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RESEARCH ARTICLE

STUDY OF PREVALENCE AND RISK FACTORS OF POLYCYSTIC OVARIAN SYNDROME AMONG ADOLESCENT AND YOUNG ADULTS OF RAMA UNIVERSITY

Dr. Kavita Verma¹, Dr. Garima Dhanani² and Dr. Payyavula Tejaswi²

1. Assistant Professor, Department Of Obstetrics and Gynaecology, Rama Medical College Mandhana, Kanpur.
2. Postgraduate Junior Resident, Department Of Obstetrics and Gynaecology, Rama Medical College Mandhana Kanpur.

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Abstract

Background: There is little epidemiological data from India on the prevalence and risk factors associated with polycystic ovarian syndrome (PCOS). The objectives of the present study were to estimate the prevalence of PCOS using different criteria among adolescents and young women and to evaluate risk factors associated with PCOS.

Materials and Methods: A total of 200 participants, adolescents (12–17 years, n = 100) and young women (18–30 years, n = 100), were recruited. Participants who were overweight and having menstrual disorders or biochemical abnormalities were invited for ultrasonographic examination. A standardized questionnaire assessed the regularity of menstrual cycles, body hair growth, skin, body weight, sleep, and androgen excess. The ovarian volume and follicular size were assessed transabdominally. Prevalence of PCOS was assessed by the Rotterdam, AE-PCOS, and NIH criteria. Study period – 1st January '23 – 31st August '23

Results: The mean age of participants with PCOS was 21 ± 6.069 years and those without PCOS was 19.62 ± 5.583 years. Mean body weight, body mass index, fasting insulin, systolic and diastolic blood pressures were significantly higher in the PCOS group. Prevalence of polycystic ovaries on ultrasonography was observed in 78.6% of the women with PCOS as against 5% in women without PCOS. Obesity (OR: 7.34, 95% CI: 1.95–27.27), insulin resistance (OR: 5.62, 95% CI: 0.461 – 0.982) and hypertension (OR: 10.76, 95% CI: 0.916 – 0.998) were significantly associated with PCOS. Overall, the Prevalence of pcos was highest among female AGE GROUP 17-30YRS.

Conclusion: There is a high prevalence of PCOS in today society, which emphasizes the need for urgent preventive and control measures. Early diagnosis and assessment of risk factor is therefore crucial in incorporating lifestyle and dietary modifications for weight reduction and better control of blood pressure at a younger age to further prevent long-term reproductive and metabolic disorders.

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Corresponding Author:- Dr. Kavita Verma

Address:- Assistant Professor, Department Of Obstetrics and Gynaecology, Rama Medical College Mandhana, Kanpur.

Introduction:-

Polycystic ovarian syndrome (PCOS) also referred to as Stein–Leventhal syndrome(1; 2) is a heterogeneous endocrine disorder in women of reproductive age and is associated with a broad range of health conditions including hypertension, dyslipidaemia, insulin resistance, hyperandrogenaemia(2), and type 2 diabetes mellitus (T2DM)(3). Globally, the prevalence of PCOS is estimated to be between 5.5% and 12.6% in women in the age group of 17–45 years(4). According to the World Health Organization (WHO) estimation revealed over 116 million women (3.4%) are affected by PCOS worldwide. The predisposing risk factors include genetics, neuroendocrine, lifestyle/environment, obesity that contributes to the development of PCOS(5). In India, the prevalence estimates are between 8.2% and 22.5% depending on the diagnostic criteria used. (4)

PCOS is one of the primary causes of infertility in women. Overweight and obesity, sedentary lifestyle, and a family history of PCOS may predispose a young girl to PCOS(6). Although the aetiology of this condition remains uncertain, its diagnosis is based on abnormalities of the reproductive system, hyperandrogenism, and persistent anovulation after exclusion of primary diseases of the ovaries and adrenal and pituitary glands. Women with PCOS have a 11-fold increased risk of developing metabolic syndrome and glucose intolerance when compared with age-matched controls (3). However, early diagnosis and management in PCOS can help prevent long-term metabolic abnormalities. Achieving modest weight loss can help improve reproductive, metabolic, and mental health, which are the key aspects in overcoming the burden of PCOS(7).

The objectives of the present study were to estimate the prevalence of PCOS using different criteria used to diagnose PCOS among adolescents (12–17 years) and young women (< 30 years) with irregular menses and urine pregnancy test (UPT) negative and to further evaluate risk factors associated with PCOS.

Methods:-

A total of 200 participants, adolescents (12–17 years, n = 100) and young women (18–30 years, n = 100), were recruited. Participants who were overweight and having menstrual disorders or biochemical abnormalities were invited for ultrasonographic examination.(8) A standardized questionnaire assessed the regularity of menstrual cycles, body hair growth, skin, body weight, sleep, and androgen excess. The ovarian volume and follicular size were assessed transabdominally. Prevalence of PCOS was assessed by the Rotterdam(9), AE-PCOS(2), and NIH criteria.

Inclusion Criteria-

- AGE-1ST AGE GROUP 12-17 YRS
- 2ND AGE GROUP 18-30 YRS
- Patient with irregular menses-OLIGOMENORRHEA
- urine pregnancy test – negative
- EXCESSIVE HAIR GROWTH

Study period -1ST January'23 -31ST August '23

Anthropometric measurements- including height, weight, and waist measurements were determined by standardized methods. The body mass index (BMI) was calculated as weight in kilograms divided by the square of height in meters. Fasting plasma glucose (glucose oxidase–peroxidase method), postprandial blood sugar and fasting insulin.

USG examination of the abdomen-Participants who were overweight or having menstrual disorders and any biochemical abnormalities were invited for USG examination. The ovarian volume and follicular size were assessed transabdominally using a 3.5–5 MHz curvilinear probe Based on the various criteria for diagnosis of PCOS included in the study, the findings from USG were categorized as participants having PCOS or not.

Questionnaire for PCOS assessment -The participants were administered a standardized questionnaire which assessed the regularity of menstrual cycles, body hair growth, skin, body weight, and sleep. The Ferriman–Gallwey score was used for evaluating hirsutism, and a score of 1–4 was used for nine areas of the body. A total score less than 8 is considered normal, a score of 8–15 indicates mild hirsutism, whereas a score greater than 15 indicates moderate or severe hirsutism,

Statistical analysis

IBM SPSS Statistics 23.0 was used for compilation and analysis of data. The dataset was cleaned or corrected for outliers by replacing missing values with mean values for interval data. Demographic, anthropometric, and clinical and biochemical parameter variables and symptoms were used for comparing participants based on PCOS. Comparison between PCOS and non-PCOS participants was done using independent t-tests for continuous variables and χ^2 tests for categorical variables. Continuous variables were represented as mean \pm standard deviation and categorical variables using frequency (%). P-value less than 0.05 was considered statistically significant. Relationship between categorical variables was represented through odds ratios (ORs). Sensitivity analyses were carried out to determine which of the three criteria best identified PCOS prevalence in our population. the Rotterdam criteria (2003)(9) were used to classify the participants with and without PCOS, whereas the other two diagnostic criteria, namely, NIH 1990 and AE-PCOS 2006(2), were used for the comparison of prevalence of PCOS with the Rotterdam criteria

Results:-

The mean age of participants with PCOS was 21 ± 6.069 years and those without PCOS was 19.62 ± 5.583 years. Mean body weight, body mass index, waist circumference, systolic and diastolic blood pressures were significantly higher in the PCOS group. Prevalence of polycystic ovaries on ultrasonography was observed in 78.6% of the women with PCOS as against 5% in women without PCOS. Obesity (OR: 0.103, 95% CI: 0.518 - 0.976), insulin resistance (OR:0.007, 95% CI :0.461 – 0.982) and hypertension (OR: 0.012, 95% CI: 0.916 – 0.998) were significantly associated with PCOS .The overall prevalence of PCOS was highest with 8.1% according to the Rotterdam criteria followed by AE-PCOS (2.9%) and NIH (2.1%).

It was observed that participants with irregular menstrual history had higher chance of getting detected as having PCOS than those with regular periods. Similarly, the OR of detecting PCOS in participants with hirsutism and confirmation of polycystic ovaries by ultrasound was higher, respectively, when compared with those without these symptoms as shown in Table 2 below. When restricting the analysis to adolescents, it was observed that girls with irregular menstrual history for at least 2 years as per the latest NIH 2012/International PCOS Guidelines 2018 of higher chance of getting diagnosed with PCOS when compared with those with a lesser duration of irregular menstrual history similar to the study done in Chennai India (10).

Discussion:-

There is a high prevalence of PCOS in today society, which emphasizes the need for urgent preventive and control measures. Early diagnosis and assessment of risk factor is therefore crucial in incorporating lifestyle and dietary modifications for weight reduction and better control of blood pressure at a younger age to further prevent long-term reproductive and metabolic disorders .

The salient findings of this study are as follows: (1) The Rotterdam criteria(9)reported the highest prevalence when compared with the other two criteria to detect prevalence and evaluate risk for diagnosing PCOS among Indian adolescent girls and women; (2) the prevalence of PCOS is high among young girls which steadily increases with age; (3) menstrual irregularity for 2 years can be used as an early indicator for PCOS; and (4) obesity, insulin resistance, and hypertension are the metabolic parameters associated with PCOS as shown in studies done Kashmir(11) , Telangana(12)and in Gwalior(13).The associated clinical findings of PCOS usually begin to manifest during adolescence with the presentation evolving into a clinical picture that can vary considerably. The reproductive dysfunction presents with a range of menstrual disorders, including amenorrhea, oligomenorrhea, and abnormal uterine bleeding associated with anovulation or oligo ovulation. Patients may also present with ovarian enlargement, endometrial hyperplasia, and infertility.

In summary, the prevalence of PCOS and its symptoms increase with age(14), this was similar to pcosestimated from other study done in Bhopal (8.2%)(4) and in Telangana (12)thus emphasizing the need for a multi-disciplinary approach to catch this disorder at an early stage. A long-term personalized management program involving evidence-based(15) practice from a team of dermatologists, diabetologists, and diabetes educators along with appropriate obstetricians/gynaecologist's counselling, and appropriate referral to physicians and endocrinologists is required for effectively treating individuals with PCOS. This strategy can aid in regulating menstrual cycles, treating PCOS-related dermatological issues such as hirsutism and acne, attaining fertility, lowering the burden of obesity, diabetes, and risk of other metabolic complications(16), and addressing health-related quality of life issues related to

this syndrome. One of the early steps in prevention and management of PCOS could be to create awareness and understanding of this disorder in the community through schools and colleges.

Table 1:- Various criteria used for the diagnosis of PCOS in the literature.

National Institutes of Health (1990)		Rotterdam (2003)	AE-PCOS Society (2006)	NIH (2012)
	Oligomenorrhea (<10 menses year) or oligo-ovulation	Ovarian dysfunction: oligomenorrhea (<10 menses a year) Or oligo-ovulation / Anovulation	Clinical hyperandrogenism and/or biochemical hyperandrogenism	Hyperandrogenism + Oligo / Anovulation + polycystic ovarian morphology
	Clinical hyperandrogenism	Clinical hyperandrogenism And / or Biochemical hyperandrogenism (elevated total/free testosterone and/or DHEAS)	Oligomenorrhea (<10 menses a year) or oligo-ovulation and/or Polycystic ovaries on ultrasound (\geq antral follicles in one ovary or ovarian volume $\geq 10 \text{ cm}^3$ in one ovary)	Hyperandrogenism + Oligo / Anovulation
	And / Or Biochemical hyperandrogenism (elevated total/free testosterone and/or DHEAS)	Polycystic ovaries on ultrasound (≥ 12 antral follicles in one ovary or ovarian volume $\geq 10 \text{ cm}^3$ in one ovary)		Hyperandrogenism + polycystic ovarian morphology
				Oligo / Anovulation + polycystic ovarian morphology

	Requires 2 of 2	Requires 2 of 3	Requires 2 of 2	To identify one of 4 phenotypes using Rotterdam criteria
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Table 2:- Biochemical & Clinical parameters of PCOS & Non PCOS groups.

Variable	PCOS		
	PCOS(n=40)	NON PCOS(160)	p-Value
	Mean ± SD	Mean ± SD	
AGE	21±6.069	19.62±5.583	0.299
S. TSH	4.480±2.21	3.41±1.24	0.003
Diastolic blood pressure(mmHg)	82.96±10.442	74.16±7.88	0.000
Systolic blood pressure(mmHg)	143.28±21.023	122.96±10.36	0.000
Blood sugarFASTING (mg/dl)	111.32±27.729	88.12±8.42	0.000
Blood sugarPOSTPRANDIAL	161.24±43.412	124.89±14.92	0.000
Fasting insulin(μIU/ml)	17±9	13±6	
HEIGHT	155.052±8.499	153.76±10.86	0.591
Body mass index	26.92±3.62	26.01±3.59	0.281
WEIGHT	67.76±10.08	65.01±11.61	0.294
SNORING	0.48±0.51	0.23±0.42	0.034
ACNE	0.52±0.51	0.47±0.50	0.691
ACANTHOSIS NIGRICANS	0.48±0.51	0.20± 0.40	0.019
Polycystic ovaries on USG	33(78.6)	24(5.0)	0.001

Table 3:- Association of PCOS with obesity, insulin resistance, and hypertension.

Variable	Odds Ratio (OR)	95% C. I. for OR	P
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		Lower	Upper	
Hypertension	10.76	2.58	44.80	.001
Over Weight	7.34	1.95	27.27	.003
Insulin Resistance	5.62	1.40	22.50	.015

Table 4:- Distribution of PCOS Cases According to Age group of Study Subjects.

Age Group	PCOS		Total
	No	Yes	
12-16	(82.9%)	(17.1%)	41 (100%)
17-21	(70%)	(30%)	20 (100%)
22-26	(84.6%)	(15.4%)	13 (100%)
27-30	(80.0%)	(20.0%)	25 (100%)
Total	(79.8%)	(20.2%)	99 (100%)

Figure 1:- Over all prevalence of PCOS among all Age groups of study subjects was 20 (20%) , among age group 12-19 yrs. the prevalence of pcos is 18.40% and in age group 20-30 yrs. was 22%.

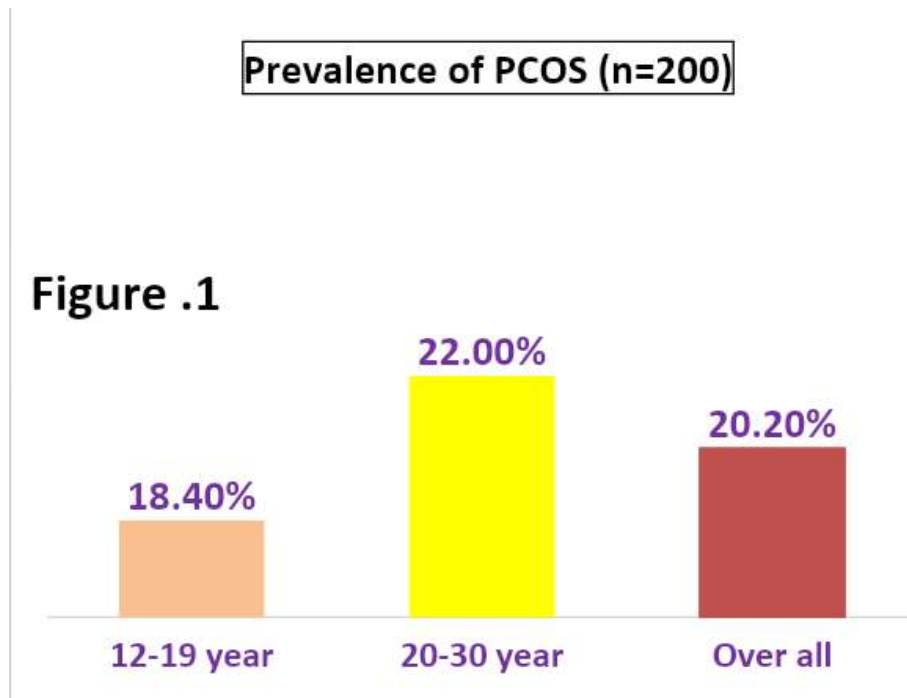
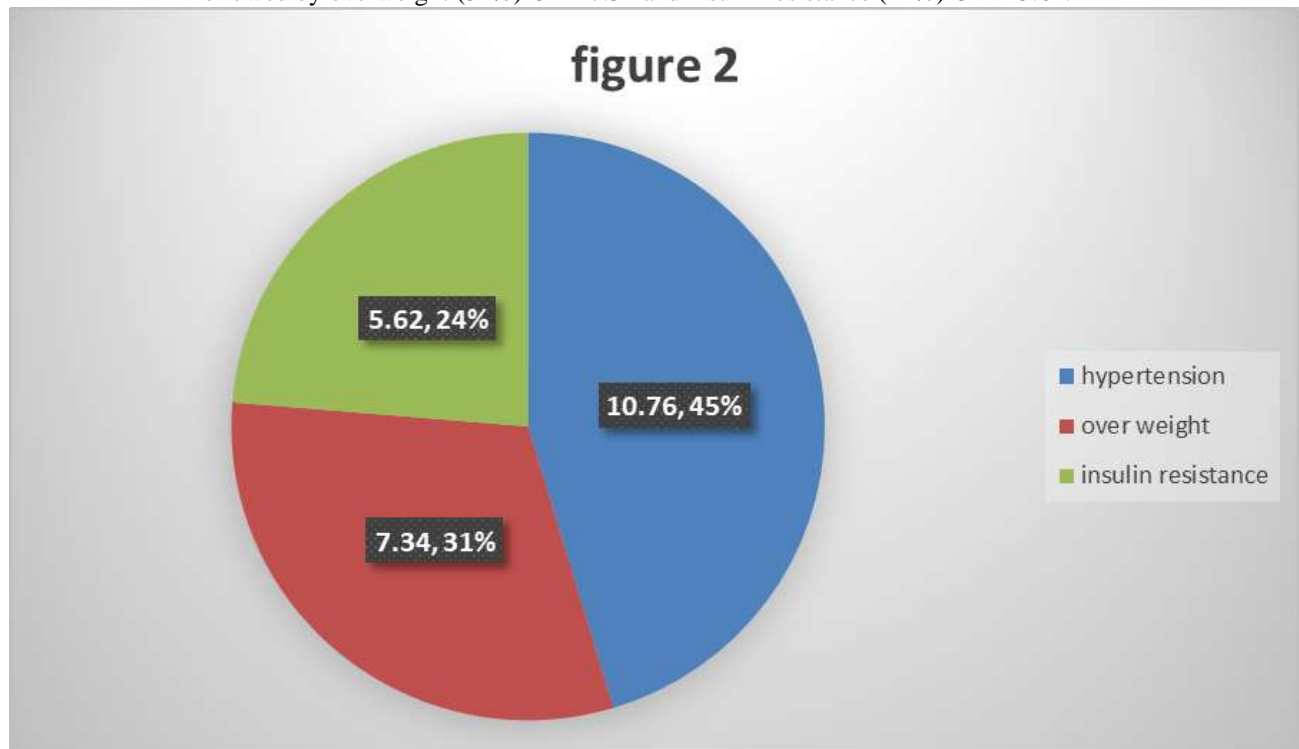


Figure 2:- shows that hypertension has highest association 45% PCOS patient were hypertensive OR - 10.76, followed by overweight (31%) OR - 7.34 and insulin resistance (24%) OR - 5.62.



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Head of Department of obstetrics and gynaecology of Rama medical college Kanpur
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Declarations

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Conflict of interest:

None declared

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Not required

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