,36	55,476	0,000*
No	223	54,13	324	78,64		
Alcohol use						
Yes	120	29,13	169	41,02	12,796	0,000*
No	292	70,87	243	58,98		
Smoking status						
Yes	129	31,31	120	29,13	1,627	0,443
No	249	60,44	265	64,32		
Quit	34	8,25	27	6,55		
Regular exercise status						
Yes	71	17,23	108	26,21	9,771	0,002*
No	341	82,77	304	73,79		
Use of herbal supplements specific to PCOS						
Yes	122	29,61	7	1,70	121,548	0,000*
No	290	70,39	405	98,30		

**p<0,05*

Table 1 presents the results of the Pearson chi-square test comparing the sociodemographic characteristics of participants diagnosed with PCOS and those without.

It was observed that there are statistically significant differences between participants diagnosed with PCOS and those not diagnosed, based on age group, occupation, marital status, whether there is a family member with

PCOS, medication and alcohol use, regular exercise, and use of herbal supplements specific to PCOS ($p<0.05$). The proportion of participants with PCOS in the 26-33 age group, housewives, married individuals, those with a family member with PCOS, medication users, and those using herbal supplements specific to PCOS was higher compared to those without PCOS. Additionally, the rate of alcohol use and regular exercise was higher among participants without PCOS than those with the diagnosis. Existing studies already report that alcohol consumption further negatively affects PCOS (Norman et al., 2002). However, it is well established that regular exercise is important for patients with PCOS, and weight loss associated with exercise reduces symptoms and helps maintain hormonal balance (Gündoğan and Arıkan, 2022).

Table 2. *Comparison of Beck Depression Inventory, Beck Anxiety Inventory, and SCL-90-R scores between participants diagnosed with and without PCOS*

	PCOS	**N**	$\bar{x}$	**s**	**t**	**p**
Beck Depression Inventory	PCOS present	412	42,19	11,06	9,895	0,000*
	PCOS absent	412	34,63	10,87		
Beck Anxiety Inventory	PCOS present	412	20,14	12,14	7,000	0,000*
	PCOS absent	412	14,35	11,57		
Somatization (SOM)	PCOS present	412	1,21	0,83	6,702	0,000*
	PCOS absent	412	0,84	0,77		
Obsessive–Compulsive (OBKO)	PCOS present	412	1,63	0,87	7,476	0,000*
	PCOS absent	412	1,17	0,87		
Interpersonal Sensitivity(KADU)	PCOS present	412	1,64	1,00	8,510	0,000*
	PCOS absent	412	1,06	0,95		
Depression (DEP)	PCOS present	412	1,66	0,93	7,886	0,000*
	PCOS absent	412	1,14	0,96		
Anxiety (ANX)	PCOS present	412	1,20	0,92	6,540	0,000*
	PCOS absent	412	0,80	0,82		
Hostility (HOST)	PCOS present	412	1,36	0,97	6,691	0,000*
	PCOS absent	412	0,92	0,91		
Phobic Anxiety (FOB)	PCOS present	412	0,90	0,89	6,614	0,000*
	PCOS absent	412	0,54	0,68		
Paranoid Ideation (PAR)	PCOS present	412	1,48	0,92	5,749	0,000*
	PCOS absent	412	1,12	0,90		
Psychoticism (PSIK)	PCOS present	412	0,98	0,83	5,992	0,000*
	PCOS absent	412	0,65	0,75		
Additional Scale (EK)	PCOS present	412	1,28	0,79	6,313	0,000*
	PCOS absent	412	0,95	0,75		
SCL90R Inventory Overview	PCOS present	412	1,33	0,80	7,709	0,000*
	PCOS absent	412	0,92	0,75		

**p<0,05*

Table 2 presents the results of the independent-samples t-test comparing scores on the Beck Depression Inventory, Beck Anxiety Inventory, and Symptom Checklist-90-Revised (SCL-90-R) between participants with PCOS and those without PCOS. According to Table 2, a statistically significant difference in Beck Depression Inventory scores was observed between participants with and without PCOS ($p<0.05$). Participants with PCOS had higher scores on the Beck Depression Inventory than those without PCOS. While participants' scores on the 'Symptom Checklist-90-Revised (SCL-90-R)' are kept under control, it is planned to determine whether there are significant differences in scores between participants diagnosed with PCOS and those without it on the 'Beck Depression Inventory' and 'Beck Anxiety Inventory.' For this purpose, MANCOVA analysis was applied to the data. To perform MANCOVA, assumptions such as normality and homogeneity of the variance-covariance matrix must be met (Tabachnick & Fidell, 2007).

The homogeneity of variances is examined with Levene's Test, and the equality of covariance matrices is checked with Box's M test (Kumandaş & Kutlu, 2011). In large-sample studies, Box's M test can yield significant results

(Tabachnick & Fidell, 2007). According to the results of Box's M test, which is used to assess the equality of covariance matrices among dependent variables, the assumption of covariance equality in this study is satisfied (Box's M= 3.462, p=0.327 > 0.05). Levene's test is a method for testing the equality of variances between two independent samples without assuming normality (Lee et al., 2010). For homogeneity to be achieved in Levene's test, the p-value should be greater than 0.05. Based on the Levene's Test results for the dependent variables, which are the Beck Depression Inventory and Beck Anxiety Inventory, the assumption of equal variances (p>0.05) was satisfied.

Table 3. *Multivariate tests*

		Value	F	df	Error df	p	Eta Squared
Intercept	Pillai's Trace	,825	1930,514	2,000	820,000	,000*	,825
	Wilks' Lambda	,175	1930,514	2,000	820,000	,000*	,825
	Hotelling's Trace	4,709	1930,514	2,000	820,000	,000*	,825
	Roy's Largest Root	4,709	1930,514	2,000	820,000	,000*	,825
SCL90R	Pillai's Trace	,800	1642,796	2,000	820,000	,000*	,800
	Wilks' Lambda	,200	1642,796	2,000	820,000	,000*	,800
	Hotelling's Trace	4,007	1642,796	2,000	820,000	,000*	,800
	Roy's Largest Root	4,007	1642,796	2,000	820,000	,000*	,800
With and	Pillai's Trace	,041	17,385	2,000	820,000	,000*	,041
without a	Wilks' Lambda	,959	17,385	2,000	820,000	,000*	,041
PCOS	Hotelling's Trace	,042	17,385	2,000	820,000	,000*	,041
diagnosis	Roy's Largest Root	,042	17,385	2,000	820,000	,000*	,041

**p<0,05*

Multivariate tests conducted in the study are shown in Table 3. Eigenvalues indicate the amount of variation explained by each eigenvector. In MANOVA, Wilks' Lambda, Pillai's Trace, and Hotelling-Lawley trace are based on the sum of all eigenvalues. However, Roy's Largest Root test is based on the first eigenvalue (Scheiner, 2001). According to the MANCOVA results, there are significant differences among the groups examined in the study (F = 17.385, p = 0.001, as indicated by Roy's Largest Root test). Because Roy's Largest Root test allows for post hoc testing and yields strong test statistics (Scheiner, 2001), it was considered in this analysis.

Table 4. *Tests of within-subjects effects*

Source	Dependent Variable	Type III Sum of Squares	df	Mean Square	F	p	Partial Eta Squared
Corrected Model	Beck Depression	73693,645	2	36846,822	819,028	,000*	,666
	Beck Anxiety	90959,931	2	45479,966	1183,637	,000*	,742
Intercept	Beck Depression	173857,851	1	173857,851	3864,498	,000*	,825
	Beck Anxiety	1606,227	1	1606,227	41,803	,000*	,048
SCL-90R	Beck Depression	61917,886	1	61917,886	1376,306	,000*	,626
	Beck Anxiety	84068,318	1	84068,318	2187,916	,000*	,727
Participants with and without a PCOS diagnosis	Beck Depression	1564,907	1	1564,907	34,785	,000*	,041
	Beck Anxiety	17,483	1	17,483	,455	,500	,001
Error	Beck Depression	36935,529	821	44,988			
	Beck Anxiety	31546,038	821	38,424			
Total	Beck Depression	1326235,000	824				
	Beck Anxiety	367525,000	824				
Corrected Total	Beck Depression	110629,174	823				
	Beck Anxiety	122505,970	823				

**p<0,05*

To evaluate the effect of each independent variable on each dependent variable, intra-group effect tests were conducted following the MANCOVA test, as shown in Table 4. The intra-group effect tests revealed that the diagnosis of PCOS has a statistically significant effect on women's depression levels (F(1,821) = 34.785, p < .001). However, the diagnosis of PCOS did not create a significant difference in terms of anxiety levels (F(1,821) = 0.455, p = .500). Additionally, individuals' overall psychological symptom levels (SCL-90-R) showed strong and significant effects on both depression and anxiety. These findings support the psychological effects of PCOS related to depression, but do not differentiate in terms of anxiety levels. Multiple comparison tests are presented in Table 5.

Table 5. *Multiple comparison tests*

Dependent Variable	PCOS-diagnosed and non-PCOS	PCOS-diagnosed and non-PCOS	Mean Difference (I–J)	Std. Error	p
Beck Depression	Yes	No	2,856	0,484	0,001*
	No	Yes	-2,856	0,484	0,001*
Beck Anxiety	Yes	No	0,302	0,448	0,500
	No	Yes	-0,302	0,448	0,500

**p<0,05*

As a result of multiple comparison tests, it was found that women diagnosed with PCOS have significantly higher levels of depression ($p < .001$). This finding supports the association between PCOS and depressive symptoms. However, no significant difference was observed between the groups in terms of anxiety levels ($p = .500$), indicating that PCOS does not have a notable effect on anxiety.

In this study, multiple linear regression analysis was preferred in line with the necessity of evaluating psychological and clinical factors that may affect individuals' depression levels. The analysis conducted aims to test the effect of PCOS diagnosis statistically, overall psychological symptom level (SCL-90-R), and anxiety level on depression, and to reveal the predictive power of these variables (Table 6).

Table 6. *The predictive role of participants' Beck Anxiety scores, PCOS Diagnosis Status, and SCL-90-R scores on Beck Depression scores*

Variable	B	SE	β	t	p
(Constant)	29,744	,914		32,533	,000*
Beck Anxiety	,093	,038	,098	2,477	,013*
PCOS Diagnosis Status (Yes / No)	-2,828	,483	-,122	-5,856	,000*
SCL-90-R	9,943	,574	,691	17,327	,000*
R=0,509	R^2=0,669		F(3;820)=551,478		*p<0,05

Dependent variable*: Beck Depression Scale*

Table 6 shows the statistical values related to the results of the regression analysis conducted to examine the predictive effect of participants' scores on the 'Beck Anxiety Inventory,' 'PCOS Diagnosis Status,' and 'SCL-90-R Scale' on the 'Beck Depression Inventory' scores. While the SCL-90-R scores positively and strongly predict depression levels ($\beta = 0.691$; $p < .001$), the Beck Anxiety scores also significantly predict depression levels in a positive direction ($\beta = 0.098$; $p = .013$). The PCOS diagnosis, on the other hand, negatively predicts depression levels, and individuals diagnosed with PCOS tend to have significantly higher depression scores ($\beta = -0.122$; $p < .001$). The combined predictive power of these three variables for depression levels (R^2) is 66.9%. This means that the overall symptom level, anxiety level, and PCOS diagnosis explain 66.9% of the variation in depression levels. The regression formula can be written as follows:

Beck Depression Score = Beck Anxiety Scale x 0.093 + PCOS Diagnosis Status x -2.828 + SCL90R Scale x 9.943 + 29.744

Discussion

Although the literature suggests that cigarette use can affect hormonal balance and disrupt menstrual regularity (Mazlumoğlu et al., 2024; Hahn et al., 2013; Palm-Fischbacher and Ehlert, 2014), this study did not find a connection between smoking and PCOS. The fact that the majority of participants were young adults, the short duration of their smoking, and the biological effects not yet being prominent could explain this result. The lack of difference in PCOS prevalence by education level is consistent with prior literature, and biological factors and lifestyle-related conditions are thought to have a greater impact on the development of the syndrome than sociodemographic variables such as education.

The differences observed between groups in variables such as age, marital status, and occupation do not fully align with previous research (Özsoy and Doğru, 2021; Sharma et al., 2025), suggesting that the demographic distribution of PCOS may vary across societies. Geographic differences, sample structure, or group comparability can be among the possible reasons for such discrepancies. The higher rates of medication and herbal supplement use, as well as exercise among women diagnosed with PCOS, indicate that this group has increased health awareness and is making efforts to improve their quality of life. This trend is consistent with studies in the literature emphasizing the importance of healthy lifestyle habits in managing PCOS (El Hayek et al., 2016; Nicolucci, 2012). On the other hand, the finding related to alcohol use has no direct counterpart in the literature. The limited number of studies explaining the relationship between PCOS and alcohol

(Norman et al., 2002) indicates that this topic requires further research.

One of the important findings of the study is that women with PCOS have significantly higher levels of psychological symptoms. It has long been emphasized in the literature that a wide range of psychological symptoms, including anxiety and depression, may be associated with PCOS. Hofmann et al. (2025) and Percy et al. (2009) indicate that PCOS increases depression, anxiety, and body image issues in women; Snyder (2006) shows that depression rates are significantly higher in women with PCOS. Similarly, Cipkala et al. (2011) reported that women with PCOS have higher levels of depression. Overall, these studies suggest that the physical symptoms of PCOS can have serious effects on psychosocial functioning.

Studies indicating that disruption of hormonal balance can affect neurotransmitter systems (Balıkçı et al., 2014) shed light on the biological basis of mood disorders in women with PCOS. On the other hand, numerous studies have demonstrated that depression, anxiety, stress, and various psychosocial difficulties often accompany PCOS and negatively impact quality of life (Jalnapurkar and Findley, 2018; Yin et al., 2021; Shannon and Wang, 2012; Rassi et al., 2010; Deeks et al., 2010; Barry et al., 2011). Additionally, broader symptoms such as somatization, eating disorders, phobias, and aggression have been reported to be associated with PCOS in various studies (Brutocao et al., 2018; Cinar et al., 2011; Dokras et al., 2012).

In this study, the higher levels of depression in women with PCOS are consistent with findings in the literature that suggest depression is an important psychological risk factor for PCOS (Cooney et al., 2017; Sulaiman et al., 2017). However, the differing results regarding anxiety levels imply that the psychological effects of PCOS may be context-dependent. Factors such as sample characteristics, measurement tools, cultural dynamics, and symptom expression can explain these differences. Therefore, further research with different samples is needed to better understand the relationship between PCOS and anxiety.

The clear relationship between overall psychological symptom levels and depression indicates that mental symptoms develop through mutual interactions and have a multi-layered structure. This situation demonstrates that PCOS is a holistic phenomenon that should be addressed not only in terms of its biological aspects but also considering its psychological and social dimensions.

Results and Recommendations

Research findings indicate that women diagnosed with PCOS are mostly between the ages of 26 and 33, married, housewives, using medication, and receiving herbal supplements. This group is at a higher risk for anxiety, depression, and other psychological symptoms. This situation highlights the importance of implementing educational programs to improve the quality of life for individuals with PCOS and to support them in coping with psychological issues. Additionally, lifestyle measures such as regular exercise, balanced nutrition, routine medical check-ups, and medication use when necessary are recommended. To increase awareness starting from adolescence, informative seminars should be organized in schools, and it is essential to consider the high psychological risk when working with individuals with PCOS, with treatment plans tailored to this condition. Although considering demographic and environmental variables is seen as a limitation of the study, regression analysis shows a relationship between general symptoms and anxiety and depression. These results emphasize that the psychological impact of PCOS should not be overlooked and that further comprehensive research is necessary to explore this relationship.

Declarations

Ethical Approval and Consent to Participate

Participants in the study were informed and gave their consent. Additionally, approval was obtained from the Scientific Research Ethics Committee of the Graduate Education, Teaching, and Research Institute of Cyprus Health and Society Sciences University (KSTU//2022/047, Date: 15.07.2022).

Publication Permission

Not applicable.

Availability of Data and Materials

Not applicable.

Conflict of Interest

The authors declare no conflict of interest.

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Author Contributions

This study is part of a master's thesis. MK conducted all stages of the article. MK was involved in preparing the thesis topic, introduction, methods, and discussion sections, collecting data, and writing the abstract and summary. The thesis advisor contributed to the review and editing of the work. Author MK analyzed and interpreted the research data. Both authors reviewed and approved the final versions of the manuscript

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