

PREVALENCE OF POLYCYSTIC OVARY SYNDROME AND ITS RELATIONSHIP WITH OBESITY: A CROSS-SECTIONAL STUDY AMONG FEMALE COLLEGE STUDENTS IN WEST BENGAL

Rama Das¹, Nirmalya Kumar Sinha², Pragna Paromita Chakraborty¹, Rajkumar Maiti^{3*}

¹Department of Food and Nutrition, Barrackpore Rastraguru Surendranath College, Barrackpore, West Bengal, India.

²Department of Nutrition & Department NSS, Raja Narendralal Khan Women's College (Autonomous) Midnapore, West Bengal, India.

³Department of Physiology, Bankura Christian College, Bankura, West Bengal, India.

*Corresponding authors:

Dr. Rajkumar Maiti, Assistant Professor, Department of Physiology, Bankura Christian College, Bankura, West Bengal, India.

E-mail: rajkumar@bankurachristiancollege.in.

ORCID: 0000-0002-6714-408X

ABSTRACT

Background: Polycystic ovarian syndrome (PCOS) and obesity are now one of the major global health issues for women, especially for adolescents and young adults.

Objective: To investigate the relationship between obesity and PCOS.

Methods: This cross-sectional study was conducted among the female students of a general college in the North 24 Parganas District of West Bengal, India. The body mass index (BMI), which was calculated using each student's height and weight, was used to assess their nutritional health.

Results: Mean age of the students was 23.22 ± 2.48 years, while weight, height, and BMI of the participants were 58.04 ± 8.57 kg, 158.66 ± 5.72 cm, and 23.08 ± 3.32 kg/m², respectively. The prevalence of underweight and overweight or obesity was 11.00% and 22.00%, respectively, while 25.00% of the participants had PCOS. This study showed that PCOS was more prevalent among overweight/obese students (27.27%), while underweight students were less affected by PCOS (9.09%).

Conclusion: A healthy lifestyle may be effective for the management of obesity and PCOS.

Keywords: PCOS, BMI, obesity, lifestyle

INTRODUCTION

Polycystic ovary syndrome (PCOS) is one of the most prevalent metabolic and endocrine disorders. This syndrome was previously called Stein-Leventhal syndrome and was first identified in 1935. It affects fifteen to twenty percent of women of reproductive age (Rosenberg, 2019). According to the WHO, PCOS affects 116 million women globally in 2012, making it a significant clinical and public health concern (Aggarwal et al., 2019; Bharathi et al., 2019). Even still, the exact cause of PCOS remains a mystery, studies have revealed that the overproduction of androgens in the ovaries is one of the features of this disorder (Alanbay et al., 2012). The aberrant ovarian response to gonadotropins, insulin, and insulin-like substances, which are such as insulin-like growth factor-1 (IGF-1), which amplifies LH-stimulated androgen released by theca cells, is what causes androgen secretion.

The clinical features of PCOS are obesity, hirsutism, acne, infertility, and oligomenorrhea (Aggarwal et al., 2019). PCOS is responsible for different types of hormonal and metabolic complications, such as increased androgen production and disordered gonadotropin secretion leading to menstrual irregularity, hirsutism, and infertility.

This syndrome is not fatal, but if not treated properly, it may result in major health complications in the near future, include a higher chance of endometrial cancer, obesity, type 2 diabetes, dyslipidemia, hypertension, infertility, abnormal bleeding, and cardiovascular disorders (CVDs) (Raisbeck, 2009).

Recent studies have revealed that metabolic consequences are more likely to occur in obese people. The classic trials by Dunaif et al., provided excellent illustrations of the impact of obesity and PCOS (Dunaif et al., 1989; Dunaif et al., 1992). Some other researchers also found a strong correlation between obesity and PCOS with evidence showing that 38% to 88% of women with PCOS are either overweight or obese (Barber et al., 2006; Legro, 2000; Balen et al., 1995). Lim et al., 2012 found that, as compared to their non-obese counterparts, women with obesity had an odds ratio of 2.77 for developing PCOS. Among light of this, the current study was conducted to determine whether obesity and PCOS are related among college-going female students.

METHODOLOGY

Study design: The present study adopted a cross-sectional design. The interview method was being used for this study. A questionnaire was being used to collect all the data from each individual sample.

The study was conducted among the female students of a general college in the North 24 Parganas District of West Bengal, India.

Anthropometric measurements: According to Lohman et al. (1988), all anthropometric measurements were performed by skilled researchers utilizing accepted methods. Every piece of equipment was routinely inspected by human responders to reduce chance errors. Martin's anthropometer was used to measure height to the nearest 0.1 centimeter. Using a weighing scale (Doctor Beliram and Sons, New Delhi, India), the body weight of participants wearing light clothing was recorded to the nearest 0.5 kg. Before beginning any measurement, the weighing scale was reset to 0. Before collecting measures, people were asked to take off their shoes for height and weight. BMI (body mass index) was calculated using the following standard equations:

$$\text{BMI (kg/m}^2\text{)} = \text{Weight (kg)} / \text{height}^2 \text{ (m}^2\text{)} \text{ (Park, 2005).}$$

Nutritional status: Guidelines for BMI (kg/m²) established by the World Health Organization (WHO, 1995) were used to assess nutritional status on a worldwide scale.

Determination of PCOS: Rotterdam Consortium criteria on PCOS were followed to identify the students suffering from PCOS (Rotterdam, 2004).

Inclusion and exclusion: The cured PCOS patients were not selected for the study. The probable participants with chronic health complications were not included in this study.

Statistical analysis: SPSS for Windows was used to perform the statistical analysis. The Kolmogorov-Smirnov test was used to test normally distributed data. A one-way ANOVA was used to examine the group means. The significant differences within categories were found using Pearson's chi-square test. P value <0.05 is considered statistically significant.

RESULTS AND DISCUSSION

Altogether, 100 college female students took involved in this study. The students mean age was 23.22±2.48 [95%CI: 22.73-22.71] years. The weight, height, and BMI of the participants were 58.04±8.57 [56.34-59.74] kg, 158.66±5.72 [157.53-159.80] cm and 23.08±3.32 [22.42-23.74] kg/m² respectively. The study found that 11.00% of the participants were underweight, while 22.00% were overweight or obese (Table 1). This study supports the presence of a double burden of malnutrition in India, with the prevalence of overweight/obesity surpassing that of underweight (Bhandari et al., 2021). The shift from traditional diets and lifestyles to more Westernized patterns, marked by increased consumption of processed foods, a higher intake of fats and sugars, and a reduction in physical activity, may be one of the most important determining factors for this nutritional transition (Popkin et al., 2020). Some other factors,

including the socio-economic condition, cultural influences, and dietary habits, also play an important role. This creates an escalating burden of diet-related non-communicable diseases.

Table 1: Different anthropometric parameters and health complications among female college students

Variables	Mean±SD/ N (%)
Age (years)	23.22±2.48
Weight (kg)	58.04±8.57
Height (cm)	158.66±5.72
BMI (kg/m ²)	23.08±3.32
Nutritional status	
Underweight	11 (11.00)
Normal weight	67 (67.00)
Overweight/obesity	22 (22.00)
PCOS	
Present	25 (25.00)
Absent	75 (75.00)

The study indicated that the BMI among the family income groups viz. \geq Rs.61663.00, Rs. 46129.00-61662.00, Rs. 30831.00-46128.00 and \leq Rs. 30830.00 were 23.72 ± 2.52 kg/m², 22.67 ± 3.14 kg/m², 23.10 ± 4.17 kg/m², and 22.59 ± 3.82 kg/m² respectively (Figure 1). This study reported that the higher-income families had a higher BMI though it was statistically insignificant ($F=0.701$; $P>0.05$).

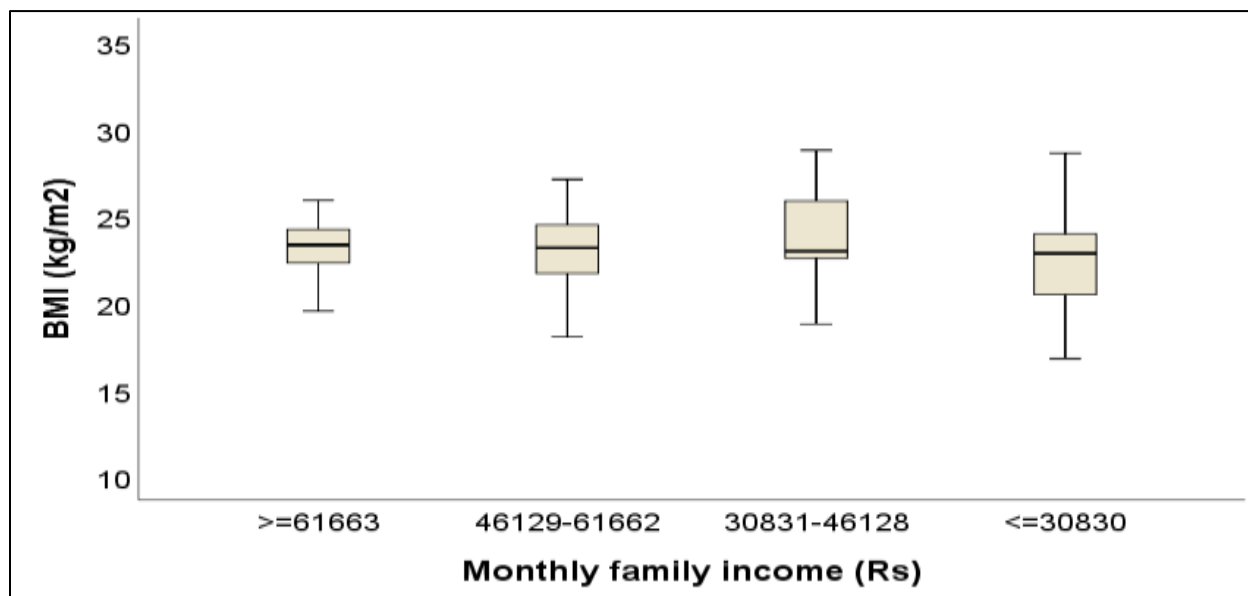


Figure 1: Effect of monthly family income on the BMI of the female college students

This study demonstrated that there was no significant correlation between the nutritional status and the number of family members. ($\chi^2=14.536$; $P>0.05$) [Figure 2].

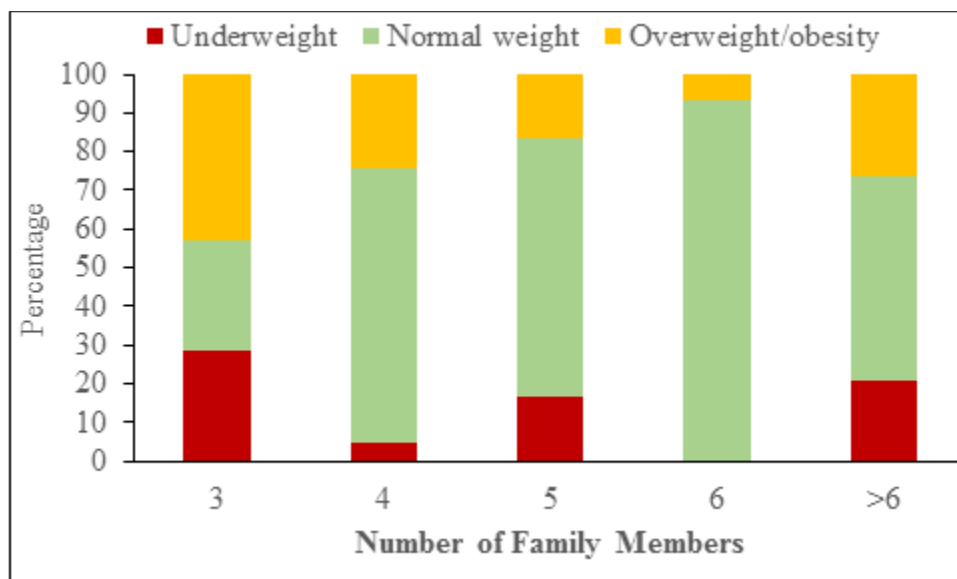


Figure 2: Effect of number of family members regarding the dietary condition of the female college students

This investigation showed that 25.00% of the participants had PCOS (Table 1). Some other studies in West Bengal among college students showed an almost similar prevalence. Chatterjee & Bandyopadhyay (2020) found that approximately 28% of the college students in Kolkata, West Bengal, were shown to be highly susceptible to PCOS development. Aggarwal et al. (2019) reported that the prevalence rate of PCOS was 21.05% among medical, dental, and physiotherapy students in the age group of 17-24 years in Mumbai, Maharashtra.

This study further indicated that the prevalence of PCOS among the underweight, normal weight, and overweight/obese respondents was 9.09%, 26.87% and 27.27% respectively (Table 2). PCOS and obesity have a complex and reciprocal interaction (Barber et al., 2006). One of the most common risk factors for the onset and severity of PCOS is obesity. Insulin resistance and insulin production might be increased due to the elevation of adipose tissue in the human body due to obesity. This also triggers the pathogenesis of PCOS. Insulin resistance may have a distinguished role in PCOS-related irregular menstrual periods, disturbed ovarian function, and increased testosterone levels. PCOS might contribute to overweight/obesity. PCOS induced hormonal imbalances, such as elevated levels of androgens, can influence body composition, resulting in increased fat accumulation, particularly around the abdominal area. Furthermore, the metabolic disturbances linked with PCOS, including insulin resistance, can pose challenges for individuals in maintaining a healthy weight.

Table 2: Relationship between nutritional status and prevalence of PCOS of the female college students

PCOS	Nutritional status		
	Underweight	Normal weight	Overweight/obesity
Present	1 (9.09)	18 (26.87)	6 (27.27)
Absent	10 (90.91)	49 (73.13)	16 (72.73)
Total	11 (100.00)	67 (100.00)	22 (100.00)

The study also indicated that the prevalence of PCOS among the family income groups, viz., \geq Rs.61663.00, Rs. 46129.00-61662.00, Rs. 30831.00-46128.00 and \leq Rs. 30830.00, was 24.24%, 38.46%, 16.67%, and 17.39%, respectively (Table 3). This study showed that families with higher incomes had a higher prevalence of PCOS.

Table 3: Relationship between nutritional status and prevalence of PCOS of the female college students

PCOS	Monthly family income (Rs.)			
	≥61663	46129-61662	30831-46128	≤30830
Present	8 (24.24)	10 (38.46)	3 (16.67)	4 (17.39)
Absent	25 (75.76)	16 (61.54)	15 (83.33)	19 (82.61)
Total	33 (100.00)	26 (100.00)	18 (100.00)	23 (100.00)

CONCLUSION

The present study observed that one-fourth of all the college students were suffering from PCOS. The students who were overweight/obesity were in a more critical situation. Lifestyle modifications such as regular exercise, weight reduction, healthy food habits, proper hygiene practices, and psychological wellbeing may enhance the reproductive health of the younger population.

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