Comparative analysis of perceived stress in females with and without polycystic ovary syndrome

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ABSTRACT

Background: Polycystic ovary syndrome (PCOS) is one of the most common endocrine diseases in females of reproductive age group. It is a complicated endocrine disorder that has many adverse effects on female's physical and mental health. Polycystic ovary syndrome is characterized by many metabolic, endocrine, reproductive and psychological effects. Recently, the importance of stress with the concurrence of PCOS association has come into picture. Hence, this study was planned to find any significant relation between Perceived Stress Scale (PSS-10) between PCOS and healthy controls.

Method: A total of 262 females were included in the study of which 140 females were the patients of PCOS and the remaining 112 were not suffering from PCOS. The data was analyzed using the Perceived Stress Scale (PSS), a globally recognized and widely utilized tool for assessing stress perception. The PSS has consistently demonstrated excellent reliability and validity, providing valuable insights into the relationship between perceived stress and various pathological conditions.

Results: The results show that 71 (47%) of females were suffering from severe depression with PCOS while 51 (34%) were suffering from moderate depression and 28 (18%) were suffering from mild depression.

Conclusion: It signifies that stress plays a vital role in the progress and management of PCOS and its complications.

Keywords: Mental Health, Polycystic Ovary Syndrome, Perceived Stress Scale, Perceived Stress

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Introduction

Polycystic ovary syndrome (PCOS) is the most common endocrine disease in females of reproductive age group. It is a complicated endocrine disorder that has many adverse effects on female's physical and mental health. Polycystic ovary syndrome is

characterized by many metabolic, endocrine, reproductive and psychological effects. Some of the associated conditions include hirsutism, infertility, menstrual irregularities, obesity, and stress (1). All around the world its prevalence measures from 5% to 20% (2). It is the most common cause of an ovulatory infertility. For the diagnosis of PCOS, the 2018 International Evidence-based Guideline (EBG) for Assessment and Management of PCOS have stated that two of three features are required in adults which are (hyperandrogenism, menstrual disturbance, and cystic follicles (3).

The prevalence of PCOS is high globally and in the South Asian countries, it is much higher. In Pakistan the prevalence of PCOS is around 52 percent (4). Pakistan has overall an infertility rate of 21.9% and out of this infertility, 38.5% of the infertility in Pakistan is because of this metabolic and hormonal disorder PCOS (5).

Genetic studies suggest that PCOS is highly familial and strongly heritable with almost 60-70% of the daughters born to mothers with PCOS, exhibit the same phenotype of polycystic ovary syndrome in the adulthood which suggests a highly Autosomal Dominant Pattern (6).

However many environmental factors are also responsible for PCOS. Many studies have shown that unhealthy lifestyle, diet and specifically stress are the triggers for PCOS (7). Environmental hazardous pollutants such as heavy metals, insecticides and Endocrine Disrupting Chemicals (EDCs) have shown immense damage to human health including endocrine and reproductive health and there is great evidence that these hazardous pollutants leads to the development of PCOS (8). The severity and onset of many of the symptoms of Polycystic Ovary Syndrome have been shown to improve and reverse with lifestyle modification, physical activity and exercise and specifically stress reducing interventions (9).

Elevated levels of testosterone in blood with the elevation of blood androgens is the main contributing factor in the pathophysiology of PCOS (10). The exact cause of PCOS is unknown but many factors which includes Obesity, Insulin Resistance and Stress (Oxidative, Physical and perceived) have been linked to Polycystic Ovary Syndrome. Studies have shown that along with many genetic, environmental and hormonal causes, stress is believed to play a main role in the early onset of the disease and aggravate symptoms. Clinically young adolescent girls with PCOS present with premature puberty, cysts in one or both ovaries that measure 8mm in size, obesity, hirsutism, disturbed menstrual cycles, mood changes, acne and infertility issues (11).

Perceived stress is the feelings or thoughts that a person has about the amount of stress they have under a specific point in time over a given time period. Perceived stress describes feelings of a person about the uncontrollability and unpredictability of a person's life, how much change is occurring in a person's life and how much they are able to cope with that changes and difficulties (12).

Perceived stress can the measured by the Perceived Stress Scale (PSS). This is one of the most extensively used stress perception assessment instruments in the world and has very good results that became very much helpful in the assessment of perceived stress and its relation with different pathologic conditions. This scale was originally developed by Cohen et al. in 1983 (13). The German version of the PPS has 10 items which is why it is also called PSS-10, with six

negative items (e.g., "Unable to control the important things in your life?") and four positive items (e.g., "Confident about your ability to handle your personal problems?"). There are 5 answers to every Question on the Perceived Stress Scale (PSS-10) and answer to every question are rated on a 5 point Likert scale (0 = Never and 4 = very Often) (14).

In Perceived Stress Scale PSS-10, Question 1, 2, 3, 6, 9 and 10 are scored from 0 to 4 while Question no. 4, 5, 7 and 8 are scored reversely from 4 to 0. The scores range from 0 to 40 (15).

- ➤ Scores ranging from 0-13 would be considered low stress.
- ➤ Scores ranging from 14-26 would be considered moderate stress.
- ➤ Scores ranging from 27-40 would be considered high perceived

Yes, there are several depression assessments tools available, and one of the most commonly used is the Patient Health Questionnaire-9 (PHQ-9). It's a self-administered questionnaire that evaluates the severity of depression symptoms over the past two weeks. Each item is scored from 0 to 3, and the total score ranges from 0 to 27, with higher scores indicating more severe depression.

Methods

It was a descriptive comparative study conducted at department of Diabetes and Endocrinology at a tertiary care hospital (Lady Reading Hospital) in District Peshawar from 20th May to 20th August 2023.

A total of 262 females were included in the study of which 140 females were the patients of PCOS and the remaining 112 were not suffering from PCOS. The sample size was calculated using "RAOSOFT" online sample size calculator. Using Confidence interval 95%, Margin of Error 5%, prevalence was taken 11% (16).

This study included all females, both married and unmarried, within the childbearing age range of 18 to 45 years, who have been diagnosed with Polycystic Ovary Syndrome (PCOS) and provide informed consent to participate. Whereas participants were excluded who do not gave consent, had other hormonal or metabolic medical conditions or had a history of mental health conditions such as stress, depression or anxiety. Additionally, females who were already taking medications for these mental health conditions were not eligible for participation. The protocol of this study was approved by Ethical Review Board letter number 82036/Ethical Board/GKMC of Gajju Khan Medical College Swabi. Informed consent was obtained from participants prior to study.

Results

The prevalence of PCOS is increasing day by day due to modern diet and sedentary life style. This emerging condition is much higher in the South Asian countries as compared to other regions due to unknown reasons. In Pakistan the prevalence of PCOS is around 52 percent with an infertility rate of 21.9% and out of which, 38.5% infertility is because of this metabolic and hormonal disorder PCOS.

The severity and onset of many of the symptoms of Polycystic Ovary Syndrome have been shown to improve and reverse with lifestyle modification, physical activity and exercise and specifically stress reducing interventions.

The results in our study depicted that the ratio of depression is significantly high in the females suffering from PCOS as compared to the females who were not suffering from PCOS.

Table 1. Represents the frequency of PCOS females in different ranges of Perceived stress

		STRESS LEVEL				
		MILD (0-13)	MODERATE (14-26)	SEVERE (27-40)	TOTAL	p - value
PCOS	YES	28	51	71	150	
	NO	20	56	36	112	
TOTAL		48	107	107	262	0.022

0-13 is range of Mild Perceived Stress; 14-26 is range of Moderate Perceived Stress, 27-40 is range of Severe Perceived Stress

The statistical analysis reveals a significant relationship between PCOS and stress levels. The cross-tabulation table indicates varying stress levels among individuals with and without PCOs. Specifically, the Pearson Chi-Square test shows a significant association (p-value = 0.022), suggesting that stress levels differ significantly between those with and without PCOs. The Likelihood Ratio test supports this finding (p-value = 0.022), reinforcing the presence of this significant relationship. The results show that 71 (47%) females were suffering from severe depression with PCOS while 51 (34%) were suffering from moderate depression and 28 (18%) were suffering from mild depression.

Discussion

Among 150 Females who had PCOS, 71 females were in the range of Severe Perceived Stress, 51 females were in the range of Moderate Perceived Stress while the remaining 28 females were in the range of mild stress. This means 47.3% of the females fall in the range of Severe Perceived stress, 34% females fall in the range of Moderate Perceived Stress while 18.7% females were in the range of mild Perceived Stress. Majority of the PCOS patients were in the range of High perceived stress which coincides with the result of article published by Ghada Khafagy et.al in 2020 and Wadha K. Almeshari et.al in 2021 (17, 18).

One of the other aspects of our study that are analogous and similar to the study conducted by Pawel Dybciak et.al in 2022 depicts that the females with increasing age and PCOS have a direct relation to the level of depression. As the age of the individual suffering from PCOS increases the level of stress perception also increases and so the females with decreased age have less stress perception (19).

Data for the study was also provided by 112 females in the reproductive age range, or those who were not suffering from PCOS and were between the ages of 18 and 45. 20 of the 112 females had evidence of mild stress, 56 had signs of high stress, and 36 had evidence of severe stress. Overall, the data shows that there is a statistically significant correlation between stress levels and PCOs. This data also adds to the data provided by Jibby Jolly Benjamin et.al in 2023.(20) This was also described by Marie-Louise Marschalek et.al in 2023 that patients with PCOS had considerably higher PSS total scores and worse quality of life with p value less than 0.05 and increase adverse effects with increased number of drugs prescribed (21, 22).

Dutkiewicz et al. (2024) and Pokora et al. (2022) also investigated the relationship between mental health outcomes and metabolic factors in women with polycystic ovary syndrome (PCOS). Their findings suggest that depression, heightened tension induction, and impaired coping strategies are

significantly associated with clinical and laboratory indicators of hyperandrogenism. These results highlight the importance of considering the impact of hyperandrogenism on mental health in women with PCOS. These findings underscore the need for comprehensive assessment and management of mental health in women with PCOS, particularly those exhibiting signs of hyperandrogenism. Mental health interventions, in conjunction with appropriate treatment for PCOS, may be beneficial in improving overall well-being. These both studies clearlystated that future studies could investigate the effectiveness of different therapeutic approaches for addressing mental health concerns in women with PCOS, considering the potential role of hyperandrogenism (23, 24).

Koike H et al., 2023 conducted a study on roles of endoplasmic reticulum stress in the pathophysiology of polycystic ovary syndrome. In the study, endoplasmic retilculum stress pathways are activated in the ovaries of both a mouse model of PCOS and in humans, and local hyperandrogenism in the follicular microenvironment associated with PCOS is responsible for activating these. In conclusion, the activation of endoplasmic reticulum stress is responsible for the pathophysiology of PCOS through different effects in the granulosa cells. Furthermore, activation of ER stress in the follicular microenvironment of patients with PCOS forms part of a vicious circle with other local factors, including high levels of androgens, oxidative stress, and inflammation, as well as with systemic features of PCOS. This abnormal microenvironment causes multiple defects in the granulosa cells, which contributes to the pathogenesis of PCOS (25).

Robinson SL et al., 2020 conducted a study on the associations of maternal polycystic ovary syndrome and hirsutism with behavioral problems in offspring. It was a Prospective Birth Cohort Study and the objective of the study was to study the association between maternal polycystic ovary syndrome PCOS and hirsutism with offspring attention-deficit/hyperactivity disorder (ADHD), anxiety, conduct disorder, and behavioral problems. This study was conducted on a total of 1915 mother-child dyads. In conclusion, Maternal PCOS was related with offspring anxiety, and hirsutism was related to other offspring behavioral problems (26).

Abu-Zaid A et al., 2022 conducted a study on the topic maternal polycystic ovary syndrome and the potential risk of attention-deficit/hyperactivity disorder and autism spectrum disorder in the offspring: a systematic review and meta-analysis. The main objective of the study was to find a correlation between maternal PCOS and attention deficit/hyperactivity disorder and autism spectrum disorder in the offspring. A literature search was done in PubMed/MEDLINE, Scopus, and Web of Science from inception until January 2021. Seven studies, with 1,358,696 participants, comprising 7,334 ADHD cases and 3,920 ASD cases, were included in this study. In conclusion, it was found that there might be a significant link between maternal PCOS and the risk of offspring developing ADHD & ASD. So, this important issue might be taken into account for women with PCOS while they are pregnant. With the new advancements and the lack of time it is difficult for the doctors to coup up with the ever-new changing treatment strategies in medicine and elsewhere (22, 27).

Conclusion

According to the results of the study, higher frequency of Severe Perceived Stress was

reported in PCOS females. Among married and unmarried females, the level of Perceived stress was a little higher in the married females. On the basis of Age, there was no significant difference in the levels of perceived stress.

Conflicts of Interest: None

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