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PCOS AND METABOLIC DYSREGULATION IN SOUTH ASIAN WOMEN: ASSOCIATION OF WEIGHT GAIN, PREDIABETES, AND PSYCHOSOCIAL IMPACTS: A CROSS-SECTIONAL CLINICAL STUDY

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ABSTRACT
Polycystic ovary syndrome (PCOS) is a common endocrine and metabolic disorder that significantly affects the reproductive, metabolic, and psychological health of women of reproductive age. The present study was conducted to assess the association of weight gain, prediabetes, and psychosocial impacts among South Asian women with PCOS. This cross-sectional analytical study was carried out at ddepartment of Gynecology, The Second Affiliated Hospital, Hengyang Medical School, University of South China, Hengyang, Hunan 421001, China.from September 2023 and September 2025 and included 200 women aged 18–40 years with confirmed PCOS. Clinical, anthropometric, biochemical, and psychosocial data were collected using a structured proforma. Prediabetes was assessed using fasting blood glucose and HbA1c, while psychosocial burden was evaluated using PHQ-9 and GAD-7. The mean age of participants was 26.8 ± 4.9 years, and the mean BMI was 28.6 ± 4.3 kg/m². Most participants were either overweight (38%) or obese (36%). Prediabetes was identified in 36% of women, while psychosocial distress was observed in 61%. Depressive symptoms and anxiety symptoms were found in 32% and 35% of participants, respectively. A significant association was observed between higher BMI and prediabetes ($p < 0.001$). The findings indicate that PCOS in South Asian women is strongly associated with metabolic dysregulation and psychosocial burden, emphasizing the need for early metabolic screening and holistic clinical management.

Keywords: Polycystic ovary syndrome; PCOS; Prediabetes; Obesity; Weight gain; Psychosocial distress; South Asian women

INTRODUCTION

Polycystic ovary syndrome is a major endocrine condition affecting women of reproductive age that has emerged to become a leading health issue for women worldwide, rather than just a reproductive disease alone[1]. Globally, the prevalence of polycystic ovary syndrome ranges between diagnostic criteria, but is estimated to affect a large number of women of reproductive age, and is one of the most common endocrine and metabolic conditions encountered in clinical practice[2]. In addition to the traditional links with menstrual dysfunction, hyperandrogenism, anovulation, and infertility, it is now known that, over time, the syndrome is also associated with significant metabolic, cardiovascular, and psychological implications. International consensus also recently highlighted that polycystic ovary syndrome is a complex, multisystem disease, which requires consideration of both reproductive and non-reproductive aspects of health[3].

A primary issue among women with polycystic ovary syndrome is metabolic dysfunction, in particular, weight gain, central obesity, insulin resistance, impaired glucose tolerance, prediabetes, and subsequent type 2 diabetes mellitus[4]. Insulin resistance is one of the key underlying mechanisms in many women with the syndrome and contributes to the amplification of both reproductive and metabolic dysfunction[5]. Elevated levels of insulin play a role in the excess androgen production from the ovary, and as body fat increases, the degree of insulin resistance and metabolic dysfunction worsens. This leads to a vicious cycle where endocrine symptoms as well as metabolic dysfunction are commonly present and often compound each other. Consequently, many women with polycystic ovary syndrome start to show early metabolic changes even before they develop clinically apparent diabetes or cardiovascular disease[6].

This metabolically vulnerable burden is especially important in South Asian women, who show an increased metabolic vulnerability[7]. South Asians are already known to be more susceptible to central obesity, insulin resistance, and dysglycemia, often at the same body mass index as their Western peers. This may potentially predispose women with polycystic ovary syndrome to further weight gain, altered glucose metabolism, and prediabetes at a younger age[8]. In fact, it has been proposed that South Asian women with polycystic ovary syndrome may have greater fasting insulin, reduced insulin sensitivity, central obesity, and metabolic syndrome than other ethnic origins. This suggests that metabolic assessment may be particularly important in this group, and the impact of the disease may be underestimated if assessed solely in terms of its reproductive symptoms[9].

Beyond its metabolic consequences, polycystic ovary syndrome is increasingly being recognised as having a significant psychosocial impact[10]. Weight gain, acne, hirsutism, amenorrhea, and the threat to female fertility may have a profound impact on body image, self-esteem, mood, and social well-being. Women with the syndrome report higher rates of anxiety, depression, and poorer quality of life than other women. These mental health factors are clinically relevant as they may affect health-care seeking, medication adherence, diet and exercise, and long-term management of the disease. In South Asian cultures, where attractiveness, marriage, and fertility may be cultural priorities, the psychological impact of polycystic ovary syndrome may be magnified[11,12].

While the international published literature increasingly acknowledges that polycystic ovary syndrome is associated with both metabolic and mental dysfunction, there is limited research published to date that evaluates the burden of weight gain and prediabetes together with psychosocial outcomes in South Asian women[13]. While many studies have examined infertility, menstrual irregularities, or individual endocrine features, few studies have addressed the interplay between obesity-induced metabolic dysregulation and psychological well-being in this population. This represents an important clinical gap, particularly in populations that are already at elevated risk of early cardiometabolic disease[14].

Therefore, the present study was conducted to evaluate metabolic dysregulation in South Asian women with polycystic ovary syndrome, with particular emphasis on weight gain, prediabetes, and psychosocial impacts. The present study seeks to address these issues in a single patient population to gain a better appreciation of the overall health burden of polycystic ovary syndrome and to drive the need for a more holistic approach to clinical management[15].

MATERIALS AND METHODS

This hospital-based cross-sectional analytical study was carried out between September 2023 till September 2025 at the Department of Gynecology, The Second Affiliated Hospital, Hengyang Medical School, University of South China, Hengyang, Hunan 421001, China. It aimed to assess the association of metabolic dysfunction and psychological distress in polycystic ovary syndrome among South Asian women, especially focusing on weight gain, prediabetes, and psychological health.

We recruited 200 women, aged between 18 and 40 years, through a non-probability consecutive sampling method. Women presenting to the gynecology outpatient department with a diagnosis of, or suspected, polycystic ovary syndrome, were recruited. Women who met the diagnostic criteria and agreed to take part in the study were considered for final enrolment. Polycystic ovary syndrome was diagnosed using the Rotterdam criteria, which consist of the presence of at least two of the following three items after excluding other endocrine disorders: oligo-ovulation or anovulation presenting as menstrual irregularity, clinical and/or biochemical hyperandrogenism, and polycystic ovary morphology on ultrasound.

Women were eligible for inclusion if they were of South Asian descent, between 18 and 40 years of age, had polycystic ovary syndrome, and consented to undergo comprehensive clinical, biochemical, and psychosocial evaluation. Women were excluded if they had a history of diabetes mellitus, pregnancy, thyroid disease, hyperprolactinemia, Cushing syndrome, congenital adrenal hyperplasia, chronic liver disease, chronic renal disease, or any other major endocrine or systemic disease that might influence metabolic status or a similar appearance to polycystic ovary syndrome. Women taking medications that could substantially affect metabolic, hormonal, and psychological status were also excluded.

The study was approved by the institutional review board, and all women provided written informed consent. Data collection was performed using a pre-designed study proforma. Age, marital status, educational status, menstruation history, duration of symptoms, family history of diabetes, history of weight gain, physical activity and dietary habits, and gynecological and metabolic symptoms were collected by direct interview and physical examination.

All women were subjected to anthropometric and clinical examination. Weight was assessed in kilograms using a digital weighing scale, and height in meters using a stadiometer. Body mass index was defined as weight in kilograms divided by height in meters squared. Waist circumference was taken in centimeters with a non-stretchable tape measure at the point midway between the lowest costal margin and the iliac crest. In addition, a physical examination was conducted to record the common clinical features of polycystic ovary syndrome and the associated metabolic abnormalities, such as menstrual irregularity, acne, hirsutism, acanthosis nigricans, and hypertension.

Biochemical evaluation was performed after an 8-10-hour overnight fast. Venous blood samples were obtained aseptically and analysed at the hospital laboratory by standard methods. The main biochemical variables assessed in this study were fasting blood glucose and glycated hemoglobin, which were used to detect early signs of disordered glucose metabolism. Prediabetes was defined for this study as a fasting blood glucose between 100 and 125 mg/dL and/or a glycated hemoglobin (HbA1c) between 5.7% and 6.4%. Those with values indicative of overt diabetes were excluded from the data analysis.

An assessment of psychosocial distress was undertaken to assess the psychosocial impact of polycystic ovary syndrome. We used the nine-item Patient Health Questionnaire-9 scale to assess for the presence of depressive symptoms and the seven-item Generalized Anxiety Disorder-7 scale to assess anxiety symptoms. Participants were also asked about the psychosocial impact of polycystic ovary syndrome symptoms, including weight gain, acne, hirsutism, menstrual dysfunction, social embarrassment, low self-esteem, and body dissatisfaction. In the analyses, psychosocial distress was defined as the participant having clinically significant depressive or anxiety symptoms, and/or self-reporting a high level of emotional or social burden due to the syndrome.

To compare the study outcomes, the cohort was divided into body mass index and glycemic status groups. The population was grouped into normal weight, overweight, and obese categories (using body mass index) and into prediabetes and non-prediabetes categories (using fasting blood glucose and glycated hemoglobin). These were compared to investigate whether higher body weight and abnormal glycemic status were linked to a higher prevalence of psychosocial distress and its manifestations.

The key variables investigated in the study were body weight, body mass index, waist circumference, fasting blood glucose, glycated hemoglobin, depressive symptoms, anxiety symptoms, and body image dissatisfaction. The primary measures of outcome were the rates of overweight, obesity, prediabetes, and psychosocial distress, and the association of these outcomes with excess body weight and metabolic dysfunction.

Data were entered into and analyzed with the Statistical Package for the Social Sciences version 26.0. The data were reviewed for missing, logical, and input errors before final analysis. Age, body mass index, waist circumference, fasting blood glucose, glycated hemoglobin, and scores of psychosocial distress measures were described as mean ± standard deviation, while categorical variables were presented as number and percentage. Chi-square test was used to determine the relationship between categorical variables, while an independent t-test was used, if appropriate, to compare continuous variables between the groups of interest. To assess independent associations of prediabetes and psychosocial distress, we performed multivariate logistic regression after adjusting for potential confounders such as age, body mass index, waist circumference, family history of diabetes, and level of physical activity. The level of statistical significance was set at p less than 0.05.

RESULTS

A total of 200 South Asian women diagnosed with PCOS were included in the study. The average age of the study group was 26.8 ± 4.9 years, with 58% of women in the 21-30 years age group. The majority were single (55%), and 45% were married. The women had a high frequency of recent or progressive weight gain (68%), and 42% had a family history of diabetes mellitus.

Regarding symptoms and signs, irregular menstruation was the most frequent (78%), followed by acne (52%), hirsutism (47%), and acanthosis nigricans (39%), suggesting a high burden of metabolic and androgenic symptoms. The baseline characteristics of the women are shown in Table 1. These results show that in this cohort, PCOS is frequently associated with both reproductive and visible metabolic signs, and especially weight gain and signs of insulin resistance.

Table 1: Baseline Demographic and Clinical Characteristics of Study Participants (n = 200)

Variable	Frequency (n)	Percentage (%)
Age 18–20 years	24	12.0
Age 21–30 years	116	58.0
Age 31–40 years	60	30.0
Unmarried	110	55.0
Married	90	45.0
History of weight gain	136	68.0
Family history of diabetes	84	42.0
Menstrual irregularity	156	78.0
Acne	104	52.0
Hirsutism	94	47.0

Acanthosis nigricans	78	39.0

The mean Body Mass Index (BMI) of the study group was 28.6 ± 4.3 kg/m², suggesting a generalised overweight status. Many participants had either an overweight or an obese BMI. In detail, 38% were overweight, 36% obese, and only 26% had a normal BMI.

The mean fasting blood glucose concentration was 104.2 ± 12.6 mg/dL, and the mean HbA1c was 5.9 ± 0.5%, implying a shift towards glucose intolerance. Using operational criteria, 72 (36%) of the participants were classified as having prediabetes. These metabolic data are presented in Table 2. These findings suggest a high burden of obesity and early signs of glucose metabolic problems, suggesting a metabolic vulnerability among women with PCOS in this community.

Table 2: Anthropometric and Metabolic Profile of Participants (n = 200)

Variable	Mean ± SD / Frequency	Percentage (%)
BMI (kg/m²)	28.6 ± 4.3	—
Normal weight	52	26.0
Overweight	76	38.0
Obese	72	36.0
Fasting Blood Glucose (mg/dL)	104.2 ± 12.6	—
HbA1c (%)	5.9 ± 0.5	—
Prediabetes	72	36.0

The respondents complained of high psychological distress. The PHQ-9 scale indicates that 64 participants (32%) had moderate to severe depression symptoms, and 70 participants (35%) had significant anxiety symptoms (GAD-7 ≥10). Moreover, 118 participants (59%) expressed displeasure with body image and 54% of women were socially embarrassed or lost self-worth because of PCOS symptoms.

Overall, psychosocial distress was observed among 122 participants (61%), which indicates that more than half of the women who were in the study group experienced major psychosomatic distress due to PCOS. This data is summarised in Table 3. The findings demonstrate that PCOS is more than a metabolic disorder, it is also a significant psychological disorder particularly among young women.

Table 3: Psychosocial Profile of Participants (n = 200)

Variable	Frequency (n)	Percentage (%)
Depressive symptoms (PHQ-9 ≥10)	64	32.0
Anxiety symptoms (GAD-7 ≥10)	70	35.0
Body image dissatisfaction	118	59.0
Social embarrassment	108	54.0
Psychosocial distress (overall)	122	61.0

A significant association was observed between BMI and prediabetes status. The proportion of women with prediabetes was 11.5% among women with normal BMI, but rose to 34.2% among overweight women and 58.3% among obese women. The Chi-square test revealed that there was significant association ($p < 0.001$) between high BMI and prediabetes. These results are shown in Table 4. This indicates that a higher BMI has a high correlation with prediabetes amongst women with PCOS.

Table 4: Association Between BMI and Prediabetes (n = 200)

BMI Category	Prediabetes (n)	No Prediabetes (n)	p-value
Normal	6	46	
Overweight	26	50	
Obese	40	32	**<0.001**

A key finding of the study was that metabolic dysfunction was associated with psychosocial distress. Female prediabetics experienced a greater proportion of psychosocial distress (68%), compared to normoglycemic women (56%). Similarly, obese women experienced more depressive and anxiety symptoms, compared to normal BMI women.

Multivariate logistic regression showed that BMI and prediabetes were independent risk factors to psychosocial distress, despite age and family history of diabetes in the models. These findings indicate that there is a strong association between psychological distress and metabolic dysfunction.
The figure 1 illustrates the percentage of the various classes of BMI. Most women fall in the overweight and obese BMI category, which shows that obesity is an epidemic in PCOS.

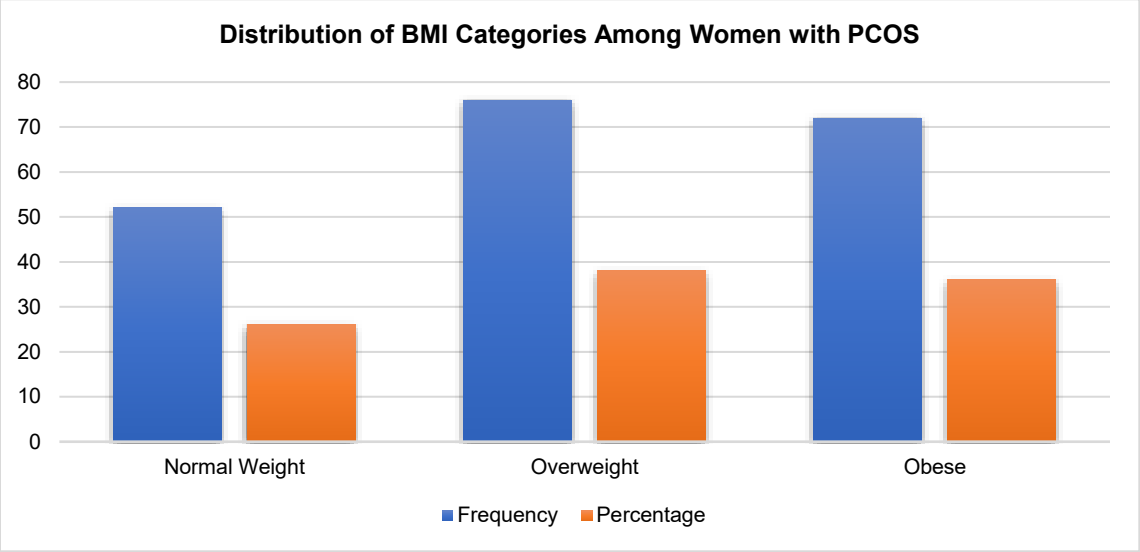

Figure 1: Distribution of BMI Categories Among Study Participants

Figure 2 presents the difference in psychosocial distress between women with and without prediabetes. Women with metabolic disease have a greater burden of distress, suggesting a strong association between metabolic and mental health.

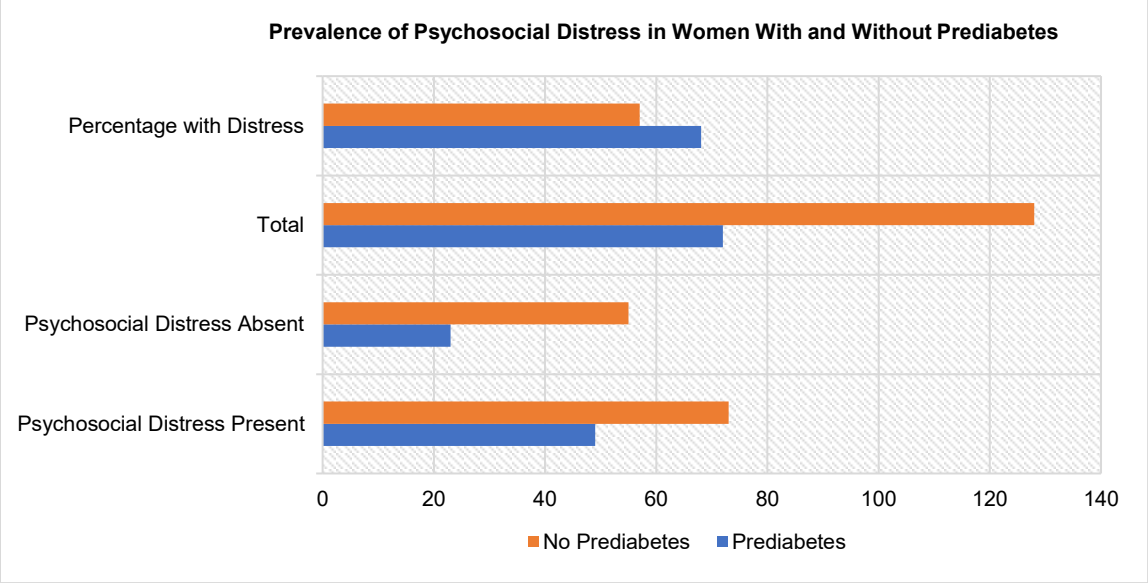

Figure 2: Prevalence of Psychosocial Distress in Women With and Without Prediabetes

The results of this study demonstrate that PCOS in South Asian women is strongly associated with weight gain, prediabetes, and psychosocial distress. Nearly half of the women were overweight or obese, and more than one-third had prediabetes. Furthermore, more than half of the participants had significant psychosocial impairment. Crucially, rising BMI and metabolic dysfunction were linked with prediabetes and psychological distress, suggesting the importance of a composite approach to treatment of PCOS.

DISCUSSION

This study sought to assess the relationship of weight gain, prediabetes, and psychosocial effects among women with PCOS in South Asia, and the results confirm the study's aim[10]. The results indicate that PCOS in this population is associated not only with reproductive symptoms but also with a significant burden of metabolic dysfunction and psychosocial distress[11]. This study indicates that the syndrome should be considered as a multisystem disease, rather than simply from the perspective of menstrual dysfunction or infertility[12].

A key study finding was the high prevalence of overweight and obesity. This finding is significant because being overweight and obesity are known to exacerbate the endocrine (hormonal) and metabolic dysfunction of PCOS[13]. Excess body weight leads to insulin resistance and hyperinsulinemia, which are key features of PCOS. Thus, the prevalence of weight gain in this study supports the notion that excess body weight is an important driver of severity in women with PCOS[14].

The study also reported a high proportion of prediabetes (36%), and this suggests that many women with PCOS may have early disturbances in glucose metabolism before the onset of diabetes mellitus[15]. This is especially relevant among South Asian women, who already have an increased risk of insulin resistance, abdominal obesity, and early impairment of glucose metabolism. The strong association between increased BMI and prediabetes in this study also supports the view that weight gain is strongly associated with impaired metabolic outcomes in PCOS[16].

The study also showed a high prevalence of psychosocial symptoms, such as depression, anxiety, body image dissatisfaction, and embarrassment. This is important because it suggests the effects of PCOS can be far-reaching in terms of body image, mood, and quality of life[17]. This is not surprising as symptoms of weight gain, acne, hirsutism, and irregular menstruation can have a visible and emotionally distressing effect in young women. These impacts may be amplified in South Asian cultures due to the social stigma associated with body image, fertility, and marriage[18].

A significant finding of the current study is that it has identified the association between metabolic and psychosocial impairment. The finding of higher emotional distress in women with prediabetes and higher BMI suggests that metabolic and psychological dysfunction in PCOS is likely to be linked. This is important from a clinical perspective because it suggests that the care of women with PCOS should involve not only the management of hormonal and/or reproductive dysfunction, but also metabolic screening and psychosocial support[19,20].

The findings of this study are generally consistent with existing literature showing that women with PCOS have a higher burden of obesity, insulin resistance, impaired glucose metabolism, anxiety, depression, and reduced quality of life[7,11]. Variations in prevalence from other studies may be due to differences in ethnic background, study participant characteristics, setting, and measures used[13].

This study has some limitations. This is a cross-sectional study, so no causality can be inferred. It only had a single-center design and may not be generalisable. In addition, more advanced metabolic markers such as fasting insulin and HOMA-IR were not included[15,19].

Further studies need to be conducted with larger multicenter cohorts and more comprehensive metabolic and psychological profiling to determine the long-term impact of PCOS in South Asian women. Overall, the present study shows that PCOS in South Asian women is closely associated with weight gain, prediabetes, and psychosocial distress, emphasizing the need for a more comprehensive and multidisciplinary approach to diagnosis and management[7-12].

CONCLUSION

The current research indicates that weight gain, prediabetes, and heavy psychosocial distress are highly linked to PCOS in South Asian women. The findings indicate that PCOS is a serious metabolic and psychological health problem rather than a reproductive one. Obesity, glucose intolerance, and psychological distress are the conditions that should be evaluated in women with PCOS at the age of their early 20s. A holistic approach can also be helpful in long term health and well being of such women.

Authors' Contributions

SP: Conceptualization, data collection, manuscript drafting
JZ: Study design, supervision, data analysis, critical revision of manuscript
All authors read and approved the final manuscript.

Availability of Data and Materials

The datasets used and/or analyzed during the current study are available from the corresponding author on reasonable request.

Competing Interests

The authors declare that they have no competing interests.

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