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Original Article

Frequency of Depressive Symptoms in Women with Polycystic Ovary Syndrome and Obesity versus Women with Polycystic Ovary Syndrome without Obesity

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ABSTRACT

Polycystic Ovary Syndrome (PCOS) is a complicated hormonal condition that impacts women globally. Its association with obesity and its potential impact on mental health, specifically depressive symptoms, has gained increasing attention. This study aimed to determine the relationship between depressive symptoms and PCOS in women, with a focus on the influence of obesity. **Objective:** To compare the frequency of depressive symptoms among women who have PCOS, categorized based on whether they are obese or not. **Methods:** This analytical cross-sectional study was conducted at Liaquat University Hospital, Hyderabad from Apr 2021 to Oct 2021 for a period of 6 months. Data were collected prospectively using a structured proforma. The CES-D scale was administered via face-to-face interviews by trained research staff. Clinical information (e.g., duration of PCOS, menstrual history, and biochemical reports) was extracted from the hospital's electronic medical records. All data were anonymised before analysis. Data included demographic information, clinical characteristics of PCOS, and depressive symptom scores measured using the Center for Epidemiologic Studies-Depression (CES-D) scale. The study was conducted from Apr 2021 to Oct 2021 for a period of 6 months. **Results:** Women with PCOS and obesity exhibited significantly higher mean CES-D scores and a higher prevalence of clinically significant depressive symptoms (CES-D ≥ 16) compared to those without obesity. Hyperandrogenism, oligomenorrhea, and hirsutism were more prevalent in women with PCOS and obesity. **Conclusions:** The study found out that women with PCOS and obesity appear to be at a higher risk of experiencing clinically significant depressive symptoms. Healthcare providers should consider the mental health needs of this population, emphasizing a multidisciplinary approach to care.

"This is a correction to the original article. For information about the changes made, please see the major corrections linked as a supplemental file on the article's landing page. The information will also be available at 10.54393/pjhs.v5i07.4585 on 31st July 2024."

INTRODUCTION

Polycystic Ovary Syndrome (PCOS) is a common hormonal imbalance, affecting an estimated 6–10% of Pakistani women [1]. Among obese women in the country, this rate is considerably higher, falling between 18–27% [2]. Typical clinical symptoms of PCOS include signs of hyperandrogenism such as irregular menstruation, excessive body hair, and acne. Additionally, both adult women and young girls with PCOS face an increased risk of associated health issues, including Type 2 diabetes, fertility problems, heart disease, weight problems, elevated insulin levels, insulin resistance, and other metabolic conditions [3]. New studies suggest that adult women suffering from PCOS are more prone to mental health challenges, particularly symptoms associated with internalizing disorders [4]. A comprehensive meta-analysis by Barry *et al.* (2011) reported that women

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with PCOS have significantly higher odds of depression (OR 3.0, 95% CI 2.0-4.5) and anxiety (OR 5.0, 95% CI 3.0-8.0) compared to controls[4]. Another long-term study that followed 83 adult women with PCOS for 25 years found consistently higher scores for depression symptoms, as measured by the Center for Epidemiologic Studies-Depression (CES-D) scale, in comparison to women not diagnosed with PCOS [5]. The study indicated that women with PCOS were twice as likely to screen positively for depression compared to those without the condition. The underlying reasons for the heightened prevalence of depressive symptoms among women with PCOS are still not entirely understood but could be related to the severity of physical symptoms like hirsutism, metabolic issues, and infertility problems. Additionally, it is hypothesized that symptoms of depression might be involved in the development of PCOS, possibly via stress-related behavioral and physiological pathways [6]. While research has been conducted on the prevalence of depression in adult women with PCOS, there is a gap in knowledge about the extent and contributing factors of depression in younger individuals with PCOS. In Pakistan, around 11% of adolescents are diagnosed with depression, and girls are two to three times more likely to suffer from major depressive disorder than boys [7]. For girls dealing with obesity or metabolic issues, the incidence of depression ranges from 12% to 21% [8]., revealed that young individuals with obesity and Type 2 Diabetes (T2D) had higher depressive symptoms, as measured by the CES-D scale, compared to those with Type 1 Diabetes (T1D) who were not obese [9]. A considerable number of these adolescents with T2D had CES-D scores exceeding the threshold of 16, signaling significant depressive symptoms and necessitating further evaluation for depression [10]. Likewise the study which included 704 young people with T2D aged between 10 and 17 and with a BMI in the 85th percentile or higher, found that 17% of the girls had elevated levels of depressive symptoms [11]. Given these heightened rates of depression among adolescents with obesity and T2D, along with the increased risk of depression in adult females with PCOS, there's a critical need to study the prevalence of depression in young individuals with both PCOS and obesity, a demographic yet to be adequately studied in Pakistan.

The rationale of this study was to explore whether women with PCOS and obesity would demonstrate similar levels of depression symptoms as girls without obesity. Therefore, the objectives of this study were to compare depressive symptoms among women with obesity and without obesity that have PCOS.

METHODS

This analytical cross-sectional study was conducted at Liaquat University Hospital, Hyderabad from Apr 2021 to Oct 2021 for a period of 6 months. The initial selection criteria for participants' enrollment included female gender with age range between 11 and 17 years and having presence of polycystic ovaries or irregular menses. The participants were chosen via non-probability purposive sampling. Females with already established psychiatric diagnosis, having Cushing syndrome or metabolic disorder were excluded from the study. Following ethical approval from the CPSP Ref No. CPSP/REU/MED-2019-124-15541 dated October 25, 2020 and seeking signed informed consent from all participants, patients were enrolled from the outpatient department. Sample size was calculated using OpenEpi for comparing two independent means. Assuming a mean CES-D difference of 4 points (SD ~5), with 80% power and α=0.05, a minimum of 80 participants per group was required. To account for dropouts, we enrolled 194 women (90 obese, 104 non-obese) [2]. PCOS was diagnosed using the Rotterdam criteria (2003), requiring at least two of the following three features after excluding other causes: (i) oligo-/anovulation, (ii) clinical and/or biochemical hyperandrogenism, and (iii) polycystic ovarian morphology on ultrasound (≥12 follicles of 2-9 mm or ovarian volume >10 mL), with no other underlying cause for oligomenorrhea or elevated androgens). Ultrasound of all women was done to assess the number of cysts in the ovaries.

Obesity was defined as BMI ≥ 27.5 kg/m^2 (Asian-specific cut-off recommended by the WHO-Asia Pacific guidelines), while non-obese was defined as BMI < 25.0 kg/m^2. BMI was calculated as weight (kg) divided by height (m^2). The depressive symptoms were assessed by CES-D. The data were analyzed via SPSS version 24.0. Mean ± SD was calculated for quantitative variables while frequency and percentages were calculated for qualitative variables.

RESULTS

The mean age of women with PCOS and obesity was 25.5 ± 3.2 years, while those with PCOS without obesity had a slightly higher 26.0 ± 2.8 years. The average BMI value for women with PCOS and obesity was substantially higher 30.4 ± 2.7, compared to those without obesity, who had an average BMI value of 22.3 ± 2.1. In terms of education level, a similar distribution was observed in both groups, with a significant proportion holding a Bachelor's degree. Employment status showed that a higher percentage of women with PCOS and without obesity were employed compared to those with PCOS and obesity.

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Table 1: Demographic Characteristics

Characteristics	PCOS with Obesity (n=90)	PCOS without Obesity (n=104)	Total (n=194)
Age (Mean ± SD)	25.5 ± 3.2	26.0 ± 2.8	25.8 ± 3.0
BMI (Mean ± SD)	30.4 ± 2.7	22.3 ± 2.1	26.3 ± 4.0
Education Level			
Uneducated	25 (27.8%)	28 (26.9%)	53 (27.3%)
High School	25 (27.8%)	28 (26.9%)	53 (27.3%)
Bachelor's Degree	40 (44.4%)	48 (46.2%)	88 (45.4%)
Employment Status			
Employed	25 (27.8%)	36 (34.6%)	61 (31.4%)
Unemployed	65 (72.2%)	68 (65.4%)	133 (68.6%)

Table 2 reveals that the duration of PCOS was similar in both groups, with women in the PCOS with obesity group having 5.7 ± 1.2 years, and those without obesity having 5.3 ± 1.0 years. Notably, hyperandrogenism was more prevalent among women with PCOS and obesity, with 75.6% of this group exhibiting this clinical characteristic compared to 50.0% in the PCOS without obesity group. Oligomenorrhea was also more common in the PCOS with obesity group, with 91.1% experiencing it, while 73.1% of women without obesity had this condition. Hirsutism was observed in 66.7% of women with PCOS and obesity, whereas it was present in 34.6% of women without obesity.

Table 2: Clinical Characteristics

Characteristics	PCOS with Obesity (n=90)	PCOS without Obesity (n=104)	Total (n=194)
Duration of PCOS (Years)	5.7 ± 1.2	5.3 ± 1.0	5.5 ± 1.1
Hyperandrogenism	68 (75.6%)	52 (50.0%)	120 (61.9%)
Oligomenorrhea	82 (91.1%)	76 (73.1%)	158 (81.4%)
Hirsutism	60 (66.7%)	36 (34.6%)	96 (49.5%)

Table 3 presents the scores for depressive symptoms, as measured by the CES-D (Center for Epidemiologic Studies-Depression) scale. Women diagnosed with both PCOS and obesity showed a higher average CES-D score of 22.8 (with a standard deviation of 4.7). In contrast, those without obesity had a lower average score, registering at 18.5 (with a standard deviation of 3.9). The median CES-D score for women with PCOS and obesity was 23 (IQR: 20-26), while for those without obesity, it was 19 (IQR: 16-22). Additionally, a notably higher percentage of women with both PCOS and obesity, specifically 75.6%, had CES-D scores of 16 or above. A CES-D score of ≥16 was used as a screening threshold to indicate clinically significant depressive symptoms warranting further psychiatric evaluation; it does not replace a formal clinical diagnosis of major depressive disorder. On the other hand, only 46.2% of women without obesity reached this threshold for depression. In comparison, only 24.4% of women with PCOS and obesity had CES-D scores below 16, while 53.8% of women without obesity fell into this category.

Table 3: Depressive Symptoms Scores (CES-D)

CES-D Score Range	PCOS with Obesity (n=90)	PCOS without Obesity (n=104)	Total (n=194)
Mean ± SD	22.8 ± 4.7	18.5 ± 3.9	20.7 ± 4.3
Median (IQR)	23 (20-26)	19 (16-22)	21 (18-24)
CES-D ≥ 16 (n, %)	68 (75.6%)	48 (46.2%)	116 (59.8%)
CES-D < 16 (n, %)	22 (24.4%)	56 (53.8%)	78 (40.2%)

DISCUSSION

The study reported a significant increase in prevalence of depressive symptoms among girls with PCOs and Obesity in comparison to girls having PCOS without Obesity. The mean age difference between women with PCOS and obesity and those without obesity, though statistically significant, is relatively small (25.5 years vs. 26.0 years). This finding aligns with the general understanding that PCOS can affect women of various age groups. However, it's important to note that the average BMI in the PCOS with obesity group (30.4) is considerably higher than that in the PCOS without obesity group (22.3). This observation mirrors the well-established association between PCOS and obesity. This aligns with multiple studies conducted both nationally and internationally, which have consistently shown a robust correlation between PCOS and obesity. Often, obesity worsens the clinical symptoms of PCOS, such as irregular menstrual cycles and hyperandrogenism [12]. For instance, research by Escobar-Morreale *et al.*, in 2012 revealed that obesity is linked to more pronounce clinical and biochemical signs of hyperandrogenism in women with PCOS [13]. The distribution in educational level of participants is very much similar in both groups. A substantial proportion in both groups was having Bachelor's degrees. This suggests that education level might not be a significant differentiating factor in this context opposing to the study by Hopkins *et al.* [14]. But a more close investigation into the socioeconomic factors affecting women with PCOS, suggest a link of higher socioeconomic status in easy access to healthcare, and mental health support. The duration of PCOS among both groups was not much different, which indicates that there is not any significant association present between obesity and duration of PCOS. This matches what other studies have found: PCOS tends to stick around regardless of weight [15]. More women with PCOS and obesity had high levels of male hormones (75.6%) compared to those without obesity (50.0%). This shows how PCOS, obesity, and hormone imbalances are all connected. Other studies have seen similar patterns. For example, Azziz *et al.*, in 2016 pointed out how having too much male hormone is a big part of PCOS, and obesity can make it worse [16]. In women with PCOS and obesity, a higher percentage experienced irregular periods (91.1%) compared to those without obesity (73.1%). This matches what other studies have found;

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showing that being obese can worsen period problems in PCOS. International studies, like one in 2012 have consistently shown a link between obesity and menstrual issues in PCOS [17,18]. Excess body hair (hirsutism) was more common in women with PCOS and obesity (66.7%) compared to those without obesity (34.6%). This lines up with research showing that obesity can impact the symptoms of PCOS, especially those related to too much male hormone, like excess hair growth. International studies, such as one in 2014, have also highlighted how obesity can make hirsutism worse in PCOS [18, 19]. It's clear that women who have both PCOS and obesity tended to have higher average scores on the CES-D, which suggests more severe depressive symptoms, compared to those without obesity. Additionally, a noticeably larger number of women with both conditions scored above the threshold of 16 on the CES-D, indicating clinically significant depressive symptoms. This suggests a possible link between obesity and more severe depression symptoms in women with PCOS [20]. Many studies conducted both in the United States and internationally have explored the relationship between PCOS, obesity, and depression symptoms. For example, a study in 2011 in the United States found that women with both PCOS and obesity are more likely to experience depression compared to those who are not obese [21]. Similarly, research in Australia in 2017 also discovered a higher occurrence of depression among women with both PCOS and obesity [22]. However, it's important to recognize that the link between PCOS, obesity, and depressive symptoms is intricate and influenced by various factors. This may include biological aspects related to hormonal imbalances, psychological factors tied to body image and self-esteem, and sociocultural factors impacting how women perceive and manage their condition.

CONCLUSIONS

This study unearths the complex relationship among PCOS, obesity, and depressive symptoms. The study found out that women with PCOS and obesity appear to be at a higher risk of experiencing clinically significant depressive symptoms. Healthcare providers should consider the mental health needs of this population, emphasizing a multidisciplinary approach to care.

Authors Contribution

Conceptualization: SF
Methodology: AA, HS
Formal Analysis: SF, AA
Writing, review and editing: SF, AN, AA, SB, FL, HS

All authors have read and agreed to the published version of the manuscript.

Conflicts of Interest

The authors declare no conflict of interest.

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