

Original Article

Role of Stress in Onset of Polycystic Ovarian Syndrome (PCOS)

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ABSTRACT

Background: Polycystic ovarian syndrome (PCOS) is a prevalent endocrine disorder in women of reproductive age, characterized by a variety of symptoms that impact their physical and psychological health. Recent studies have suggested a potential link between stress and the onset of PCOS, but this relationship remains underexplored.

Objective: The objective of this study was to investigate the correlation between stress and the development of PCOS in a young female population, specifically focusing on university students.

Methods: This cross-sectional study involved 105 female university students aged between 15 and 25 years from major universities in Rawalpindi and Islamabad. Participants were divided into two groups: those diagnosed with PCOS and those without. Stress levels were measured using the Perceived Stress Scale (PSS), a 10-item questionnaire scored on a 5-point Likert scale. Data were analyzed using t-test and regression analysis to explore the correlation between stress levels and the presence of PCOS.

Results: The study found that women with PCOS had significantly higher stress levels (M = 22.93, SD = 6.46) compared to those without PCOS (M = 19.56, SD = 4.45), with a t-value of 3.07 (p = .003). Regression analysis showed a positive correlation (r = .60, p < .001) between stress and PCOS. The majority of the PCOS-diagnosed group were single and within the 15-20 age range.

Conclusion: The findings indicate a significant association between high stress levels and the presence of PCOS in young women. This suggests the need for incorporating stress management strategies in the prevention and treatment of PCOS. Further research with a more diverse and larger population is recommended to generalize these findings.

Keywords: Polycystic Ovarian Syndrome, Stress, Young Women, Cross-sectional Study, Perceived Stress Scale.

INTRODUCTION

Stress, often perceived as an invisible yet omnipresent factor, plays a crucial role in the onset and exacerbation of various physical, emotional, and psychological disorders, particularly in the context of modern life (1). Among these disorders, polycystic ovarian syndrome (PCOS) stands out as a significant concern in the female population. PCOS is the most prevalent endocrinological disorder among women of reproductive age, with its implications extending beyond mere metabolic dysfunction to encompass substantial alterations in body composition (2).

This condition, affecting approximately 5–10% of young females, has become a common endocrine disorder in this demographic. Its symptoms are diverse and often debilitating, ranging from hirsutism and obesity to acne and irregular menstrual cycles. These symptoms not only impact the physical health of women but also profoundly affect their psychological well-being, often leading to a distorted body image and challenges to their feminine identity (2, 3).

A notable aspect of PCOS is its relationship with stress. The prevailing symptoms of PCOS are characterized by an increased level of stress, which in turn elevates cortisol levels. This escalation exacerbates PCOS symptoms by inducing insulin resistance, creating a vicious cycle. The prevalence of undiagnosed PCOS is alarmingly high, estimated at around 75% among females visiting hospitals for various issues. This high prevalence is attributed to a lack of awareness and knowledge about PCOS, coupled with the complexity of its diagnosis, which varies based on different diagnostic criteria (4-6).

Stress, in its broad definition, is the body's response to external stimuli and changes in the environment. It encompasses a spectrum of psychological and physical tension arising from a mismatch between the perceived demands of a circumstance and an individual's ability to cope (7). This tension can be either beneficial or detrimental, depending on its nature and duration. Polycystic Ovarian

Syndrome, a chronic illness characterized by hormonal imbalances, represents a significant stressor in itself. It involves major characteristics like excess androgen, ovulatory dysfunction, and polycystic ovaries, each contributing to the overall stress experienced by affected individuals (8-10).

Women with PCOS have been found to exhibit higher levels of neuroticism, anxiety, and depression, indicating a difficulty in coping with stress. This is compounded by metabolic stress, which contributes to the chronic nature of the syndrome and its reproductive, metabolic, and psychological dysregulation. Such stress not only perpetuates the cycle of illness but also leads to abnormal circulating markers of oxidative stress, further complicating the pathophysiology of PCOS (2, 11-13).

The intricate link between stress and PCOS has been the subject of various studies. Clinical indications of PCOS have been strongly correlated with mental distress, emphasizing the need for a comprehensive approach to diagnosis and treatment that considers both the physical and psychological aspects of the syndrome. The World Health Organization estimates that PCOS affects about 3.4 percent of women globally, a statistic that highlights the widespread nature of this condition and its implications for female health (8, 14, 15).

This research aims to delve deeper into the association between stress and PCOS, particularly focusing on how stress-related factors impact women's body composition and overall health. Previous studies have indicated a high prevalence of stress among women with PCOS, suggesting a significant role in their altered body composition. However, the psychological roots of PCOS remain largely unexplored, providing a direction for current research.

The primary goal of this study is to identify stress as a leading cause of PCOS. While prior research has predominantly focused on the biological causes of PCOS, it is increasingly evident that the syndrome's symptoms may have a psychological background. Given the known impact of stress on various physiological and psychological disorders, this research seeks to establish a direct link between stress and PCOS (8, 16, 17).

MATERIAL AND METHODS

The study was methodically structured as a systematic investigation aimed at collating, understanding, evaluating, and synthesizing essential evidence pertinent to the research questions. A cross-sectional research design was adopted to facilitate comparisons between two distinct groups. Data collection was primarily executed through interviews targeting college and university students aged between 15 and 25 years. Participants were categorized into two groups: those diagnosed with polycystic ovarian syndrome (PCOS) and those without the condition. The interview process involved querying about symptoms commonly associated with PCOS, such as irregular menstrual cycles and hirsutism. Additionally, the interviews encompassed in-depth discussions on the impact of stress on the well-being of individuals with PCOS.

For the quantification of stress, the Perceived Stress Scale, a widely recognized psychological measuring tool, was employed. This instrument, comprising 10 items, is designed to evaluate the extent to which individuals perceive their lives as unpredictable, uncontrollable, and overloaded. Each item on the scale is rated using a 5-point Likert scale, ranging from 'never' (0) to 'very often' (4) (18).

The diagnosis of polycystic ovarian syndrome was initially identified through a question in the demographic sheet, followed by a confirmatory interview. This approach was deemed most suitable for studies focused on collecting data pertaining to participants' emotions and opinions. The research design effectively delineated the variable of interest, stress, which was central to the research question (19).

In terms of instrument validation, the Perceived Stress Scale, developed by Cohen et al. (1983), has established its efficacy as a reliable psychological measure for stress, especially for young adults aged 12 years and above (20). The instrument's face validity and content are well-regarded, with a KMO coefficient of 0.82. Furthermore, Cronbach's alpha for the PSS10 revealed a relatively high reliability score of .78. To calculate the total PSS score, the responses to positively stated items (items 4, 5, 7, and 8) were reversed, followed by summing across all items. Higher scores on this scale indicated elevated levels of perceived stress (20). For the assessment and analysis of the collected data, the Statistical Package for the Social Sciences (SPSS), version 25, was utilized. This software facilitated a comprehensive analysis of the data, allowing for a deeper understanding of the relationship between stress and PCOS (21).

RESULTS

The study on the relationship between stress and Polycystic Ovarian Syndrome (PCOS) involved 105 participants, as detailed across several tables. Table 1 describes the psychometric properties of the Perceived Stress Scale used in the study. This scale, comprising 10 items, showed a reliability score (alpha) of .70. The mean stress score among participants was 21.34 with a standard deviation of 5.99, on a potential score range of 0-40 and an actual range of 7-40. The scale exhibited a skewness of .29 and a kurtosis of .30.

In terms of demographic characteristics (Table 2), the participants' ages ranged predominantly from 15 to 25 years, with 36.2% between 15 and 20 years and 63.8% between 21 and 25 years. A vast majority, 95.2%, were single, while only 4.8% were married. Regarding employment status, 80% were unemployed, 10.5% were employed, and 9.5% were engaged in personal business. The educational status varied, with 13.3% at the intermediate level, 63.8% undergraduates, and 22.9% graduates.

The correlation between stress and PCOS (Table 3) was found to be significant, with a correlation coefficient of .60 ($p < .001$). This indicates a strong positive relationship between stress levels and the presence of PCOS.

Further analysis was conducted to compare the mean stress levels between participants with and without PCOS (Table 4). Participants without PCOS had a mean stress score of 19.56 (SD = 4.45), while those with PCOS had a higher mean stress score of 22.93 (SD = 6.46). The T-test for this comparison yielded a value of 3.07 (df = 103) with a significance level of .003, and the effect size (Cohen's d) was calculated at .61. These findings indicate a significant difference in stress levels between the two groups.

Table 1 Psychometric Properties of Perceived Stress Scale

Variable	Value
Number of Items (k)	10
Alpha Reliability (α)	.70
Mean Score (M)	21.34
Standard Deviation (SD)	5.99
Score Range (Actual)	7-40
Score Range (Potential)	0-40
Skewness	.29
Kurtosis	.30

Table 2 Demographic Characteristics of Participants

Demographic	Frequency (f)	Percentage (%)
Age		
15 – 20 years	38	36.2
21 – 25 years	67	63.8
Marital Status		
Single	100	95.2
Married	5	4.8
Employment Status		
Unemployed	84	80.0
Employed	11	10.5
Personal Business	10	9.5
Educational Status		
Intermediate	14	13.3
Undergraduate	67	63.8
Graduate	24	22.9

Table 3 Correlation between Stress and PCOS

Variable	Correlation Coefficient
Stress	.60** ($p < .001$)

Table 4 Group Comparison for PCOS

PCOS Status	Mean Stress (M)	SD	T-test (df)	p-value	95% CI	Cohen's d
No (n=50)	19.56	4.45	3.07 (103)	.003	[-5.54, -1.19]	.61
Yes (n=55)	22.93	6.46				

Table 5 Regression Coefficients of Stress on PCOS

Variable	Unstandardized Coefficient (B)	Standardized Coefficient (β)	Standard Error (SE)	F Statistics (F)
Constant	-.01		.18	10.1
Stress	-.03	.29	.01	

M = Mean, SD = Standard Deviation, CI = Confidence Interval, p = probability value, *p < .001.

Table 5 presents the regression coefficients assessing the impact of stress on PCOS. The regression analysis showed that the unstandardized coefficient (B) for stress was -.03 and the standardized coefficient (β) was .29, with a standard error of .01. The F statistic for the model was 10.1, indicating the model's overall significance. This suggests that higher stress levels are significantly associated with the likelihood of having PCOS.

This comprehensive analysis provides insights into the significant association between stress and PCOS among young adults, highlighting the importance of stress management in this demographic.

DISCUSSION

This research endeavored to elucidate the role of stress in the development of polycystic ovarian syndrome (PCOS) among university and college students. The findings indicated a notable prevalence of severe stress among women with PCOS, which not only posed a challenge to their emotional well-being but also impacted their psycho-physiological health. These outcomes resonate with the findings of (22) Dokras et al. (2016) and Barry (2011) (23), who observed heightened levels of stress and anxiety in women with PCOS compared to those without the condition. Drawing on the transactional model of stress and coping, it becomes evident that when stress is perceived as surpassing an individual's coping resources, it detrimentally affects their well-being. This study aligns with prior research demonstrating a high correlation between stress, anxiety, depression, and the physical symptoms of PCOS (21-23). Additionally, Zehravi et al., 2021, Chan and La Greca, 2020, Chang and Dunaif, 2021, Ribeiro Santiago et al., 2020 suggested a vicious cycle between metabolic stress and emotional distress in PCOS, further complicating its manifestations (18-20, 24).

The present study's aim was to investigate the effect of stress on the onset of PCOS in a sample drawn from major universities in Rawalpindi and Islamabad. The participants included both diagnosed and self-reported PCOS cases, aged 15 to 25. The results underscored a positive correlation between stress and PCOS, thus supporting the study hypothesis. Notably, the t-test analysis revealed that a majority of the diagnosed PCOS cases were single individuals aged between 15-20 years, possibly reflecting the prevalent age of marriage and the onset of PCOS symptoms post-puberty in this demographic. The significance of these findings is substantial, providing a foundation for further diagnosis and analysis of PCOS in relation to stress (25).

However, the study faced several limitations. The sample size, primarily comprising young university students, was relatively small and may not effectively represent the broader population of women with PCOS. This limitation hinders the ability to generalize the findings to a wider demographic. Additionally, the reliance on online data collection could introduce bias, as it excludes non-literate women or those without internet access. This methodological choice potentially limits the comprehensiveness of the data.

Future research in this area would benefit from adopting longitudinal approaches and pre-testing to establish more robust relationships between the study variables. Moreover, expanding the sample

size and including a more diverse population, possibly through in-person interviews in clinical settings, could enhance the validity and generalizability of the findings. From a practical standpoint, the study underscores the need for more awareness programs, educational seminars, and advertisements to increase public knowledge about PCOS and its association with stress (20-22). This awareness is crucial for developing effective PCOS life programs and reducing the risk of associated diseases. The study also highlights the necessity for therapeutic interventions, guiding women with PCOS towards healthier lifestyles and providing comprehensive knowledge about the symptoms and interrelations between stress and PCOS. Understanding the influence of PCOS on daily life activities and its potential to cause stress is vital for healthcare professionals in developing targeted treatment and support strategies (20-23, 25).

CONCLUSION

The conclusion of this study underscores a significant correlation between stress and the onset of polycystic ovarian syndrome (PCOS) in a young female population, primarily comprising university students. This correlation highlights the necessity for increased awareness and more effective management strategies for PCOS, particularly focusing on stress reduction and psychological support. The implications of these findings are far-reaching, suggesting the potential for early intervention and targeted educational programs to mitigate the impact of stress on individuals susceptible to PCOS. Moreover, these results call for a broader approach to PCOS treatment that goes beyond physiological aspects to include psychological well-being. This holistic approach could significantly

improve the quality of life for women with PCOS and reduce the overall burden of this condition. The study's limitations, notably in sample size and diversity, point towards the need for further research with a wider and more varied population to reinforce these findings and expand the understanding of the complex relationship between stress and PCOS.

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