POLYCYSTIC OVARY SYNDROME: RISK FACTORS AND ASSOCIATED FEATURES AMONG UNIVERSITY STUDENTS IN PAKISTAN

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ABSTRACT

Objective: To evaluate the risk factors and common clinical features existent among the female students with polycystic ovary syndrome at ISRA University, Hyderabad, Pakistan. **Methods:** Cross-sectional study was carried out at the ISRA University Hyderabad, Sindh, Pakistan between February 2019 and July 2019. The female students from the medical section were selected using a simple random sampling technique. All-female students between 19 to 24 years studying in (1st to 5th-year MBBS) were included. While those students studying in other departments (other than MBBS) were excluded. Ethical approval was sought from the ethical review committee of the university. Rotterdam's criterion was used for the confirmation of the diagnosis of the syndrome. SPSS version 22 was used for the statistical analysis of the data. The level of p-values <0.05 was considered to be statistically significant. **Results:** Around 40% of participants reported to have menstrual disturbances. The majority (31.7%) of them had been dealing with the syndrome for more than three years. PCOS was prevalent among 37.3% of study participants. PCOS was more prevalent (59.4%) among participants in their late adolescence (22-24 years). A statistically significant difference (p-value <0.05) in mean age of menarche, BMI, Hirsutism score and WHR between participants diagnosed having PCOS in comparison with those without PCOS. **Conclusion:** The prevalence of PCOS is high among adolescent female. Genetic predisposition is the main risk factor (positive family history of PCOS while menstrual disturbances are the most frequent clinical feature.

Keywords: Adolescents, Menstrual Disturbances, PCOS, Risk Factors

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INTRODUCTION:

Polycystic ovary syndrome (PCOS) is a major public health concern and has significant evolutionary insinuations for 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 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]

Prevalence of PCOS, its onset, clinical presentation, and severity may vary in different nationalities, ethnic and cultural groups. Globally around 50 to 80 million (one in ten) women in fertile age are affected with PCOS. In the United States of America (USA) alone, approximately 5 million women in premenopausal age reported having PCOS every year. Studies have reported high variability in the prevalence of PCOS worldwide, ranging from 2.2 to 26%.[2-5]

Why adolescents?

Adolescents are known to be the primary sufferers of PCOS. Studies have reported the prevalence of confirmed diagnosis of PCOS in adolescents aged 10 to 19 years was 5-10% reported by the studies.[5] Due to its mottled nature, it is more challenging to recognize this disorder in 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.[6]

In the presence of these discrepancies, using routine diagnostic criteria for PCOS further raises concerns for misdiagnosing the syndrome in the adolescent age group.[7]

Considering the long term consequences of PCOS amalgamate by the social trepidations related to the nature of the problem, it is essential to evaluate its occurrence in young adults.[2, 8, 9] 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.[3] 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, 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 is 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 the female students with polycystic ovary syndrome at ISRA University, Hyderabad, Pakistan.

MATERIAL AND METHODS:

A Cross-sectional study was carried out at the Isra University Hyderabad, Sindh, Pakistan Department between February and July 2019. 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, the sample size of 185 was obtained.

All female students of undergraduate medical section (MBBS) between 19-25 years studying in (1st-5th year) and willing to participate were included in the study. While students from other sections of university, age <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 include; 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. While status of 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. Body mass index (BMI) was calculated in kg/m^{2}according to the World Health Organization (WHO) guidelines [11]and waist-hip ratio (WHR) was resolute by dividing the waist circumference by the hip circumference. 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.[4, 12]

Ultrasound assessment was also performed and PCOS was defined by the existence of at least $\geq$ 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]

Rotterdam's criterion (RC) was used for the diagnosis of PCOS. According to the RC, at least two out of three conditions (after excluding other etiologies) i.e. clinical and/or hyperandrogenism, amenorrhea or oligo-menorrhea and appearance of single or multiple cysts on ultrasonography is confirmatory of having PCOS.[14]

Blood samples were collected for the analysis of levels of follicle-stimulating hormone (FSH), Luteinizing Hormone (LH) and Testosterone levels of all participants.

SPSS (SPSS, Inc., Chicago, IL, USA) version 22 was used for the statistical analysis of the data. All descriptive data were stated as means ± SD while demographic and medical history variables were articulated in frequencies and percentages. The student's t-test was used for the analysis of the significance of difference in the variables between participants with or without PCOS. The level of p values <0.05 was considered to be statistically significant.

RESULTS:

The demographic characteristic of study participants is given in table 1. The mean age of participants was 22.6 years. While table 2 is demonstrating the medical history including menstrual cycle status, history of PCOS, family history etc. of participants related to PCOS.

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

	n	(%)
Study Year		
• 1st year	27	14.6%
• 2nd year	34	18.4%
• 3rd year	45	24.3%
• 4th year	39	21.1%
• 5th year	40	21.6%
Age		
• 19-21 years	78	42.0%
• 22-24 years	107	58.0%
Marital Status		
• Married	21	11.3%
• Unmarried	164	88.6%
Living area		
• Urban	119	64.3%
• Rural	66	35.7%

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

	n	%
Menstrual cycle status		
• Normal	113	61.1%
• Oligo-menorrhea	53	28.6%
• Poly-menorrhea	13	7%
• Amenorrhea	06	3.3%
Previously diagnosed with PCOS		
• Yes	29	15.7%
• No	143	77.3%
• Don't Know	13	7%
Use of hormonal pills		
• Yes	31	16.7%
• No	154	83.3%
Family history of PCOS		
• Yes	43	23.3%
• No	105	56.7%
• Don't Know	37	20%

Among the study participants, total 59 participants were reported having menstrual irregularity problem, 39 reported to have complaints of increase in body weight, acne was the compliant of 21 participants while 50 were having problem of excessive hair growth in different parts of the body including face, underarms etc. Prevalence of PCOS based on the Rotterdam criteria is presenting in table 3. PCOS was more prevalent (59.4%) among participants in their late adolescence (22-24 years).

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

PCOS variables	PCOS present (according to RC)
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%)

There was a statistically significant difference (p-value < 0.05) in the mean age of menarche, BMI, Hirsutism score and WHR between participants diagnosed having PCOS in comparison with those without PCOS. While the study participants having PCOS had statistically significant (p-value <0.05) higher mean values of serum LH and testosterone levels compared with a non-PCOS group (table 4)

Table4: Differences in means and standard deviations of different variables between participants with and without PCOS

	Total Mean±SD	PCOS Mean±SD	No PCOS Mean±SD	P-value
Age	22.5±0.7	22.3± 0.9	22.8±2.1	0.06
Age of Menarche	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**

* Significant difference (<0.05)

** Highly significant difference (<0.001)

DISCUSSION:

Different changes occur in human body with the passage of time, the adolescent phase of life is the time when multiple anatomical, physiological and psychological changes occur in the life of a female.[1] Due to cultural, societal and familial restrictions, the majority of adolescent girls do not able to share their problems and unable to get appropriate advice for their menstrual cycle-related problems.[3] PCOS is amongst these problems that are of serious concern and a challenge among the adolescent girls worldwide that need to be diagnosed at the early stage of life with cautious assessment, well-timed intervention and apposite treatment.[11] To our knowledge, this is the first study in Pakistan that study was designed with the objectives not only estimating the prevalence of PCOS but also to elucidate the associated risk factors and common clinical features existent among young female university students.

The prevalence 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. Using similar diagnostic criteria, 15.2% prevalence was reported in a study by an Iranian researcher Lizneva et al. While Joshi et al. reported the 22.5% prevalence of PCOS using the same criteria.[15] Another study by Ybarra et. al. on Brazilian adolescents,

demonstrated the prevalence (26.4%) of PCOS using Rotterdam criteria. [4, 16]

A study by Sharif et al. reported an 18.3% prevalence of PCOS in their study participants, while other studies from Qatar and Palestine reported PCOS prevalence 11.7% and 48% respectively.[17, 18] While studies from India have reported the prevalence of PCOS (from 2.7% to 36%) among adolescents.[7, 19] This significant variation in the prevalence of PCOS in the present study and other studies may be due to the process of participant's recruitment as well as 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). In a study similar to the present study by Laddad M.M et al. reported that PCOS was more prevalent in late adolescence i.e. 73.07%. [20]

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.[21] Present study also instituted that 23% 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 matter of concern for the adolescents that reduce their quality of life. [22] Menstrual disturbances were also the most commonly reported problem among the participants having PCOS in the present study. As 40.5% participants were suffering from menstrual disturbances of which the prevalence of oligo-menorrhea was 28.6%, poly-menorrhea (7%) and amenorrhea (3.3%). Total 26% of participants were having problems of hirsutism in the present study. Maslyanskaya S. et al. reported that abnormalities in menstrual cycle were the most common problem among adolescents with PCOS.[23] While Hashemipour et al.has an estimated prevalence of hirsutism and disorder related to menstrual cycles was 13% and 1.5%, respectively.[24] However, a meta-analytic study reported the prevalence of hirsutism (18%) and oligo-menorrhea (79%) among their study participants.[25]

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

The mean BMI (21.6±3.6) and WHR (10.4±6.2) of PCOS group participants in the present study i.e. higher BMI and WHR in comparison with the non-PCOS group (p-value < 0.05). Similar findings reported by Laddad et al., Joseph N. et al and Joshi B. et al reported significantly higher BMI and WHR of their participants having PCOS.[15, 20, 26]

The sampling frame limits the generalization as our study included girls from one medical institution of the city. Confining the age range of participants to 19-24 years reflecting the prevalence of PCOS among adolescents which is the strength of the present study.

CONCLUSION:

The findings of the current study conclude that the prevalence of PCOS is high among adolescent university students in Hyderabad, Pakistan. Genetic predisposition is the main risk factor while menstrual disturbances are the most frequent clinical feature extant among the university adolescents.

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