Prevalence Of Polycystic Ovary Syndrome Among Reproductive Age Women: A Rural Based Cross Sectional Study

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ABSTRACT

Introduction: Polycystic ovary syndrome (PCOS) affects 5–13% of reproductive-aged women, leading to reproductive, metabolic, and psychological challenges. Complications like gestational diabetes and hypertension are common in affected women. This study aims to assess the prevalence and associated factors of PCOS among reproductive-aged women, enhancing awareness and improving management through targeted interventions.

Materials and Methods: This study employed a quantitative, descriptive cross-sectional design in Gautam Budha Nagar, Greater Noida, targeting women aged 15–49 years. A sample of 100 women was selected through convenience sampling. Inclusion criteria included reproductive-aged women, while pregnant or breastfeeding women and those with other androgen excess conditions were excluded. A self-structured questionnaire assessed PCOS symptoms and demographic factors. Data analysis involved descriptive and inferential statistics.

Results: Of the participants, 54% indicated a high likelihood of PCOS, 34% moderate, and 12% low. Irregular periods and excessive hair growth were reported by 53% and 59% of participants, respectively. The study reveals significant correlations among various symptoms of Polycystic Ovary Syndrome (PCOS). Irregular periods positively correlated with increased facial hair growth ($r = .356$, $p < 0.01$) and waist weight gain ($r = .275$, $p < 0.01$). Heavy menstrual bleeding was strongly associated with insulin resistance ($r = .355$, $p < 0.01$) and difficulty conceiving ($r = .355$, $p < 0.01$). Notably, symptoms of insulin resistance had a perfect correlation with challenges in conceiving ($r = 1.000$, $p < 0.01$) and were positively linked to ovarian cyst diagnoses ($r = 1.000$, $p < 0.01$), highlighting the intricate interconnections among these symptoms.

Discussion: Findings underscore the need for improved awareness and targeted interventions for PCOS in diverse populations, particularly in rural areas where healthcare access is limited. Further research should explore the influence of lifestyle and environmental factors on PCOS prevalence and symptomatology

Keywords: *Polycystic ovarian syndrome, prevalence, rural, reproductive age women*

1. INTRODUCTION

Polycystic ovary syndrome (PCOS) is an endocrine disorder affecting women of reproductive age, with prevalence rates ranging from 5% to 13%. It is linked to reproductive, metabolic, and psychological issues, influenced by factors like obesity and ethnicity. Diagnosis requires meeting two criteria: oligo-anovulation, hyperandrogenism, and polycystic ovaries. Diagnostic tools include ultrasound and serum AMH levels. [1,2,3,4]. The 2023 update of the International Evidence-Based Guideline for PCOS emphasizes the need for improved monitoring and prevention strategies for women with PCOS, including gestational diabetes, hypertension, and adverse birth outcomes. [3] Further research is being conducted to understand the impact of different PCOS phenotypes on pregnancy outcomes. [5,6,7].

PCOS affects 8-13% of reproductive-aged women, with up to 70% undiagnosed. It significantly contributes to infertility and often emerges during adolescence. Common symptoms include irregular periods, infertility, acne, hair growth, male-pattern baldness, and weight gain. Women with PCOS are at a higher risk of developing long-term health issues like type 2

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diabetes, hypertension, high cholesterol, heart disease, endometrial cancer, and mental health challenges like anxiety and depression. (Polycystic Ovarian Syndrome: How Your Ovaries Can Affect Your Heart, 2021). Diagnosis typically involves identifying at least two criteria: signs of high androgen levels, irregular menstrual cycles, or the presence of polycystic ovaries via ultrasound. Blood tests can confirm hormonal changes, though these changes often vary among individuals. [10,11,12].

Treatments for various conditions include lifestyle modifications, birth control, medications, and fertility treatments, such as lifestyle interventions, ovulation-stimulating medications, surgical procedures, or in-vitro fertilization, to improve quality of life and manage symptoms. [13]. Research on the prevalence of PCOS in India faces several limitations, including lack of nationwide data, inconsistent use of diagnostic criteria, underrepresentation of rural and tribal populations, inadequately addressing the prevalence among adolescents, and insufficient exploration of lifestyle factors. [14, 15, 16].

NEED OF THE STUDY

Polycystic ovary syndrome (PCOS) is a prevalent endocrine disorder among women, impacting reproductive, metabolic, and psychological health. Despite its prevalence, it remains underdiagnosed and undertreated, particularly in underrepresented regions. Research on PCOS in India is limited due to lack of nationwide data, inconsistent diagnostic criteria, and underrepresentation of rural and tribal populations. This study aims to fill these gaps by investigating PCOS prevalence in Gautam Budha Nagar, Uttar Pradesh, a growing urban area with diverse socio-economic and cultural backgrounds. The study will provide insights into demographic, socio-economic, and medical history variables influencing PCOS occurrence and presentation, as well as lifestyle factors like diet, physical activity, and stress. Understanding PCOS prevalence is crucial for developing targeted interventions, improving early diagnosis, and mitigating long-term health risks.

AIM OF THE STUDY

The aim of the study is to assess the prevalence and associated factors of PCOS among reproductive-aged women, enhancing awareness and improving management through targeted interventions.

Objectives of the Study

1. To assess the prevalence and associated factors of PCOS among reproductive-aged women.

2. To evaluate the correlation between severity of PCOS symptoms with their demographic variables.

3. To investigate the association among diverse clinical symptoms of PCOS and their interrelationships in women of reproductive age.

2. RESEARCH METHODOLOGY

Research approach: Quantitative research approach

Research Design: Descriptive cross-sectional design.

Sample and sample size: 100 women of reproductive age (15–49 years) residing in the region.

Sampling technique: Convenient sampling technique

Setting of the study: Gautam Budha Nagar, Greater Noida, Uttar Pradesh,

Data analysis and interpretation: Descriptive and inferential statistical methods.

Inclusion criteria: women of reproductive age (15–49 years) residing in Gautam Budha Nagar.

Exclusion criteria: women who were pregnant or breastfeeding and those experiencing other conditions of androgen excess, such as drug-induced androgen excess, Cushing's syndrome, thyroid disorders, androgen-secreting tumors, hyperprolactinemia, and adrenal hyperplasia.

Dependent variable: presence or absence of PCOS, as determined by clinical and/or ultrasound diagnosis.

Independent variables: demographic information such as age, educational status, occupation, marital status, weight, family income, type of residency, and age at menarche. Additionally, medical history variables included symptoms such as irregular periods, heavy bleeding during menstruation, hirsutism, thinning or hair loss on the scalp, acne, difficulty losing weight, weight gain, symptoms of insulin resistance, difficulty getting pregnant, a diagnosis of ovarian cysts, family history of PCOS, and other medical conditions.

Tool Description:

A self-structured questionnaire was developed to assess the symptoms of Polycystic Ovary Syndrome (PCOS). It consisted of 12 items addressing key symptoms such as irregular periods, heavy menstrual bleeding, hirsutism, thinning or hair loss on the scalp, acne, difficulty losing weight, weight gain, symptoms of insulin resistance, difficulty conceiving, diagnosis of ovarian cysts, family history of PCOS, and other medical conditions. The scoring system for the questionnaire employed a binary Yes/No response format for each item, with participants required to respond to all questions. A "No" response was assigned a score of 0, while a "Yes" response was assigned a score of 1.

The total score was used to evaluate the likelihood of PCOS. A score of 0–4 indicated a low likelihood of PCOS, 5–8 suggested a moderate likelihood, and 9–12 indicated a high likelihood of PCOS. Percentages of "Yes" and "No" responses

for each question were calculated based on the responses of all participants.

Ethical clearance was obtained from the Institutional Review Board, and written consent was collected from all participants. Data was collected using a self-structured questionnaire that assessed the participants' medical history, including PCOS-related symptoms like irregular periods, heavy bleeding, hirsutism, hair thinning, acne, difficulty in weight management, insulin resistance, infertility, and the presence of ovarian cysts. The questionnaire also gathered demographic information such as age, education, occupation, marital status, weight, family income, type of residency, and age at menarche.

3. RESULTS

Frequency and percentage distribution of demographic variables of Women of reproductive age

The demographic characteristics of the study participants included age, educational status, occupation, marital status, weight, family monthly income, type of residence, and age of menarche. Age-wise distribution revealed that the largest proportion of participants, 47 (47%), were in the age group of 20–30 years, followed by 35 (35%) in the 31–40 years group, and 18 (18%) in the 41–50 years group.

In terms of educational status, 40 participants (40%) had completed 10th grade, 35 (35%) had completed 12th grade, 20 (20%) had an undergraduate degree or higher, and 5 (5%) had no formal education. Regarding occupation, 38 participants (38%) were homemakers, another 38 (38%) were private employees, 14 (14%) were government employees, and 12 (12%) were business owners.

Marital status data indicated that the majority, 68 participants (68%), were married, while 16 (16%) were unmarried, and 8 (8%) each were separated or divorced. In terms of weight distribution, 47 participants (47%) were overweight, 46 (46%) had normal weight, 5 (5%) were obese, and 2 (2%) were underweight.

Family monthly income showed that 38 participants (38%) reported an income between ₹50,001–₹1,00,000, 36 (36%) earned less than ₹50,000, 18 (18%) had an income between ₹1,00,001–₹1,50,000, and 8 (8%) earned more than ₹1,50,000. Regarding the type of residence, 45 participants (45%) resided in rural areas, 23 (23%) in semi-rural areas, 17 (17%) in semi-urban areas, and 15 (15%) in urban areas.

Lastly, the age of menarche data showed that the majority, 77 participants (77%), reported their age of menarche as 12–14 years, while 13 (13%) had menarche at ≤11 years, and 10 (10%) had menarche at ≥15 years.

Clinical symptoms of PCOS among women of reproductive age

A total of 53 participants (53%) reported experiencing irregular periods, whereas 47 (47%) did not. For heavy menstrual bleeding, 47 participants (47%) affirmed the symptom, while 53 (53%) denied it. An increase in facial hair growth was observed in 59 participants (59%), with the remaining 41 (41%) not noticing this symptom. Similarly, thinning or hair loss on the scalp was reported by 59 participants (59%), and 41 (41%) did not experience this issue.

Persistent acne or oily skin was identified by 62 participants (62%), while 38 (38%) reported no such problem. Difficulty in losing weight despite diet or exercise efforts was the most frequently reported symptom, with 69 participants (69%) affirming and 31 (31%) denying the issue. Weight gain around the waist or abdominal area was reported by 65 participants (65%), while 35 (35%) did not experience it. Symptoms of insulin resistance, such as fatigue or cravings for sugary foods, were observed in 65 participants (65%), with 35 (35%) not experiencing these symptoms.

Difficulty in getting pregnant was reported by 58 participants (58%), whereas 42 (42%) did not face such issues. A diagnosis of cysts on the ovaries by a healthcare provider was confirmed by 65 participants (65%), while 35 (35%) reported no diagnosis. A family history of PCOS (e.g., mother, sister, or aunt) was noted by 58 participants (58%), whereas 42 (42%) did not report such a history. Finally, 78 participants (78%) reported having other medical conditions, such as diabetes, hypertension, or high cholesterol, while 22 participants (22%) did not.

These findings highlight the prevalence of various PCOS-related symptoms among the study population, with some symptoms being more common than others. Table Two and Figure 1 represents the Frequency and percentage.

Table-2 Frequency and percentage distribution of clinical symptoms of PCOS among Women of reproductive age

S.No	PCOS Symptoms	Yes (F)	No (F)	Total
1	Have you noticed irregular periods (e.g., cycles shorter than 21 days or longer than 35 days)?	53	47	100
2	Do you experience heavy bleeding during your period?	47	53	100
3	Have you noticed an increase in facial hair growth (e.g., upper lip, chin, or jaw)?	59	41	100

| 4 | Do you have thinning or hair loss on your scalp? | 59 | 41 | 100 |
5	Do you have persistent acne or oily skin, particularly on the face or upper body?	62	38	100
6	Have you had difficulty losing weight despite diet or exercise efforts?	69	31	100
7	Do you tend to gain weight around your waist or abdominal area (belly fat)?	65	35	100
8	Do you experience symptoms of insulin resistance (e.g., fatigue, or cravings for sugary foods)?	65	35	100
9	Have you experienced difficulty getting pregnant?	58	42	100
10	Have you ever been diagnosed with cysts on your ovaries (polycystic ovaries) by a healthcare provider?	65	35	100
11	Does anyone in your family have PCOS (e.g., mother, sister, aunt)?	58	42	100
12	Do you have any other medical conditions, such as diabetes, hypertension, or high cholesterol?	78	22	100

F- Frequency
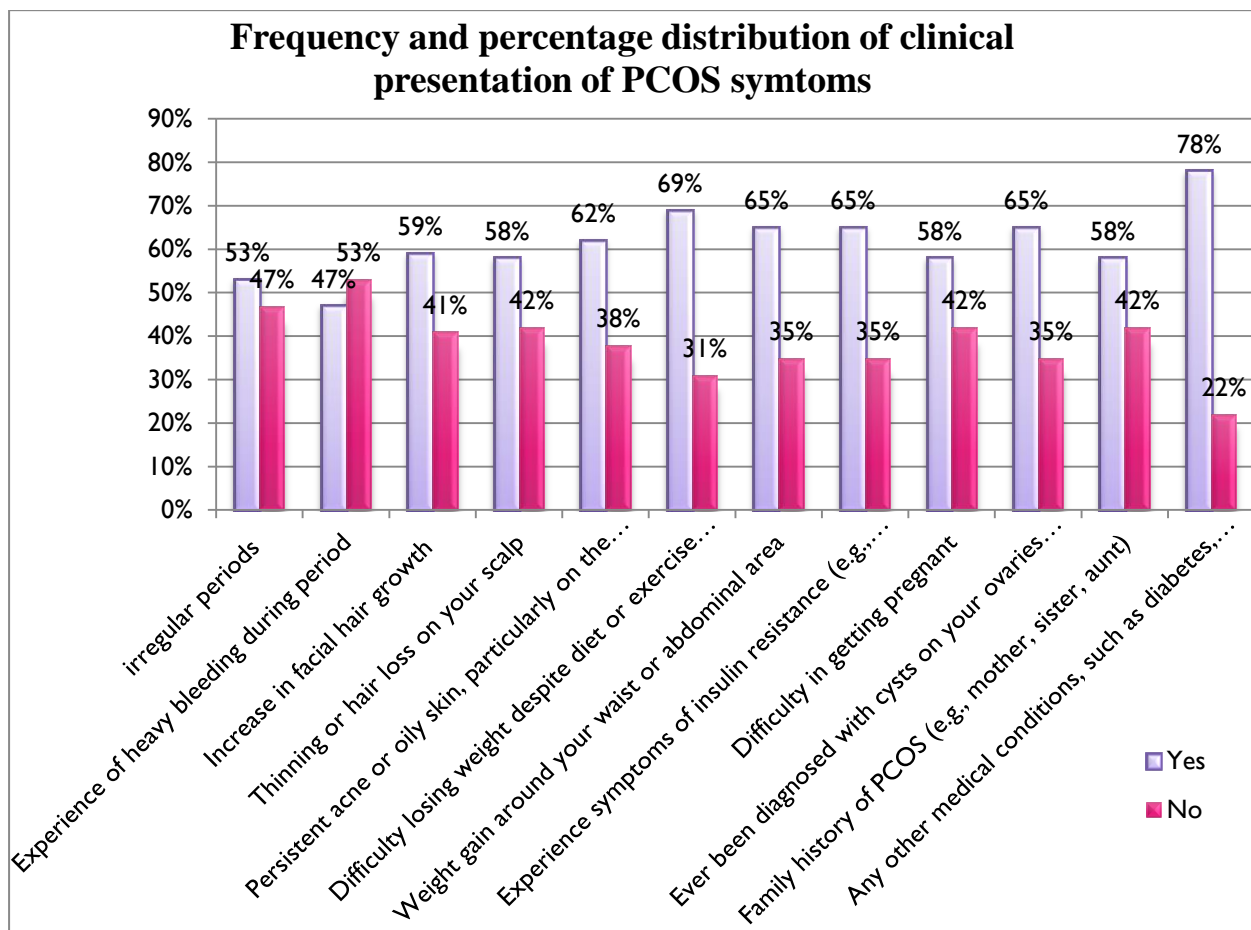
Fig 1: Frequency and percentage distribution of clinical presentation of PCOS symptoms

Table-3 Frequency and percentage distribution of likelihood of PCOS.

Self-Assessment Questionnaire for PCOS	Frequency	Percentage
Low likelihood of PCOS.	12	12%
Moderate likelihood of PCOS	34	34%
High likelihood of PCOS	54	54%

Table 3 and Figure 2 presents the frequency and percentage distribution of the likelihood of PCOS based on the self-assessment questionnaire. Among the participants, 54 (54%) were categorized as having a high likelihood of PCOS, 34 (34%) had a moderate likelihood, and 12 (12%) were classified as having a low likelihood of PCOS.
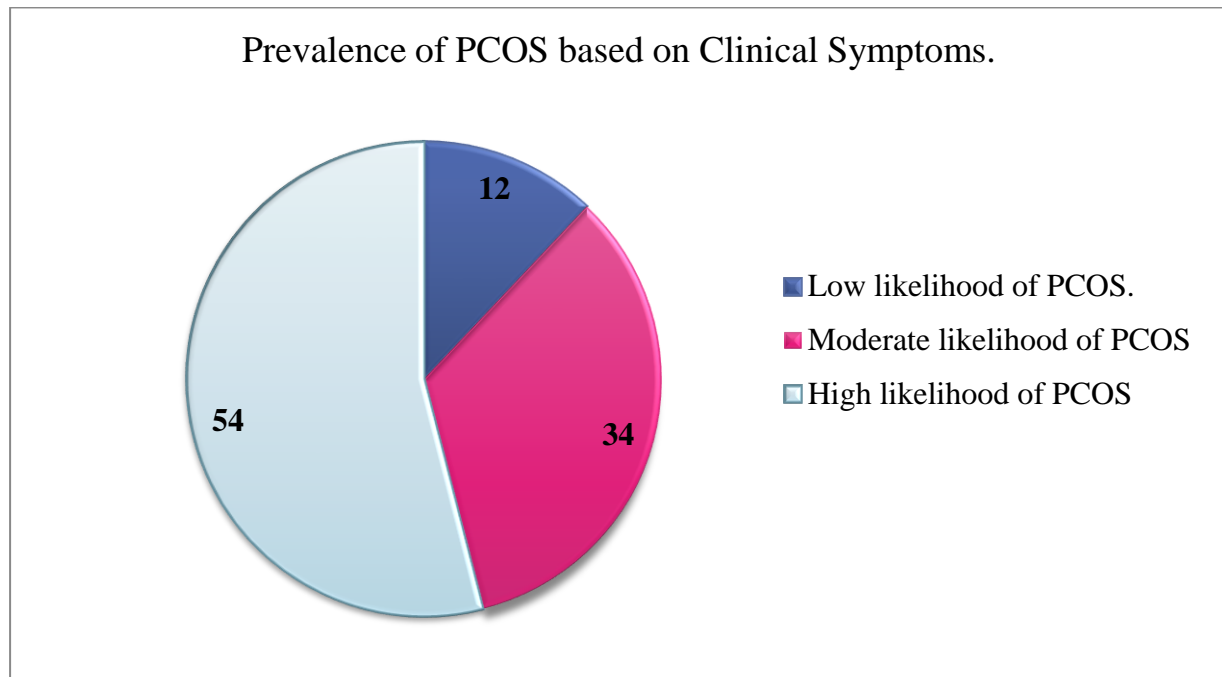
Figure 2. Pie Chart Showing the Percentage distribution of Symptoms of PCOS among Women.

Association between Demographic Variables with PCOS Symptoms of Women

The association between demographic variables and PCOS symptoms among women reveals several trends. Regarding age, women aged 20-30 years had the highest representation, with 24 showing moderate symptoms and 15 showing high symptoms, though the chi-square value ($\chi^2 = 3.35$, $p = 0.50$) indicates no significant association. Educational status showed that women with 10th Standard education had the highest prevalence of moderate and high symptoms, but no significant association was observed ($\chi^2 = 4.29$, $p = 0.63$).

In terms of occupation, private employees reported the highest frequency of moderate symptoms ($n = 25$), followed by homemakers with high symptoms ($n = 17$). However, this association was not statistically significant ($\chi^2 = 8.98$, $p = 0.17$). Marital status revealed that married women had the highest prevalence of both moderate ($n = 36$) and high symptoms ($n = 24$), though this relationship was also not significant ($\chi^2 = 6.82$, $p = 0.33$).

Weight distribution showed that overweight women had the highest prevalence of moderate ($n = 24$) and high symptoms ($n = 19$), but the chi-square analysis ($\chi^2 = 5.38$, $p = 0.49$) found no significant link. Family monthly income showed no significant association ($\chi^2 = 5.62$, $p = 0.46$), though women in the income group of ₹5,001-₹1 lakh reported the highest prevalence of moderate symptoms ($n = 23$).

Regarding residence, rural women showed the highest prevalence of moderate ($n = 24$) and high symptoms ($n = 17$), but the association was not significant ($\chi^2 = 8.28$, $p = 0.21$). Finally, the age of menarche showed no significant association ($\chi^2 = 3.97$, $p = 0.40$), though women with menarche between 12-14 years had the highest prevalence of moderate ($n = 38$) and high symptoms ($n = 29$). Overall, no demographic variable was found to have a statistically significant association with PCOS symptoms.

Table 4 correlation between various symptoms of PCOS and their interrelationships

Symptoms		S1	S2	S3	S4	S5	S6	S7	S8	S9	S10	S11	S12
Have you noticed irregular periods (e.g., cycles shorter than 21 days or longer than 35 days)?	Pearson Correlation	1	0.00	.35**	0.11	0.09	0.11	.27**	-0.02	-0.03	-0.02	-0.03	-0.06
	P- value		0.97	0.00	0.27	0.38	0.30	0.01	0.85	0.77	0.85	0.77	0.52
Do you experience heavy bleeding during your period?	Pearson Correlation		1.00	0.09	0.17	0.04	0.11	0.02	.35**	0.11	.35**	0.11	0.06
	P- value			0.36	0.08	0.73	0.27	0.85	0.00	0.27	0.00	0.27	0.52
Have you noticed an increase in facial hair growth (e.g., upper lip, chin, or jaw)?	Pearson Correlation			1.00	-0.03	0.10	0.06	0.03	0.07	-0.05	0.07	-0.05	-0.19
	P- value				0.74	0.32	0.58	0.78	0.49	0.62	0.49	0.62	0.05
Do you have thinning or hair loss on your scalp?	Pearson Correlation				1.00	0.06	0.01	.241*	0.07	0.16	0.07	0.16	-0.10
	P- value					0.56	0.90	0.02	0.49	0.12	0.49	0.12	0.33
Do you have persistent acne or oily skin, particularly on the face or upper body?	Pearson Correlation					1.00	-0.30	-0.19	0.12	0.09	0.12	0.09	-0.17
	P- value						0.00	0.06	0.25	0.40	0.25	0.40	0.10
Have you had difficulty losing weight despite diet or exercise efforts?	Pearson Correlation						1.00	0.14	-0.04	0.13	-0.04	0.13	-0.15
	P- value							0.16	0.70	0.20	0.70	0.20	0.14
Do you tend to gain weight around your waist or abdominal area (belly fat)?	Pearson Correlation							1.00	-0.01	.225*	-0.01	0.23	-0.14
	P- value								0.91	0.02	0.91	0.02	0.18
Do you experience symptoms of insulin resistance (e.g., fatigue, or cravings for sugary	Pearson Correlation								1.00	0.18	1**	0.18	-0.09
	P- value									0.07	0.00	0.07	0.39

foods)?														
Have you experienced difficulty getting pregnant?	Pearson Correlation										1.00	0.18	1**	-0.06
	P- value											0.07	0.00	0.55
Have you ever been diagnosed with cysts on your ovaries (polycystic ovaries) by a healthcare provider?	Pearson Correlation											1.00	0.18	-0.09
	P- value												0.07	0.39
Does anyone in your family have PCOS (e.g., mother, sister, aunt)?	Pearson Correlation												1.00	-0.06
	P- value													0.55
Do you have any other medical conditions, such as diabetes, hypertension, or high cholesterol?	Pearson Correlation													1
	P- value													

The table highlights the correlation between various symptoms of PCOS and their interrelationships. Irregular periods showed a significant positive correlation with increased facial hair growth (r = .356, p < 0.01) and weight gain around the waist (r = .275, p < 0.01). Heavy bleeding during periods exhibited a strong correlation with symptoms of insulin resistance (r = .355, p < 0.01) and difficulty in getting pregnant (r = .355, p < 0.01).

Increased facial hair growth showed a significant negative correlation with other medical conditions, such as diabetes, hypertension, or high cholesterol (r = -.197, p < 0.05). Thinning or hair loss on the scalp displayed a significant positive correlation with weight gain around the waist (r = .241, p < 0.05). Persistent acne or oily skin correlated negatively with difficulty losing weight despite diet or exercise (r = -.302, p < 0.01).

Weight gain around the waist showed a positive correlation with insulin resistance (r = .225, p < 0.05). Symptoms of insulin resistance demonstrated a perfect positive correlation with difficulty getting pregnant (r = 1.000, p < 0.01), indicating a strong interconnection between these symptoms. Difficulty getting pregnant also correlated positively with having been diagnosed with ovarian cysts (r = 1.000, p < 0.01).

These correlations underline the complex interdependence of PCOS symptoms, with certain symptoms showing significant overlap or associations, which could provide insights into the syndrome's multifaceted nature.

4. DISCUSSION

The current study assessed the prevalence and associated factors of Polycystic Ovary Syndrome (PCOS) among women of reproductive age residing in Gautam Budha Nagar, Uttar Pradesh. A comprehensive analysis of demographic, socio-economic, and medical history variables revealed insights into PCOS symptoms and their interrelationships. This discussion contextualizes the findings with existing literature and explores implications for clinical practice, public health interventions, and future research.

Demographic Characteristics and PCOS Prevalence

The study found that 54% of participants had a high likelihood of PCOS, with 34% showing moderate likelihood. This high prevalence aligns with global trends, where PCOS affects 6-20% of women. Younger women aged 20-30 showed the highest PCOS likelihood, suggesting it is most commonly diagnosed during reproductive years. However, no significant associations were found between symptoms and age, suggesting the need for more granular analyses.

Clinical Symptoms of PCOS

The majority of individuals with polycystic ovary syndrome (PCOS) experience symptoms such as weight gain, insulin resistance, hirsutism, thinning scalp hair, and acne, which are often linked to metabolic disturbances. Additionally, 58% of individual's experience infertility issues and 65% have a prior diagnosis of ovarian cysts.

Association between demographic variables and PCOS

The study found that women with secondary education, homemakers, and private employees had higher prevalence of PCOS symptoms, possibly due to limited access to health resources or awareness. Overweight participants showed the highest likelihood of PCOS, and women from rural and semi-rural areas had higher prevalence due to limited healthcare access or delayed diagnosis. No significant statistical associations were found between demographic variables and PCOS symptoms.

Interrelationships between PCOS symptoms

The study found significant associations between specific symptoms, such as irregular periods, weight gain, insulin resistance, acne, and hirsutism, indicating the interconnected nature of metabolic and reproductive dysfunction in PCOS. However, weak correlations suggest heterogeneous patterns, necessitating individualized diagnosis and management approaches due to PCOS's heterogeneous nature.

Future Recommendations:

To effectively combat PCOS, it's crucial to launch health education campaigns targeting women with lower education levels, emphasizing early diagnosis and treatment. Employers should implement workplace wellness initiatives, promote stress management, and create supportive work environments. Community-based weight management programs can reduce PCOS risk, especially among overweight women. Strengthening healthcare infrastructure in rural areas can improve access to affordable diagnostic tools and specialized treatments. Developing integrated healthcare services with multidisciplinary teams can address the complex needs of women with PCOS. Advocating for public health policies prioritizing women's health, especially in underserved populations, is also essential.

5. CONCLUSION

The study highlights the high prevalence of Polycystic Ovary Syndrome (PCOS) among women in Gautam Buddha Nagar, Uttar Pradesh, emphasizing the need for increased awareness, timely diagnosis, and effective management to mitigate its physical and mental health effects. Multidisciplinary care can effectively address the clinical and behavioral aspects of PCOS, reducing health impairments in later life. It was determined that 54% of subjects exhibited a high probability of PCOS, whereas 34% had a moderate probability. Women aged 20-30 had the greatest likelihood of PCOS, indicating that it is predominantly diagnosed during reproductive years. PCOS symptoms encompass weight gain, insulin resistance, hirsutism, alopecia, and acne, frequently associated with metabolic irregularities. The research indicated that women with secondary education, homemaking roles, and private employment exhibited a higher prevalence of PCOS symptoms, potentially attributable to restricted access to health resources or awareness. Overweight individuals exhibited the greatest propensity for PCOS, while women from rural and semi-rural regions demonstrated increased prevalence attributable to restricted healthcare access or postponed diagnosis. The research identified notable correlations among particular symptoms, highlighting the interrelated characteristics of metabolic and reproductive dysfunction in PCOS.

Conflict of Interest: Nil

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