Original Article

Polycystic Ovaries and Associated Biochemical Features in Medical Students of the Women Medical College in Haryana

Deepika Kataria[1], Monika[2], Babita Rani[3], Renu Garg[4], Rajiv Mahendru[5], SK Jha[6], Chiranjeev[7]

[1]Senior resident, Department of Community Medicine, [2]Intern student, [3]Professor, Department of Community Medicine, [4]Professor & Head, Dept. of Biochemistry, [5]Professor & Head, Dept. of Obstetrics & Gynaecology, [6]Professor& Head, Department of Community Medicine, [7]Professor& Head, Dept. of Radiodiagnosis, BPS GMC (W) Khanpur Kalan, Sonepat, Haryana.

How to cite this article: Deepika Kataria, Monika, Babita Rani et. al. Polycystic Ovaries and Associated Biochemical Features in Medical Students of the Women Medical College in Haryana. Indian Journal of Public Health Research and Development / Vol. 16 No. 1, January-March 2025.

Abstract

Background: Polycystic ovarian syndrome (PCOS) is a heterogenous endocrinal disorder and one of the leading causes of infertility worldwide. 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.

Methods: This Cross – sectional study was conducted among 362 MBBS students of a government medical college in Haryana chosen by simple random sampling. After taking written consent, interview was conducted. Categorical variables were presented in the form of frequency and proportions while continuous variables as mean and standard deviation.

Results: Prevalence of PCOS among the study population was 15.74%. The mean age of onset of PCOS was 21.32 ± 1.35 years. Significant risk factors for PCOS were family h/o, drug intake for any illness, testosterone, DHEAS values, thyroid profile, Ultrasonography (USG) findings, BMI and Menstrual Irregularity with p-value < 0.005.

Conclusion: PCOS is an emerging disorder that has been linked to a number of health issues, including obesity, anovulation and irregular menstruation. Age-related increases in PCOS prevalence and symptoms highlight the necessity for a multidisciplinary approach to early detection of this condition.

Keywords: PCOS, Hyperandrogenism, Adolescence, Risk factors.

Introduction

Polycystic ovarian syndrome (PCOS) is a heterogenous endocrinal disorder and one of the leading causes of infertility worldwide.[1] It

Corresponding Author: Babita Rani, Professor, Department of Community Medicine, BPS GMC (W) Khanpur Kalan, Sonepat, Haryana.

E-mail: drbabitajangra@gmail.com

Submission date: June 3, 2024 **Revision date:** July 11, 2024 **Published date: December 28, 2024:**

is characterized by elevated androgen levels, menstrual irregularities, and/or small cysts on one or both ovaries.[2] The syndrome is associated with multiple gynaecologic, dermatologic, metabolic and psychologic aberrations, of which hyperandrogenism, anovulation and polycystic ovaries are the hallmark features.[3] Incidence of PCOS is increasing rapidly due to changes in lifestyle and stress.

Globally, prevalence estimates of PCOS are highly variable, ranging from 2.2% to as high as 26%.[4-6] Community-based studies using Rotterdam criteria among reproductive age group women have demonstrated varied prevalence figures in few Asian countries ranging from 2% to 7.5% in China[7,8] to 6.3% in Srilanka.[9]

The prevalence estimates of PCOS are between 8.2% and 22.5% in India, depending on the diagnostic criteria used.[10,11] In a study conducted in Haryana among reproductive age group women the prevalence was found 4.21%.[12] Very few studies have been conducted among young girls. A prevalence rate of 21.05 % was identified in a study conducted among medical students in Mumbai.[13]

Out of many criteria used for the diagnosis of PCOS, Rotterdam and AES criteria are most commonly used. According to the Rotterdam criteria, the women should fulfil two of the following: oligo-ovulation or anovulation, clinical or biochemical signs of hyperandrogenism, and/ or polycystic ovarian morphology,[14] whereas the AES has further broadened the criteria as a woman having clinical or biochemical hyperandrogenism, ovarian dysfunction (oligo-anovulation and/ or polycystic ovaries) and exclusion of other androgen excess or related disorders.[15]

There is a wide spectrum of signs and symptoms associated with PCOS. These signs and symptoms vary widely between women and within individuals over time. 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. 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.[4]

Teenagers frequently experience irregular menstrual cycles, which makes it possible that PCOS will go undiagnosed during adolescence and not be found until much later in adulthood. Therefore, identifying young women who are at risk of developing PCOS is essential to improving their lives and ensuring they receive the necessary therapy.

Preventive methods such as regular exercise, eating a balanced diet, engaging in meditation, calming exercise that reduce stress levels etc. are crucial in lowering the difficulties associated with PCOS. Although there is currently no cure for PCOS, long-term consequences can be avoided and its symptoms can be managed. This study was carried out to determine the prevalence of PCOS in medical undergraduates at the rural medical college in Haryana, which is the only medical college for women in the state, in light of the previously mentioned causes and the fact that prevalence of this syndrome in medical undergraduates in Haryana is still unknown.

Material and Methods

This Cross – sectional study was conducted among the MBBS students of a government medical college in Haryana. 120 MBBS girl students are admitted every year in this medical college.

Sample size: The sample size was determined at a 95% confidence level and a 20% relative accuracy based on the results of a prior study[13], which showed that 21.05% of medical college students had PCOS. This resulted in an estimated sample size of 362. Simple random sample by lottery was the type of sampling that was employed.

Data collection: The interview was conducted once consent was obtained. The information was gathered using a pre-tested semi-structured proforma that contained details about the individual's personal history, sociodemographic profile, Body mass index (BMI) was computed using calibrated devices and established methodology to assess height and weight. PCOS was diagnosed using the 2003 Rotterdam criteria. Women who were found to have neither clinical nor biochemical hyperandrogenism nor monthly abnormalities were classified as not having PCOS, whereas those who had both conditions were

classified as having PCOS. Ultrasonography was used to evaluate the remaining women who had one symptom—either hyperandrogenism or irregular menstruation—in order to confirm PCOS.

Statistical analysis: A Microsoft Excel file contained all of the data that had been gathered. For categorical data, percentages and proportions were computed. The chi square test was used to see whether there was any correlation between PCOS risk factors and the condition. A statistically significant P-value was defined as less than 0.05.

Ethical Consideration: The Institutional Ethics Committee of the institute approved the study (Registration number- BPSGMCW/RC763/IEC/22 dated16/8/2022). The methods used in the present study were implemented in accordance with the approved protocols.

Results

The present study was carried out in 362 medical undergraduates. The data were coded and entered in excel spreadsheet. The findings of the study are as follows:

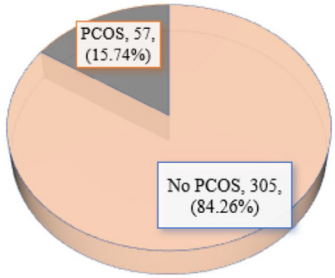

Figure 1: Prevalence of PCOS among the study population

Figure 1 shows that out of 362 students majority were not having PCOS but 57 students were diagnosed with PCOS so the prevalence of PCOS among the study population was 15.74%.

Table 1: Distribution of study population according to Sociodemographic features (n=362)

Variables		No PCOS	PCOS	Total	p value
Age (Years)	18-20	91 (86.7)	14 (13.3)	105	0.651
	20-22	166 (83.8)	32 (16.2)	198	
	>22	48 (81.4)	11 (18.6)	59	
	Mean age	21.16±1.33	21.32±1.35		0.43
Type of family	Joint	79 (81.4)	18 (18.6)	97	0.374
	Nuclear	226 (85.3)	39 (14.7)	265	
Family h/o PCOS	No	299 (86.2)	48 (13.8)	347	<0.001
	Yes	6 (40)	9 (60)	15	
Drug intake for any illness	No	277 (85.8)	46 (14.2)	323	0.024
	Yes	28 (71.8)	11 (28.2)	39	

The mean age of onset of PCOS was 21.32 ± 1.35 years. Maximum number of students belonged to 20-22 years age group followed by 18-20 years and least from >22 years age group. But the prevalence of PCOS was more among students who belonged to >22 years age group and least prevalence is seen in 18-20 years age group.

Maximum number of students belonged to the nuclear type of families but prevalence of PCOS was more among students who belonged to joint families. Majority of the population were not having family history of PCOS but out of those who had family history of PCOS, they also had PCOS. Majority of the study subjects did not take any drug but prevalence of PCOS was higher among those who were already on a drug for any illness.

The difference in prevalence in relation to family history of PCOS and drug intake for any illness was found to be statistically significant. (Table 1)

Table 2: Distribution of study population according to Biochemical features

Variables		No PCOS	PCOS	Total	p value
Testosterone values (n=362)	Normal	297 (85.8)	49 (14.2)	346	< 0.001
	Raised	8 (50)	8 (50)	16	
	Mean level	2.14±0.56	2.60±0.99		<0.001
DHEAS (n=362)	Normal	238 (92.2)	20 (7.8)	258	< 0.001
	Raised	67 (64.4)	37 (35.6)	104	
	Mean level	3.10±1.26	4.28±1.61		<0.001
Thyroid Status (n=362)	Normal	294 (85.7)	49 (14.3)	343	<0.001
	Hyperthyroid	5 (100)	0 (0)	5	
	Hypothyroid	6 (42.9)	8 (57.1)	14	
	Mean level	0.90±2.3	0.68±0.57		0.49
Prolactin level (n=362)	Normal	235 (83.9)	45 (16.1)	280	0.753
	Raised	70 (85.4)	12 (14.6)	82	
USG (n=50)	Normal USG	25(58.1)	18(41.9)	43	0.004
	Poly cystic ovaries in USG	0	07 (100)	07	

Majority of the participants had normal range of testosterone but the prevalence of PCOS was higher (50%) among those having raised values of testosterone. Majority of the participants had normal range of DHEAS but the prevalence of PCOS was higher (35.6%) among those having raised values of DHEAS. Majority of the study participants had normal thyroid profile followed by hypothyroid and then by hyperthyroid. Prevalence of PCOS was maximum (57.1%) in hypothyroid and least in hyperthyroid. Majority of the study participants had normal values of prolactin. Also, prevalence of PCOS was slightly higher in the normal range of values of PCOS.

Ultrasonography was done only in 50 cases who were having either menstrual irregularities or hyperandrogenism. Poly cystic ovaries in USG were found in all the PCOS cases as compared to non PCOS. Normal findings on USG were found in more than half of cases without PCOS. The difference in occurrence of PCOS in relation to testosterone, DHEAS values, thyroid profile and Ultrasonography (USG) findings was found statistically significant. (Table 2)

Table 3: Distribution of study population according to personal history (n=362)

Variables		No PCOS	PCOS	Total	p value
Sleep Duration (hrs)	≤ 6	146 (82)	32 (18)	178	0.252
	> 6	159 (86.4)	25 (13.6)	184	
Exercise	No	154 (88)	21 (12)	175	0.058
	Yes	151 (80.7)	36 (19.3)	187	
Scale of Stress	Low	66 (88)	9 (12)	75	0.257
	Moderate	198 (84.6)	36 (15.4)	234	
	High	41 (77.4)	12 (22.6)	53	
Body Mass Index (BMI) (Kg/m^2)	Underweight (<18)	43 (93.5)	3 (6.5)	46	0.048
	Normal (18-22.9)	193 (85)	34 (15)	227	
	Overweight (>23)	69 (77.5)	20 (22.5)	89	
	Mean	21.05±2.86	22.30±3.25		0.003
Menstrual Irregularity	No	286 (93.8)	19 (6.2)	305	<0.001
	Yes	19 (33.3)	38 (66.7)	57	

Prevalence of PCOS was slightly higher in participants with less sleep duration and those who do some physical activity. Majority of the study population had moderate stress level and a small proportion had high stress level. Prevalence of PCOS was maximum in high scale of stress and least in low stress scale. Majority of the population had normal BMI followed by overweight category and then by underweight. Prevalence of PCOS was maximum in normal BMI and least in underweight. About 2/3rd of participants (66.7%) who had menstrual irregularities, also had PCOS. This difference in occurrence of PCOS in relation to BMI and menstrual irregularity was statistically significant. (Table 3)

Discussion

PCOS among young women is an emerging problem that needs careful assessment, timely intervention and appropriate treatment. In the present study, prevalence of PCOS among study subjects was 15.74% by Rotterdam criteria. Desai et al in their school-based study in adolescent girls in Ahmedabad found the prevalence as 13.54% which was almost similar to the results of the present study.[16] The prevalence of PCOS was found 21.05% in a study conducted in Mumbai[13] which is higher as compared to present study. Previous Indian studies reported a prevalence of 8.1%[17] in a study done in south India and 10.97% in a study done in Andhra Pradesh.[18] This difference in prevalence may be due to different geographic areas, use of different diagnostic criteria and socio-cultural factors.

A significant proportion of females had a positive family history of PCOS in the PCOS group, similar finding was reported by Vishnubhotla et al[19] in their study. This point toward the likely role of genetic factors in the pathogenesis of the disease and all females with a known family history have to be routinely screened for the symptoms of the disease and aggressively counselled.

In the present study prevalence of PCOS was higher (50%) among those having raised values of testosterone and DHEAS, this finding was in consistent with the study done by Joshi B et al in Mumbai in which the hormonal levels were significantly higher among PCOS cases.[11]

Yildiz et al in their study found that Weight gain and body fat are strongly associated with PCOS, and obesity is well known to worsen the severity of this disorder.[20] Also, with every unit increase in BMI, the risk of getting PCOS increases by 9%.[21] During the past decades, the increasing prevalence of PCOS in adolescents has coincided with the rise in obesity, similar to adults.[22] The prevalence of overweight and obesity in PCOS girls were higher than non-PCOS girls in the present study which was similar with other study report.[23] Thus, there is significant correlation between obesity and PCOS.

In this study it was found that about two third of girls with PCOS were having menstrual irregularity as compared to normal girls which coincide with findings of the study done in Mumbai among medical students which reported higher menstrual irregularities among PCOS students than normal.[13]

This study has several merits. Firstly, it is one of the few that reports the prevalence of PCOS in teenage girls and young women, as most studies only cover women in the reproductive age group. The use of ultrasonography and biochemical markers in the diagnosis of PCOS is another strength. To sum up, the reports' correctness and consistency were improved since a single laboratory technician conducted all of the studies in a single lab.

Conclusion

According to the present study, PCOS is an emerging disorder that has been linked to a number of health issues, including obesity, anovulation and irregular menstruation—all of which were frequent endocrine abnormalities among teenage females. Important risk factors for PCOS included a family history of the condition, hyperandrogenism and hypothyroidism. Health care professionals and teenage girls need to be more aware of early PCOS diagnosis and treatments as they may offer the chance to cure the condition and avert further complications. Girls who are overweight or obese should receive special attention since they have a higher risk of PCOS, which may be treated with a change in lifestyle. Therefore, there is an immediate need to raise public awareness of the requirement of changing one's lifestyle to lose weight, as well as the need of early detection and treatment to avoid long-term problems.

Recommendations:

Age-related increases in PCOS prevalence and symptoms highlight the necessity for a multidisciplinary approach to early detection of this condition. To effectively treat PCOS patients, a long-term individualized care approach comprising evidence-based practice from a team of dermatologists, appropriate referral to doctors and endocrinologists and counselling from obstetricians and gynaecologists is necessary. This plan can help with menstrual cycle regulation, acne and hirsutism treatment, PCOS-related dermatological concerns, reducing obesity and the risk of various metabolic consequences and addressing quality of life difficulties associated with the syndrome.

Ethical Consideration: The Institutional Ethics Committee of the institute approved the study (Registration number- BPSGMCW/RC763/IEC/22 dated16/8/2022)

Conflict of interest: Nil

Source of funding: Nil

References

1. Sharma M, Khapre M, Saxena V et al. Polycystic ovary syndromeamong Indian adolescent girls – a systematic review and metanalysis. Nepal J Epidemiol 2021; 11: 1063–1075.
2. Umland EM, Weinstein LC, Buchanan EM. Menstruation-related disorders. In: DiPiro JT, Talbert RL, Yee GC, et al., editors. Pharmacotherapy: A Pathophysiologic Approach. 8th ed. New York: McGraw-Hill; 2011. p. 1393.
3. Ndefo UA, Eaton A, Pharm D, Green MR. Polycystic ovary syndrome: A review of treatment options with a focus on pharmacological approaches. P T. 2013;38:336–355
4. Diamanti-Kandarakis E, Kouli CR, Bergiele AT, Filandra FA, Tsianateli TC, Spina GG, et al. A survey of the polycystic ovary syndrome in the Greek island of Lesbos: Hormonal and metabolic profile. J Clin Endocrinol Metab1999;84:4006-11.
5. Michelmore KF, Balen AH, Dunger DB, Vessey MP. Polycystic ovaries and associated clinical and biochemical features in young women. Clin Endocrinol (Oxf) 1999;51:779-86.
6. Asuncion M, Calvo RM, San Millan JL, Sancho J, Avila S, Escobar-Morreale HF. A prospective study of the prevalence of the polycystic ovary syndrome in unselected Caucasian women from Spain. J Clin Endocrinol Metab2000;85:2434-8.
7. Chen X, Yang D, Mo Y, Li L, Chen Y, Huang Y. Prevalence of polycystic ovary syndrome in unselected women from southern China. Eur J ObstetGynecolReprodBiol2008;139:59-64.
8. Li R, Zhang Q, Yang D, Li S, Lu S, Wu X, et al. Prevalence of polycystic ovary syndrome in women in China: A large community-based study. Hum Reprod2013;28:2562-9.
9. Kumarapeli V, Seneviratne R de A, Wijeyaratne CN, Yapa RM., Dodampahala SH. A simple screening approach for assessing community prevalence and phenotypes of polycystic ovary syndrome in semiurban population in Srilanka. Am J Epidemiol2008;168:321-7.
10. Gupta M SD, Toppo M, Priya A, Sethia S, Gupta P. A cross sectional study of polycystic ovarian syndrome among young women in Bhopal, Central India. Int J Community Med Public Health 2018;5:95-100.
11. Joshi B, Mukherjee S, Patil A, Purandare A, Chauhan S, Vaidya R. A cross-sectional study of polycystic ovarian syndrome among adolescent and young girls in Mumbai, India. Indian J Endocrinol Metab2014;18:317-24.
12. Deswal R, Nanda S, Ghalaut VS, Roy PS, Dang AS. Cross-sectional study of the prevalence of polycystic ovary syndrome in rural and urban populations. International Journal of Gynecology& Obstetrics. 2019 Sep;146(3):370-9.
13. Aggarwal M, Yadav P, Badhe S, Deolekar P. A cross sectional study on prevalence of PCOS and risk factors associated with it among medical students. Indian J ObstetGynecol Res 2019;6(4):522-6.
14. Rotterdam ESHRE/ASRM-Sponsored PCOS consensus workshop group. Revised 2003 consensus on diagnostic criteria and long-term health risks related to polycystic ovary syndrome (PCOS). Hum Reprod 2004; 19: 41–47
15. Azziz R, Carmina E, Dewailly D et al. Androgen excess society. Positions statement: criteria for defining polycystic ovary syndrome as a predominantly hyperandrogenic syndrome: an androgen excess society guideline. J Clin Endocrinol Metab 2006; 91: 4237–4245

16. Desai NA, Tiwari RY, Patel SS. Prevalence of polycystic ovary syndrome and its associated risk factors among adolescent and young girls in Ahmedabad region. Indian Journal of Pharmacy Practice. 2018;11(3).

17. Joseph N, Reddy A, Joy D, Patel V, Santhosh P, Das S. Study on the proportion and determinants of polycystic ovarian syndrome among health sciences students in South India. J Nat Sci Biol Med . 2016;7(2):166–72.

18. Nidhi R, Padmalatha V, Nagarathna R, Amritanshu R. Prevalence of Polycystic Ovarian Syndrome in Indian Adolescents. Journal of Pediatric and Adolescent Gynecology. 2011;24(4):223-7

19. Vishnubhotla DS, Tenali SN, Fernandez M, Madireddi S. Evaluation of Prevalence of PCOS and Associated Depression, Nutrition, and Family History: A Questionnaire-based Assessment. Indian Journal of Endocrinology and Metabolism. 2022 Jul 1;26(4):341-7.

20. Yildiz BO, Bozdag G, Yapici Z, Esinler I, Yarali H. Prevalence, phenotype and cardiometabolic risk of polycystic ovary syndrome under different diagnostic criteria. Hum Reprod2012; 27:3067-73.

21. Teede HJ, Joham AE, Paul E, Moran LJ, Loxton D, Jolley D, et al. Longitudinal weight gain in women identified with polycystic ovary syndrome: Results of an observational study in young women. Obesity (Silver Spring) 2013; 21:1526-32.

22. Hedley AA, Ogden CL, Johnson CL, Carroll MD, Curtin LR, Flegal KM. Prevalence of overweight and obesity among US children, adolescents, and adults, 1999-2002. JAMA. 2004;291(23):2847-50.

23. Ben SHL, Ben SHS, Bouzid C, Younsi N, Smida H, Bouguerra R, et al. Hypertension in polycystic ovary syndrome. Arch Mal Coeur Vaiss. 2006;99(7-8): 687-90.