



## PREVALENCE OF PCOS BASED ON BMI CLASSIFICATION

Aishwarya Santosh Vernekar<sup>1</sup>, Dr. Shraddha Mohite<sup>2</sup>

<sup>1</sup> Krishna College of physiotherapy, KIMSUDU, Karad, India

<sup>2</sup> Assistant Professor, Department of Musculoskeletal Physiotherapy,

Krishna college of Physiotherapy, KIMSUDU, Karad, India

(Email: <sup>1</sup>aishvernekar20@gmail.com)

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### Abstract

PCOS (polycystic ovarian syndrome) one of the most common hormonal endocrine pathology in female of reproductive age. Prevalence ranges between 5% to 15% based on the criteria of diagnosis. The pathophysiology of PCOS is a complex interaction of between genetics, epigenetics, ovarian dysfunction, endocrine, neuroendocrine and metabolic alterations, amongst other changes. Elevated LH concentrations can be observed in approximately 40-60% of women with PCOS. This is a major sign of neuroendocrine dysfunction because of an increase in the amplitude and frequency of LH pulses, which most likely reflect an increase in GnRH pulse frequency. PCOS have an adverse effect on cardiovascular system. PCOS has two phenotypes lean PCOS and obese PCOS. Small but significant proportion of patients are present with normal body mass index (BMI;  $\leq 25$  kg/M<sup>2</sup>), they are termed as lean PCOS. They may or may not have irregular menstrual cycles and other issue like acne and alopecia. Some clinical signs are same in both the lean and obese phenotypes which make the therapeutic approach difficult.

**Methodology:** This is a study of prevalence of PCOS based on BMI classification. The inclusion criteria were women diagnosed with PCOS within the age group of 18 to 30 years. 120 samples were collected and analysed.

**Results:** Out of total population, 58.3% women with normal BMI which was highest. about 18.3% women comes under pre-obesity class. On further classification 18.3% women with BMI less than 18 come under the underweight category which is lean category. 3.3% women with BMI range of 30-34.9 have been detected with PCOS.

**Conclusion:** From the conducted study it was concluded that, though minor but there is significant presence of PCOS in lean women. Lean women are also at a risk of developing PCOS. obesity cannot be considered as a confirmatory factor for diagnosis of PCOS.

**Keywords:** PCOS, Lean PCOS, obese PCOS, Irregular Menstrual Cycle, BMI

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### 1. Introduction

PCOS (polycystic ovarian syndrome) one of the most common hormonal endocrine pathology in female of reproductive age. Prevalence ranges between 5% to 15% based on the criteria of diagnosis. According to the PCOS guidelines, at least two of the following conditions must be met: chronic anovulation, clinical or biological hyperandrogenism, and polycystic ovaries <sup>[1]</sup>. The term PCOS is a interaction of number of genetic and environmental factors. The clustering of PCOS in families is thought to resemble an autosomal dominant pattern, according to recent study. Poor food habits and inactivity might worsen PCOS risk

factors, such as obesity, pollutants and infectious diseases may also be involved.<sup>[2]</sup> Polygenetic factors are responsible for around 70% of the reported diversity in the aetiology of PCOS. It has been discovered that a number of genes, including those involved in the synthesis and action of androgens, those associated with insulin resistance, and those encoding inflammatory cytokines, may contribute to the pathogenesis of PCOS. Some other factors like history of having a high birth weight (8.5 pounds) and being born to an overweight mother, low birth weight, congenital virilization, premature pubarche obesity, acne, anovulation, and polycystic ovaries<sup>[3]</sup>. PCOS is an ambiguous condition.

The pathophysiology of PCOS is a complex interaction of between genetics, epigenetics, ovarian dysfunction, endocrine, neuroendocrine and metabolic alterations, amongst other changes<sup>[4]</sup>. In a normal fertile female, a single primordial follicle matures and undergoes ovulation. Primary defects in the hypothalamic–pituitary axis, insulin secretion and action, and ovarian function is considered as the cause of PCOS. There is elevated pulsatile gonadotrophin-releasing hormone (GnRH) levels, greater LH levels, and a relative deficit of follicle stimulating hormone (FSH)<sup>[5]</sup>. In pituitary gland secretion of LH and FSH is stimulated by release of GnRH from GnRH terminals in the hypophyseal portal system. Above the 95th percentile of normal, elevated LH concentrations can be observed in approximately 40–60% of women with PCOS<sup>[6]</sup>. This is a major sign of neuroendocrine dysfunction because of an increase in the amplitude and frequency of LH pulses, which most likely reflect an increase in GnRH pulse frequency<sup>[7]</sup>.

PCOS have an adverse effect on cardiovascular system including dyslipidaemia, hypertension, and obstructive sleep apnoea. In some study approximately more than thousand women with PCOS were reported significantly lower levels of HDL, low density lipoprotein, triglycerides, and both systolic and diastolic blood pressure<sup>[8]</sup>.

PCOS has two phenotypes lean PCOS and obese PCOS depending on the BMI. Body mass index, or BMI, is a measure currently used for determining anthropometric height/weight features in humans and for categorising them into groups.<sup>[9]</sup> It has been estimated that 35%–65% of PCOS patients are obese<sup>[10]</sup>. Small but significant proportion of patients are present with normal body mass index (BMI;  $\leq 25$  kg/M<sup>2</sup>), they are termed as lean PCOS. They may or may not have irregular menstrual cycles and other issue like acne and alopecia<sup>[11]</sup>. Some clinical signs are same in both the lean and obese phenotypes which make the therapeutic approach difficult. According to the research and previous study lean women with PCOS experience many physiological changes in the system<sup>[12]</sup>. Lean women with PCOS are also at a risk to develop many associated disorder. Undergoing careful investigation and proper diagnosis of presence of PCOS in lean women can save them from further complication. Metabolic investigation suggests higher plasma insulin levels taken two hours after glucose was given to women in the lean group. High GGT (gamma glutamyl transferase) levels are correlated with an increased incidence of cardiovascular disease<sup>[13]</sup>. Research proposes that IR should be determined early in PCOS, even in women with a low BMI and normal glucose tolerance<sup>[14]</sup>.

We must acknowledge the plight of women and girls with PCOS, as well as the complexities of its pathogenesis.

## 2. Methodology

The study was approved by Ethical Committee of Krishna Institute of Medical Sciences, “Deemed To Be University” Karad, Maharashtra . This is a study of prevalence of PCOS based on BMI classification. This study was conducted in Krishna institute of medical science, karad and nearby rural area. Subjects who were diagnosed with PCOS were selected. Sample size was calculated according to the random sampling method. Subjects were chosen by simple random sampling method according to the inclusion criteria and exclusion criteria. The inclusion criteria were women diagnosed with PCOS within the age group of 18 to 30years. Exclusion criteria werewomen, not diagnosed with PCOS. Women diagnosed with dysmenorrhea, women entering menopause and women not willing to participate in the study. The women were asked to fill the questionnaire comprised of 8 questions and demographic data. The questions were regarding the symptoms experienced by the women with PCOS. From the demographic data which included height and weight, BMI was calculated according to WHO BMI metric scale.

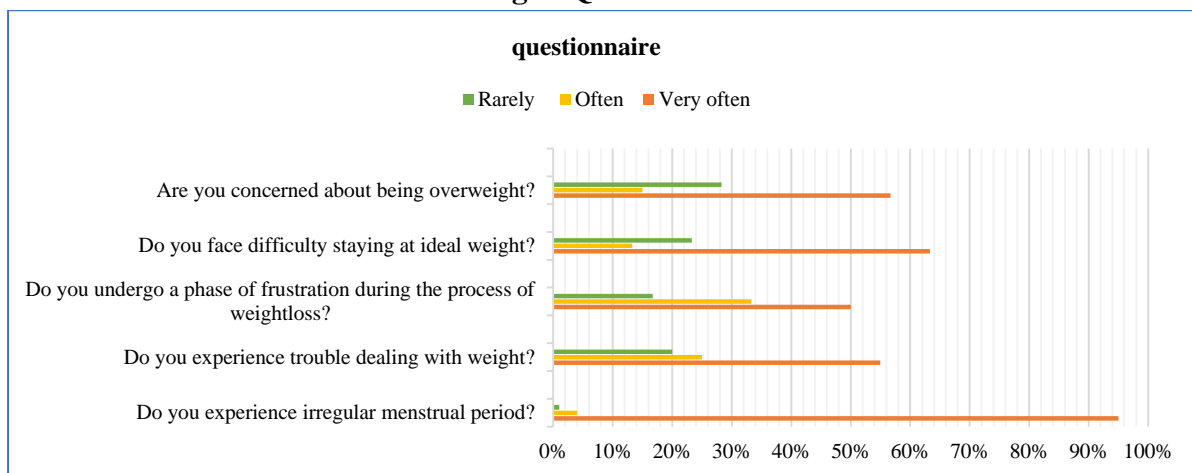
## 3. Results

The study involved a cohort of 120 women with PCOS, and all completed the questionnaire. Response rate was 100%. The majority of study population were in the age group of 20-25 years. Out of total population, 58.3% women with normal BMI which was highest. about 18.3% women comes under pre-obesity class. On further classification 18.3% women with BMI less than 18 come under the underweight category which is lean category.3.3% women with BMI range of 30-34.9 have been detected with PCOS .Considering the overall response of the women on PCOS and the relation with body mass index , the highest percent of PCOS was found in normal category people and least in obesity class 2. From this study it can been concluded that even lean individual is at risk of developing PCOS. Still further studies are required to clear and solve this debate.

**Table 1:PCOS questionnaire**

Sr no.	Questions	Very often	Often	Rarely
1	Do you experience irregular menstrual period?	95%	4%	1%
2	Do you experience trouble dealing with weight?	55%	25%	20%
3	Do you undergo a phase of frustration during the process of weight-loss?	50%	33.3%	16.7%
4	Do you face difficulty staying at ideal weight?	63.3%	13.3%	23.3%
5	Are you concerned about being overweight?	56.7%	15%	28.3%

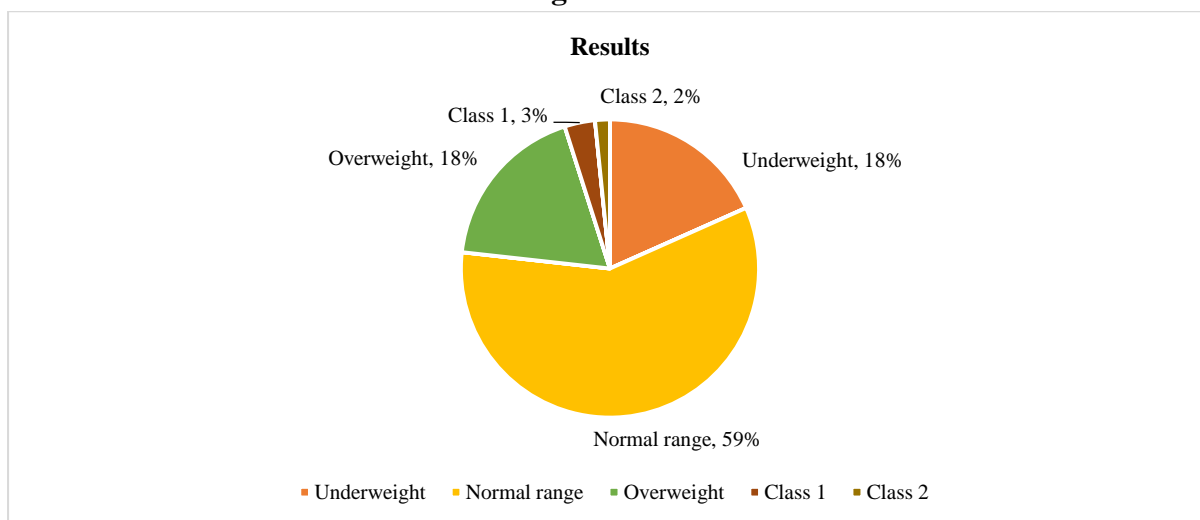
**Image1:Questionnaire**



**Table 2: classification based on BMI category**

Classification	BMI(kg\m)	Results
Underweight	< 18.5	18.3%
Normal range	18.5-24.9	58.3%
Overweight	25.0-29.9	18.3%
Class 1	30-34.9	3.3%
Class 2	35-39.9	1.6%
Class 3	>40	0%

**Image 2: Results**



**4. Discussion**

PCOS is a leading cause of infertility among the women of fertility age group. This condition continues far beyond the child bearing years. Few people are aware about the cause and sign and symptoms of PCOS despite being a leading concern in the society. Many women fail to understand that their PCOS symptoms are related to their condition. One in five women face the problem.

Weight is a major concern in the women with PCOS. PCOS has two phenotype, lean PCOS and obese PCOS depending on the BMI. The current study focuses on the relation of PCOS and BMI. This study was done to find the prevalence of PCOS based on BMI classification. Study constituted population of 120 women diagnosed with PCOS with age group of 18-35 year. The finding were significant with the resultant p value of  $<0.0001$ , which is considered extremely significant. Out of the studied population, 58.3% women were with normal BMI ranging 18.5-24.9. 18.3%, women were in underweight category. After calculation same percentage (18.3%) of individual with overweight were seen. 3.3% were under class 1 obesity. Whereas 2.0% were found in class 2 obesity. Above percentage gives a clear idea regarding the prevalence of PCOS based on the BMI classification. From the conducted study, it was concluded that, though minor but there is significant presence of PCOS in lean women. Lean women are also at a risk of developing PCOS. Previous research study conducted by Barrea L et.al. (2021) found that, even though there is a high prevalence of PCOS in women with obesity, it is not unusual to find a significant proportion of patients with normal BMI<sup>[15]</sup>. In his study, he also focused on the non-pharmacological treatments and their impact.

From this study, it is observed that around 18% of women suffering from PCOS belong to underweight category. From this, it can be concluded that obesity cannot be considered as a confirmatory factor for diagnosis of PCOS. It was observed that the most common symptom seen in women with PCOS was irregular menstrual period. About 95% women experienced this symptom in both the category, so we can consider this as an important diagnostic criterion.

Considering the dramatically increased prevalence of this syndrome in recent years, along with the possible consequences for women's health in the short and long term, it is critical to focus on women diagnosed with PCOS irrespective of their BMI category for their overall well-being in daily life. Lifestyle modification can manage the symptoms and prevent overall complication of PCOS. Not all women with PCOS are obese, overtime they might gain weight and can face difficulty staying at ideal weight. About 63% female complaint regarding maintaining ideal weight after diagnosis of PCOS. Regular exercise like walking, swimming or cycling can help to maintain overall fitness of body. Exercise also has a crucial role in maintaining regular menstrual cycle. Regular exercising helps in reducing insulin resistance. Also incorporating diet which include high nutritional value can add into this. Behavioural changes have a major contribution in lifestyle modification of PCOS. Combination of diet, exercise and behavioural changes can show positive effect in managing the risk factors of PCOS.

## 5. Conclusion

From the conducted study it was concluded that, though minor but there is significant presence of PCOS in lean women. Lean women are also at a risk of developing PCOS. obesity cannot be considered as a confirmatory factor for diagnosis of PCOS. Still further studies are required to clear and solve this debate. Both the phenotypes are at equally risk of developing PCOS irrespective of weight. Attention has to be drawn towards the life style

modification. Working on the daily habits and behavioural issue can also give positive results.

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