

**RISK FACTORS AND AWARENESS OF POLYCYSTIC OVARY  
SYNDROME****Nagaraju M<sup>1\*</sup>, Indhumathi M<sup>2</sup>, Thanuja T<sup>2</sup>, Sharanya T<sup>2</sup>, Nandini R.M.S.V<sup>2</sup>**<sup>1</sup>Associate Professor, Department of Pharmacy Practice, KLR Pharmacy College, Palwancha, Telangana 507115, India.<sup>2</sup>KLR Pharmacy College, Palwancha, Telangana 507115, India.**ABSTRACT**

Polycystic ovarian syndrome (PCOS) is a prevalent endocrine disorder characterized by elevated androgen levels, irregular menstrual cycles, and the presence of multiple ovarian cysts. This disorder manifests in two primary forms: morphological and biochemical. Hyperandrogenism symptoms in PCOS include suppressed follicular development, ovarian microcysts, anovulation, and menstrual irregularities, affecting at least 7% of adult women. PCOS is linked with increased risks of endometrial cancer, cardiovascular disease, dyslipidemia, and type 2 diabetes mellitus. Symptoms typically intensify during puberty, presenting as hirsutism, persistent anovulation, and infertility. A defective hypothalamus-pituitary feedback mechanism contributes to sustained hyperandrogenism and premature granulosa cell apoptosis due to luteinizing hormone hypersecretion. While the genetic basis of PCOS is unclear, familial patterns suggest heritability, with evidence pointing to various genetic pathways and epigenetic influences. Infertile women with PCOS often have a higher frequency of specific CAG alleles, and X-chromosome inactivation patterns among affected siblings indicate genetic complexity. PCOS profoundly impacts women's physical and mental health, traditionally managed through symptom-focused treatments. However, a holistic approach addressing overall well-being is now advocated. Increased awareness, early detection, and prompt medical consultation are vital for improving outcomes. Clinical pharmacists can play a crucial role in identifying PCOS risk factors and co-morbidities, offering patient counseling on lifestyle modifications such as diet and exercise to mitigate PCOS impact. This research aims to identify PCOS-associated risk factors and raise awareness among reproductive-age women, promoting effective disease prevention and better health outcomes.

**Key Words:** Polycystic Ovarian Syndrome (PCOS), Hyperandrogenism, Genetic Pathways, Endocrine Disorders, Risk Factors.**INTRODUCTION**

Polycystic ovarian syndrome (PCOS) is a complex endocrine disorder characterized by elevated androgen levels, irregular menstrual cycles, and the presence of multiple small cysts on one or both ovaries. [1] This condition can manifest in two primary forms: morphological (polycystic ovaries) and biochemical (polycystic ovary syndrome with hyperandrogenemia). Symptoms of hyperandrogenism in PCOS include suppressed follicular development, ovarian microcysts, anovulation, and menstrual irregularities. PCOS affects at least 7% of adult women and is associated with increased risks of endometrial cancer, cardiovascular disease,

dyslipidemia, and type 2 diabetes mellitus. [2]

Symptoms often intensify during early puberty, with common clinical features such as hirsutism, persistent anovulation, and infertility. A malfunctioning hypothalamus-pituitary feedback system contributes to persistent hyperandrogenism, and the hypersecretion of luteinizing hormone can lead to premature granulosa cell apoptosis. Although the genetic etiology of PCOS remains unclear, it is common to observe a family history of the condition [3]

Evidence suggests heritability of hyperandrogenemia and hyperinsulinemia among affected siblings in families with PCOS. Various genetic pathways, including autosomal dominant, modified autosomal dominant, and X-linked dominant, may influence phenotype expression, with multiple loci and epigenetic changes playing potential roles. Infertile women with

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PCOS show a higher frequency of CAG alleles with more than 22 repetitions compared to fertile control groups and the general population. Patterns of X-chromosome inactivation (XCI) between sister pairs with identical genotypes at polymorphic loci have also been observed in PCOS families. [4] PCOS significantly impacts the quality of life for many women worldwide, affecting both physical and mental health. Traditionally, treatment focused solely on symptom management, but recent research highlights the need for a more holistic approach to address the broader implications of PCOS on a woman's overall well-being. Increased awareness, early detection, and prompt medical consultation are crucial for improving outcomes and quality of life for women with PCOS. Clinical pharmacists can play a vital role in identifying risk factors and co-morbidities in PCOS patients. Through patient counseling on lifestyle modifications, such as avoiding junk foods, maintaining a balanced diet, and regular exercise, pharmacists can help manage and mitigate the impact of PCOS. This research aims to identify risk factors associated with polycystic ovary syndrome and raise awareness among women of reproductive age, promoting effective disease prevention and improved health outcomes. [5]

## METHODOLOGY

This study was designed as a prospective observational study conducted in the community setting. Over a duration of six months, a total of 310 participants were enrolled in the study. The study aimed to gather comprehensive data on the health status and related variables of the participants. A structured patient data collection proforma was utilized to record detailed information from each participant. [6] This included demographic data, medical history, and specific information relevant to the study's focus. Prior to participation, all individuals were required to provide informed consent, ensuring they were fully aware of the study's purpose, procedures, and any potential risks or benefits. This was facilitated through an informed consent form, which was carefully explained and signed by each participant. Additionally, a patient information leaflet was provided to each participant. This leaflet contained essential information about the study, including the objectives, procedures, and contact information for any questions or concerns. [7] The methodology ensured that the data collection process was thorough, ethical, and transparent, thereby maintaining the integrity of the study and the well-being of the participants.

### Study criteria

#### Inclusion criteria

- All women in reproductive age group (15 – 44 years)
- Women willing to participate
- Pregnant women

#### Exclusion criteria

- Menopausal Women
- Patients unwilling to participate in the study

## METHOD OF DATA COLLECTION

This prospective study will be carried out after obtaining the permission of institutional review board, KLR Pharmacy College, Palwancha, Telangana 507115, India. Survey was conducted on women of reproductive age group (15 – 45 years), in rural areas, will be included in their study. Menopausal women and unwilling to participate were excluded from the study. A specially designed questionnaire will be used for data collection which include participants demographics, family, past history, menstrual history, risk factors, diet & physical activity. [8] The data will obtain by direct participant interview and from patient case profiles. Approximately 400 cases will be collected from the survey, according to study criteria risk factors are identified, by using Rotterdam criteria, NIH, SF-12, and AE-PCOS criteria.

## RESULTS

Out of the 310 participants, the highest number of individuals fell within the age group of 20-24 years (27.096%), followed by those in the 25-29 years group (17.741%), 15-19 years group (16.77%), 40-44 years group (13.225%), and 30-34 years group (12.903%). The lowest number of participants was within the 35-39 years age group (12.25%). Regarding body weight, 175 participants (56.45%) were classified as having normal body weight, 35 participants (11.29%) were underweight, 72 participants (23.22%) were overweight, and 28 participants (9.03%) were obese. Marital status showed that out of the 310 participants, 165 were married, while 145 were unmarried. [9] Menstrual regularity data revealed that 193 participants (62.2%) reported regular menstruation, whereas 117 participants (37.7%) experienced irregular menstruation, with irregular cycles ranging from 2 months to more than 5 months. Risk factors among the participants included 91 individuals with obesity, 56 with acne, 49 with stress, 25 with acanthosis, 61 with obstructive sleep apnea, and 46 with excessive hair growth. Additionally, 31 participants were diagnosed with hypertension, 51 with diabetes mellitus, and 25 with thyroid disorders. Junk food consumption varied, with 158 participants consuming junk food once a week, 106 consuming it twice a week, and 46 consuming it more than twice a week. Physical activity levels showed that 59.7% of the participants did not engage in any external physical activities, while 40.3% reported regular physical activities. Awareness of PCOS was low, with 179 participants unaware of the condition and 131 aware. Menstrual irregularity data indicated that across all age groups, 50 participants experienced 3 months of irregularity, 40 participants had 4-5 months of irregularity, and 14 participants had more than 5 months of irregular cycles. The findings suggest that individuals with two or

more risk factors and more than three months of menstrual irregularity have a higher likelihood of developing PCOS.

**Table 1: Age Wise Distribution**

Sno	Age (yrs)	No.of People	Percentage
1	15 – 19	52	16.77
2	20 -24	84	27.09
3	25 – 29	55	17.74
4	30 – 34	40	12.90
5	35 – 39	38	12.25
6	40 – 44	41	13.22
	<b>TOTAL</b>	310	100

**Table 2: BMI of Participants**

Sno	BMI Range	No. of Participants	Total Participants	Percentage
1	<18.5	35	310	11.29
2	18.5 - 24.9	175	310	56.45
3	25 - 29.9	72	310	23.22
4	30 - 34.9	28	310	9.03

**Table 3: Marital Status**

Marital Status	Frequency
Married	165
Unmarried	145

**Table 4: Menstrual History of Participants**

Menstrual History	No. of Participants	Percentage
Regular	193	62.2
Irregular	117	37.7

**Table 5: Risk Factors Seen In Participants**

Risk Factors	No.of Patients
Obesity	91
Acne	56
Stress	49
Acanthosis	25
Obstructive Sleep Apnea	61
Hair Growth	46

**Table 6: Comorbidities Seen In Participants**

Comorbidities	No. of Patients
HTN	31
DM	51
Thyroid	25

**Table 7: Junk Food Intake**

Junk Food Intake	Frequency	Percentage
Once	158	50.96
Twice	106	34.19
>Twice	46	14.83

**Table 8: Physical Activity of Participants**

S. no	Physical activity	No. of patients	Percentage
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1	Yes	185	59.67%
2	No	125	40.32%
	Total	310	100%

**Table 9: Awareness of PCOS**

Aware of PCOS	Frequency
Aware of PCOS	131
Unaware of PCOS	179

**Table 10: Month Wise Distribution of Menstrual History**

Age	3 Months	4 - 5 Months	> 5 Months
15 - 19	5	3	3
20 -24	14	13	7
25 - 29	6	6	2
30 - 34	7	4	1
35 - 39	4	8	1
40 - 44	14	6	0

**Table 11: Risk Factors In People With Irregular Menstrual History**

No. of Risk Factors	3 Months	4 – 5 Months	> 5 Months
1 Risk Factor	14	7	3
2 Risk Factors	13	9	7
>2 Risk Factors	15	19	5

## DISCUSSION

This study includes 310 women belonging to age group of 15-45 years. Out of 310 highest number of people was under the age group of 20-24 years(27.096%), followed by 25-29 years(17.741%), followed by 15-19 years(16.77%), followed by 40- 44 years(13.225%), followed by 30-34 years (12.903%) and the lowest number of people was under the age group of 35-39 years (12.25%) respectively. [10] This study results correlates with the study results conducted they also found that <24 years age group women have higher incidence of pcos. Out of 310 people 175(56.45%) people fall under normal body weight, 35(11.29%) people fall under underweight, 72(23.22%) people fall under over weight and 28(9.03%) people fall under obese. [11] This study results were similar to the study conducted they stated that obesity play a major role in developing of pcos. Another study conducted stated that obesity is a major risk factor for pcos. Among those women(310),165 were married and 145 were unmarried. Out of 310 people,193(62.2%) people are on regular menstruation and 117(37.7%) people complain about irregular menstruation with 2 months to >5 months of irregular menstrual cycle. [12] The main concern in women with irregular periods was infertility irrespective of marital status. These results were similar to that of the study conducted. In their study the stated that oligomenorrhea and dysmenorrhea are two major risk factors and signs for development of pcos. The risk of PCOS were found to be higher in urban population than rural because of sedentary life style and lack of exercise

and junk food intake. In this study 59.7% of the participants are not involved in any kind of external physical activities and 40.3% of the People doing their regular physical activities. Study performed stated that urban people are more in risk of developing of pcos than that of rural areas because of their sedentary lifestyle and irregular food habits. [13] Junk food intake, there are 158 participants consume junk food once a week, twice a week 106, more than twice a week 46 people. In our study 23.22% women are overweight and 9% women are obese. The study done was similar to this study results. They stated that irregular pattern of food habits can lead to obesity which can be a risk factor for the future development of pcos. They also stated that comorbidities like disordered eating issues and weight should be handled while treatment of pcos. Some of the studies say that there are close association with risk of autosomal diseases. Family history of Hypertension, Diabetes Miletus, Thyroid are 10%, 16.45% and 8.6% were found among 310 study population. [14] A study performed by S. mustaniemi et al, and Coviello et al, stated that risk of development of hypertension, diabetes melitus and thyroid are more in the people affected with pcos. In our study pcos patients mostly have thyroid as their comorbidity. Risk factors observed among study population are 28% obesity, 18% obstructive sleep apnea, 17% acne, 15% stress, 14% unwanted hair growth and 8% acanthosis. This study results correlates with study conducted by the stated that they observed oligomenorrhea in 74% of pcos women. Increased testosterone levels are correlated with LH/FSH

ratio, hirsutism, and antral follicular count in pcos women. Another study stated that prevalence of pcos is more in the women with obesity, acne, hair growth as risk factors. [15] A study done by stated that women reporting pcos have increased depression, anxiety and perceived stress compared to women without pcos. Stress may act as key link between pcos and depression, anxiety and perceived stress. A study performed concluded that patients who have family history of diabetes mellitus and obesity with a BMI > 30 are more likely to develop acanthosis nigricans. Menstrual history was collected .37.7% women and 62.2% women have irregular and regular menstrual cycles respectively. [16] Among 310 study population 33.548% women complained irregular periods more than 3 months. Women with more than two risk factors and irregular periods for more than 3 months are considered as the risk group according to the Rotterdam criteria. This study results correlate with the study conducted by the and they concluded that people with more than 3 months of irregular

menstrual history along with hyperandrogenism risk factors are under risk of development of pcos.

## CONCLUSION

PCOS is a common gynecological disorder which affects ovaries and ovulation in women having sedentary life style. Most of the patients in our study are unaware of PCOS. Obesity and overweight were common conditions observed from the study which evaluated that it is a major risk factor for PCOS. Various other risk factors like acne, unwanted hair growth, stress, acanthosis was observed in this study. Some specific norms like size of cysts, levels of testosterone, blood glucose levels were not considered because this is a community-based awareness program regarding PCOS. In this study, as it is most emerging disorder proper awareness regarding risk factors, diagnosis, diet changes, exercises are provided. Life style modification and proper diet can help in better management of PCOS.

## REFERENCE

1. Lin LH, Barakat MC, Gustavo AR, et al. androgen receptor gene polymorphism and polycystic ovary syndrome int gynecol obstet 2013, 115-118
2. Berreckjs.endocrine disorders. In: Bereck is, ed. Bereck and Novak's Gynecology.15th ed. New Delhi: Wolters Kluwer's Health (India)Pvt Ltd/Lippincott Williams and wilkins; 2012, 1066-1099
3. Howkins & bourne Shaw's textbook of gynecology 16<sup>th</sup> edition disorders of the ovary 431-434
4. Kabel AM, Alghubayshi AY, Moharm FM, et al. The impact of Polycystic Ovarian Syndrome, a potential risk factor to Endometrial Cancer, on the quality of sleep. *J Cancer Res Treat.* 4(6), 2016, 96-8.
5. Dunaif A, Givens L JR, Haseltine F, Merriam GR, et al. The Polycystic Ovary Syndrome. 1st ed. Oxford: Blackwell Scientific; 1992, 377-384.
6. Ojaniemi M, Pugeat M. An adolescent with polycystic ovary syndrome. *Eur J Endocrinol.* 2006; 155(suppl 1): s149-152.
7. Zawadzki J, Dunaif A. Diagnostic criteria for polycystic ovary syndrome: towards a rational approach. In: Dunaif A, Givens JR, Haseltine FP, Merriam GR (editors). Poly- cystic Ovary Syndrome. Oxford: Blackwell Scientific Publications; 1992; 377-384.
8. Berreckjs.endocrine disorders. In: Bereck is, ed. Bereck and Novak's Gynecology.15th ed. New Delhi: Wolters kluwers Health (India)Pvt Ltd/Lippincott williams and wilkins; 2012, 1066-1099
9. Lin LH, Barakat MC, Gustavo AR, et al. Androgen receptor gene polymorphism and polycystic ovary syndrome. *Int J Gynecol Obstet.* 120, 2013, 115– 118.
10. Aubuchon M, Legro RS. Polycystic ovary syndrome: Current infertility management. *Clin Obstet Gynecol.* 54(4), 2011, 675–684.
11. McFarland C. Treating polycystic ovary syndrome and infertility. *MCN Am J Matern Child Nurs.* 37(2), 2012, 116–121.
12. Xita N, Georgiou I, Tsatsoulis A, et al. The genetic basis of polycystic ovary syndrome. *Eur J Endocrinol.* 147, 2002, 717–725.
13. Diamanti-Kandarakis E, Kandarakis H, Legro RS, et al. The role of genes and environment in the etiology of PCOS. *Endocrine.* 30, 2006, 19–26.
14. Shannon M, Wang Y. Polycystic ovary syndrome: A common but often unrecognized condition. *J Midwifery Women's Health.* 57, 2012, 221– 230.
15. Clark A. M, Thornley B, Tomlinson L, Galletley C, Norman R. J, et al. Weight loss in obese infertile women results in improvement in reproductive outcome for all forms of fertility treatment. *Hum. Reprod.* 13, 1502–1505
16. Dewailly D, Lujan M. E, Carmina E, Cedars M. I, Laven J, Norman R. J, et al. Definition and significance of polycystic ovarian morphology: a task force report from the Androgen Excess and Polycystic Ovary Syndrome Society. *Hum. Reprod.* Update 20, 2014, 334–352.