JRMI
Journal of Rehman Medical Institute

Volume 10, No. 3
July - September 2024
www.jrmi.pk

ORIGINAL ARTICLE

Polycystic Ovary Syndrome trends: clinical features and associated risk factors among adolescent students

Kumayl Abbas Meghji, Sadia Kazi, Tahreem Farooq Tunio, Seerat Hameem, Yousra Arshad Khanzada, Saviya Mamnoon

Submitted
May 16, 2024
Accepted
July 07, 2024

Author Information

From: Isra University, Hyderabad, Sindh, Pakistan

Dr. Kumayl Abbas Meghji
Assistant Professor
Department of Physiology, (Corresponding Author)
Email: Dr.kumaylabbas@gmail.com

Dr. Sadia Kazi
Associate Professor
Department of Pharmacology

Ms. Tahreem Farooq Tunio
Medical Student

Ms. Seerat Hameem
Medical Student

Ms. Yousra Arshad Khanzada
Medical Student

Ms. Saviya Mamnoon
Medical Student

Citation: Meghji KA, Kazi S, Tunio TF, Hameen S, Khanzada YA, Mamnoon S. Polycystic Ovary Syndrome trends: clinical features and associated risk factors among adolescent students. J Rehman Med Inst. 2024 Jul-Sep;10(3):21-5.

ABSTRACT

Introduction: Polycystic ovary syndrome (PCOS), a multifaceted medical condition, presents with menstrual and metabolic irregularities along with infertility. Although its incidence varies, affecting millions of women, adolescents are most susceptible.

Objective: To assess the clinical characteristics and associated risk factors among female medical students with PCOS in Hyderabad, Sindh.

Materials & Methods: This cross-sectional study was conducted from October 2023 to April 2024, in which a simple random sampling strategy was implemented for selecting female medical students. A total of 185 female students enrolled in first through fifth-year MBBS programs, aged 19 to 24 years were considered. Rotterdam's criteria confirmed the diagnosis of the condition. Statistical analysis was conducted using SPSS version 22, with $p \leq 0.05$ indicating significance.

Results: The mean age of participants was 22.6±2.34 years; PCOS was present in 37.3% students, among whom 31.7% had been coping with the condition for over three years. Participants aged 22–24 years had a higher prevalence of PCOS (59.4%). Menstrual irregularities were noted in almost 40% of participants. The difference in the mean age of menarche, BMI, Waist-hip ratio, and hormonal levels was statistically significant among participants with PCOS compared to those without PCOS ($p<0.05$).

Conclusion: Adolescent females have a higher incidence of PCOS. Menstrual irregularities are the most typical clinical manifestation of PCOS, whereas the major risk factor is genetic susceptibility.

Keywords: Polycystic Ovary Syndrome; Adolescents, Female; Students, Medical; Menarche; Menstruation Disturbances; Infertility.

The authors declared no conflict of interest. All authors contributed substantially to the planning of research, data collection, data analysis, and write-up of the article, and agreed to be accountable for all aspects of the work.

INTRODUCTION

Polycystic ovary syndrome (PCOS) or Stein Leventhal syndrome is a major public health concern and has significant evolutionary insinuations for the reproduction and health of a female.[1] The core elemental glitch in PCOS is still uncharted. The syndrome presents with an amusing paradox that results in menstrual disturbances, perturbations of the metabolic system, endocrinopathy linked with the excess production of androgens (hirsutism and acne), impaired dynamics in gonadotropins production, insulin resistance, etc.[2]

It is also recognized as the leading cause of infertility and potential sub-fecundity among women accompanied by endometrial carcinoma, cardio-metabolic risk factors, late menopause, etc.[3-5]

The prevalence, onset, clinical manifestations, and severity of PCOS can vary across different ethnicities and cultures. Globally, an estimated 50 to 80 million women of reproductive age are affected by PCOS, with approximately 5 million premenopausal women reporting the condition annually in the United States alone. Studies have indicated significant variability in PCOS prevalence worldwide, ranging from 2.2 to 26%.[6,7] Adolescents are particularly susceptible to PCOS, with studies suggesting a prevalence rate of 5-10% among adolescents aged 10 to 19 years.[8]

Due to its mottled nature, it is more challenging to recognize this disorder in the early stages among adolescent girls. Even the key diagnostic factors in PCOS (hyperandrogenism and morphology of polycystic ovaries) may imbricate with the normal early pubertal stages among adolescent girls.[9] In the presence of these discrepancies, using routine diagnostic criteria for PCOS further raises concerns about misdiagnosing the syndrome in the adolescent age group.

Considering the long-term consequences of PCOS amalgamated by the social trepidations related to the nature of the problem, it is essential to evaluate its occurrence in young adults. Ironically, the cohort of female university students whose outreach is not only feasible, but they are going to

be the future mothers, that may seem healthy and not comprehend that they have PCOS. These females encounter glitches in conceiving after their marriage which then agitate their married life and drive them towards depression.[10] Moreover, a lack of evidence regarding the association of PCOS with other health factors, and the unavailability of proper diagnostic criteria may have a major effect on the occurrence of the problem among university students in Pakistan. Furthermore, due to the unavailability of any legitimate population-based study, meager data are available about the prevalence of the syndrome in the country. Therefore, the objective of the present study was to evaluate the risk factors and common clinical features existent among female medical students with polycystic ovary syndrome at Isra University, Hyderabad, Pakistan.

MATERIALS & METHODS

This cross-sectional study was carried out at the Isra University Hyderabad, Sindh, Pakistan, between October 2023 to April 2024. The female students were selected from the medical (MBBS) section of Isra University using a simple random sampling technique based on the list obtained from the human resource section of the university. Ethical approval was also obtained from the ethical review committee of the university. Using Open Epi version 7, a sample size of 185 was obtained.

All female students of undergraduate medical section (MBBS) between 19-25 years studying in the 1st to 5th year and willing to participate were included in the study. Students from other sections of the university, aged <19 or >25 years, and students who were pregnant during the study period were excluded. After explaining all the study objectives and required assessment, informed consent was obtained. The confidentiality of all the participants was highly upheld.

Using a pretested written questionnaire, sociodemographic information including age, marital status, medical history related to PCOS, treatment history for PCOS, use of any hormonal pills, family history of PCOS, age of menarche, etc., was collected.

Body mass index (BMI) was calculated in kg/m^2 according to the World Health Organization (WHO) guidelines and waist-hip ratio (WHR) by dividing the waist circumference by the hip circumference.

The status of the menstrual cycle i.e. normal (intervals between 21 to 35 days), oligomenorrhea, and polymenorrhea (i.e. intervals of greater than 35 days and less than 21 days) was also gathered. Presence of hirsutism and acne was assessed by modified Ferriman Gallwey (mFG method) for hirsutism and acne was confirmed using the Global Acne grading system.[11,12] Ultrasound assessment was also performed and PCOS was defined by the existence of at least >12 ovarian follicles (measured 2- 9mm in diameter) in at least one or both ovaries and the volume of >10cm^3 of at least one ovary.[13]

Baseline fasting blood samples for biochemical and hormonal analysis were collected during the follicular or preovulatory phase of the menstrual cycle (days 2–4) or randomly for individuals with amenorrhea.[14] The hormonal profiles were analyzed at the Isra University Hospital Diagnostic laboratory. The prevalence of PCOS was assessed using the Rotterdam criteria.[15]

RESULTS

The demographic characteristic of study participants is given in Table 1. The mean age of participants was 22.6 years.

Table 1: Demographic characteristics of participants (n=185).

Variables	n	(%)
Study Year		
First	27	14.6
Second	34	18.4
Third	45	24.3
Fourth	39	21.1
Fifth	40	21.6
Age Groups (years)		
19-21	78	42.0
22-24	107	58.0
Marital Status		
Married	21	11.3
Unmarried	164	88.6
Residence		
Urban	119	64.3
Rural	66	35.7

Table 2 demonstrates the medical history including menstrual cycle status, history of PCOS, family history, etc. of participants related to PCOS; 113(61.1%) students had normal menstrual cycles, while the remaining 72(38.9%) had some type of menstrual irregularities. Of note is that 105(56.7%) students reported a family history of PCOS.

Regarding other symptoms, 39(21.1%) reported complaints of increase in body weight, acne was the complaint of 21(11.35%) participants, while 50(27.01%) were having the problem of excessive hair growth in different parts of the body including face, underarms, etc. The remaining 75(40.54%) students had no such complaints.

Table 2: Medical history of participants related to PCOS (n=185).

Medical History	n	%
Menstrual cycle status		
Normal	113	61.1
Oligomenorrhea	53	28.6
Polymenorrhea	13	7.0
Amenorrhea	06	3.3
Previously diagnosed with PCOS		
Yes	29	15.7
No	143	77.3
Don't Know	13	7.0
Use of hormonal pills		
Yes	31	16.7
No	154	83.3
Family history of PCOS		
Yes	105	56.7
No	43	23.3
Don't Know	37	20.0

The presence of PCOS based on the Rotterdam Criteria is presented in Table 3. The most commonly found criteria was irregular menses/oligo/anovulation and hirsutism in 44(63.77%) of the 69 students having PCOS. Moreover, PCOS was more prevalent (59.4%) among students in their late adolescence (22-24 years).

Table 3: Prevalence of PCOS according to Rotterdam criteria (n=185).

PCOS variables	PCOS present (according to Rotterdam Criteria)
Irregular menses/oligo/anovulation and hirsutism	44
Irregular menses/oligo/anovulation and multiple cysts in the ovary	16
Hirsutism/acne and multiple cysts in the ovary	9
Total	69 (37.3%)

Table 4 compares the various relevant measures of students with PCOS to those without PCOS. There was a statistically significant difference ($p<0.05$) in the mean age of menarche, BMI, Hirsutism score, and WHR between participants diagnosed having PCOS in comparison with those without PCOS. On the other hand, students having PCOS had statistically significant ($p<0.05$) higher mean values of serum Luteinizing Hormone (LH) and Testosterone levels compared with a non-PCOS group.

Table 4: Differences in means and standard deviations of different variables between participants with and without PCOS (n=185).

Variables	Total	PCOS	No PCOS	p value
	Mean ± SD	Mean ± SD	Mean ± SD	
Age (years)	22.5 ± 0.7	22.3 ± 0.9	22.8 ± 2.1	0.06
Age of Menarche (years)	13.1 ± 1.4	12.9 ± 1.6	13.4 ± 1.3	0.02
Weight (Kg)	58.2 ± 11.5	59.1 ± 12.4	57.4 ± 11.7	0.35
Height (cm)	162.6 ± 6.24	162.7 ± 6.17	162.5 ± 6.26	0.83
BMI (Kg/m^2)	20.2 ± 2.1	21.6 ± 3.6	18.9 ± 3.1	0.0001
Hirsutism Score	8.0 ± 5.4	10.4 ± 6.2	5.6 ± 5.1	0.0001
Waist Hip Ratio (WHR)	0.8 ± 0.02	0.9 ± 0.03	0.8 ± 0.2	0.0001
FSH (mIU/mL)	4.1 ± 1.5	3.9 ± 1.2	4.3 ± 1.5	0.06
LH (mIU/mL)	7.4 ± 2.9	8.6 ± 6.5	6.2 ± 2.6	0.0006
Testosterone (ng/mL)	0.4 ± 0.1	0.49 ± 0.2	0.31 ± 0.1	0.0001

DISCUSSION

The adolescent phase of life is the time when multiple anatomical, physiological, and psychological changes occur in the life of a female.[16] Due to cultural, societal, and familial restrictions, the majority of adolescent girls are not able to share their problems and are unable to get appropriate advice for their menstrual cycle-related problems. PCOS is among these problems that are of serious concern among adolescent girls worldwide and needs to be diagnosed at the early stage of life with cautious assessment, well-timed intervention, and appropriate treatment.[17] To our knowledge, this is the first study in Pakistan that was designed with the objective of estimating the prevalence of PCOS and elucidating the associated risk factors and common clinical features existent among young female university students.

The presence of PCOS among adolescent girls in the present study was 15.4%, which increased to 37.3% when the undiagnosed cases having documented symptoms qualify for the diagnosis of PCOS according to the Rotterdam criteria were encompassed. Naz et al.,[18] in a meta-analysis, reported PCOS prevalence rates of 15.2%, 26.4%, and 33.8% in Iran, Brazil, and Qatar respectively. Sharma et al.,[19] reported a prevalence rate of 17.74% among Indian adolescent women using the Rotterdam criteria. Dashti et al.,[20] reported a prevalence rate of 12.6% in Malaysia, while Aldossray et al.,[21] reported a 16% prevalence of PCOS among female university student si Saudi Arabia using the same criteria. A study by Lei et al.,[22] reported a 2.99% prevalence of PCOS among female college students in Fuzhou City, China. Studies from India have reported the prevalence of PCOS (from 12% to 17.33%) among adolescents.[23,24] This significant variation in the prevalence of PCOS in the present study and other studies may be due to the process of participant recruitment as well as the definition and consensus on diagnostic criteria.

In the present study, it has been observed that PCOS was more prevalent (59.4%) among the participants in their late adolescence (22-24 years). A study similar to the present study by Laddad MM et al.,[25] reported that PCOS was more prevalent in late adolescence i.e. 73.07%.

Studies have reported that there is a significant relationship between familial history and occurrence of PCOS i.e. 22% to 40% of premenopausal women with a first-degree relative having PCOS also exhibit PCOS in some stage of life.[26] The present study also instituted that 56.7% of participants have a positive family history of PCOS. This demonstrates the tendency of genetic predisposition in PCOS.

Menstrual disturbances and hirsutism are the main matters of concern for adolescents that reduce their quality of life.[27] Menstrual disturbances were also the most commonly reported problem among the participants having PCOS in the present

study. As 38.9% of participants were suffering from menstrual disturbances of which the prevalence of oligomenorrhea was 28.6%, polymenorrhea (7%), and amenorrhea (3.3%). A total of 27.01% of participants were having problems with hirsutism in the present study.

Maslyanskaya S et al.,[28] reported that abnormalities in the menstrual cycle were the most common problem among adolescents with PCOS. Oliveira et al.,[29] on the other hand, reported that due to the exceptionally high occurrence of hirsutism in PCOS, hirsutism itself could be a marker for PCOS complications.

The present study found that a large number of young medical students were suffering from PCOS. Except for some, the majority of them did not even know that they were suffering from this syndrome. Most of them had menstrual irregularity issues as the major clinical problem while some had a history of PCOS in their families.

Genetic predisposition, indicated by a positive family history of PCOS, was found to be a significant risk factor. This aligns with previous studies that have shown a familial tendency for PCOS, suggesting a genetic component to the syndrome. In our study, 56.7% of participants reported a family history of PCOS, which correlates well with the multi-gene involvement postulated for the syndrome.[30]

The mean BMI (21.6 ± 3.6) and WHR (10.4 ± 6.2) of PCOS group participants in the present study was higher in comparison to the non-PCOS group ($p<0.05$). Similar findings were reported by Laddad et al.;[25] Joseph N et al.,[31] also reported significantly higher BMI and WHR of their participants having PCOS.

LIMITATIONS

The sampling frame, though identifying adolescents with PCOS, limits the generalization as the study included females from one medical institution in the city. Additionally, the cross-sectional nature of the study limits the ability to establish causal relationships between risk factors, such as positive family history, and the occurrence of PCOS.

CONCLUSION

The presence of PCOS is notably high among adolescent university students in Hyderabad, Pakistan, with a significant proportion of undiagnosed cases. Genetic predisposition, indicated by a positive family history, emerged as a main risk factor.

RECOMMENDATIONS

Menstrual disturbances were the most common clinical feature, highlighting the need for early diagnosis, intervention strategies, and increased awareness and education regarding PCOS among young women in university settings.

REFERENCES

1. Memon TF, Meghji KA, Rajar AB, Khowaja S, Azam A, Khatoon S. Clinical, hormonal and metabolic factors associated with polycystic ovary syndrome among Pakistani women. Rawal Med J. 2020;45(4):817-21.
2. Di Lorenzo M, Cacciapuoti N, Lonardo M, Nasti G, Gautiero C, Belfiore A, et al. Pathophysiology and nutritional approaches in polycystic ovary syndrome (PCOS): a comprehensive review. Curr Nutr Rep. 2023;12(3):527-44.
3. Cunha A, Póvoa AM. Infertility management in women with polycystic ovary syndrome: a review. Porto Biomed J. 2021;6(1):e116.
4. Sanchez-Garrido MA, Tena-Sempere M. Metabolic dysfunction in polycystic ovary syndrome: Pathogenic role of androgen excess and potential therapeutic strategies. Mol Metabol. 2020;35:100937.
5. Sangaraju SL, Yepez D, Grandes XA, Manjunatha RT, Habib S. Cardio-metabolic disease and polycystic ovarian syndrome (PCOS): a narrative review. Cureus. 2022 May 17;14(5):e25076. doi: 10.7759/cureus.25076.
6. Safiri S, Noori M, Nejadghaderi SA, Karamzad N, Carson-Chahhoud K, Sullman MJM, et al. Prevalence, incidence and years lived with disability due to polycystic ovary syndrome in 204 countries and territories, 1990–2019. Human Reprod. 2022;37(8):1919-31.
7. Salari N, Nankali A, Ghanbari A, Jafarpour S, Ghasemi H, Dokaneheifard S, et al. Global prevalence of polycystic ovary syndrome in women worldwide: a comprehensive systematic review and meta-analysis. Arch Gynecol Obstet. 2024 Sep;310(3):1303-1314. doi: 10.1007/s00404-024-07607-x.
8. Capozzi A, Scambia G, Lello S. Polycystic ovary syndrome (PCOS) and adolescence: How can we manage it? Eur J Obstet Gynecol Reprod Biol. 2020;250:235-40.
9. Kostopoulou E, Anagnostis P, Bosdou JK, Spiliotis BE, Goulis DG. Polycystic ovary syndrome in adolescents: pitfalls in diagnosis and management. Curr Obes Rep. 2020;9:193-203.
10. Kolhe JV, Chhipa AS, Butani S, Chavda V, Patel SS. PCOS and depression: common links and potential targets. Reprod Sci. 2022 Nov;29(11):3106-23. doi: 10.1007/s43032-021-00765-2..
11. Kahraman FC, Erdoğan SS. Grading of hirsutism: a practical approach to the modified Ferriman-Gallwey scoring system. Postepy Dermatol Alergol. 2022 Aug;39(4):744-8. doi: 10.5114/ada.2021.108455
12. Bae IH, Kwak JH, Na CH, Kim MS, Shin BS, Choi H. A Comprehensive Review of the Acne Grading Scale in 2023. Ann Dermatol. 2024 Apr;36(2):65-73. doi: 10.5021/ad.23.094.
13. Senyuva I, Turan CO, Yuksel GY, Senturk S. Superb microvascular imaging Doppler technique in the evaluation of ovarian stromal vascularity in women with polycystic ovary syndrome. JPMA. 2023;73(10):1992-6.
14. Li X, Yang D, Pan P, Azziz R, Yang D, Cheng Y, et al. The degree of menstrual disturbance is associated with the severity of insulin resistance in PCOS. Front Endocrinol (Lausanne). 2022 Jun 13;13:873726. doi: 10.3389/fendo.2022.87372.
15. Kim JJ, Hwang KR, Lee D, Kim S, Choi YM. Adolescents diagnosed with polycystic ovary syndrome under the Rotterdam criteria but not meeting the diagnosis under the updated guideline. Human Reprod. 2024;39(5):1072-7.
16. Hegde A, Chandran S, Pattnaik JI. Understanding adolescent sexuality: a developmental perspective. J Psychosexual Health. 2022;4(4):237-42.
17. Tehrani FR, Amiri M. Polycystic ovary syndrome in adolescents: challenges in diagnosis and treatment. Int J Endocrinol Metabol. 2019 Jul 27;17(3):e91554. doi: 10.5812/ijem.91554.

18. Naz MSG, Tehrani FR, Majd HA, Ahmadi F, Ozgoli G, Fakari FR, et al. The prevalence of polycystic ovary syndrome in adolescents: a systematic review and meta-analysis. Int J Reprod Biomed. 2019 Sep 3;17(8):533-42. doi: 10.18502/ijrm.v17i8.4818.
19. Sharma M, Khapre M, Saxena V, Kaushal P. Polycystic ovary syndrome among Indian adolescent girls - a systematic review and metanalysis. Nepal J Epidemiol. 2021;11(3):1063-75.
20. Dashti S, Latiff LA, Hamid HA, Saini SM, Bakar ASA, Sabri NAIB, et al. Prevalence of Polycystic Ovary Syndrome among Malaysian female university staff. J Midwifery Reprod Health. 2019;7(1).
21. Aldossary K, Alotaibi A, Alkhaldi K, Alharbi R. Prevalence of polycystic ovary syndrome, and relationship with obesity/overweight: cross-sectional study in Saudi Arabia. J Adv Pharm Educ Res. 2020;10(1-2020):186-90.
22. Lei L, Yao X, Fu J, Lyu J, Liu C, Wu L, et al. Prevalence and influencing factors analysis of the polycystic ovary syndrome among female college students in Fuzhou City, Jiangxi Province. Shanghai J Preventive Med. 2024;36(2):163-7.
23. Shringarpure K, Baxi R, Sheth M, Patel P, Parmar V, Baxi S. Polycystic Ovarian Syndrome among young women of a university in central Gujarat – a cross-sectional Study. Indian J Public Health. 2023;67(4):575-81.
24. Laddad MM, Kshirsagar NS, Shinde GP, Shivade VS. Study of prevalence and determinants of polycystic ovarian syndrome among adolescent girls in rural area: a prospective study. Int J Reprod Contracep Obstet Gynecol. 2019;8(8):3135-40.
25. Laddad MM, Kshirsagar NS, Shinde G, Shivade VS. Contribution of weight gain and its association with insulin resistance and dyslipidaemia in rural adolescents in polycystic ovarian syndrome-a prospective cross-sectional study. J. Evolution Med. Dent. Sci. 2019;8(31):2452-5. doi: 10.14260/jemds/2019/535.
26. Memon TF, Channar M, Shah SAW, Shaikh A. Polycystic ovary syndrome: risk factors and associated features among university students in Pakistan. JPUMHS. 2020;10(1):22-9.
27. Wilson NA, Peña AS. Quality of life in adolescent girls with polycystic ovary syndrome. J Ped Child Health. 2020;56(9):1351-7.
28. Maslyanskaya S, Talib HJ, Northridge JL, Jacobs AM, Coble C, Coupey SM. Polycystic ovary syndrome: an under-recognized cause of abnormal uterine bleeding in adolescents admitted to a children's hospital. J Ped Adolesc Gynecol. 2017;30(3):349-55.
29. Oliveira TF, Comim FV. Understanding hirsutism in PCOS. Expert Rev Endocrinol Metabol. 2024;19(2):103-10.
30. Piri-Gharaghie T. Polycystic ovary syndrome and genetic factors influencing its development: a review article. Personalized Med J. 2021;6(23):25-9.
31. Joseph N, Reddy AG, Joy D, Patel V, Santhosh P, Das S, et al. Study on the proportion and determinants of polycystic ovarian syndrome among health sciences students in South India. J Nat Sci Biol Med. 2016 Jul-Dec;7(2):166-72. doi: 10.4103/0976-9668.184704.