Prevalence and Risk Factors of Polycystic Ovary Syndrome (PCOS) among Medical Students of a Private Medical College in Lahore

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ABSTRACT

Background: Polycystic ovary syndrome (PCOS) is thought to be among the most frequent causes of infertility within the female population, affecting 4-18% of the women in reproductive age worldwide. The study environment, the challenges that medical students face are different from that of other professional degrees. The primary objective of this study was to determine the prevalence of polycystic ovary syndrome (PCOS) symptoms and secondary objective were to identify risk factors among medical students.

Subjects and methods: A cross sectional study was conducted on 289 medical students of CMH Lahore Medical College and Institute of Dentistry. The inclusion criteria were female students willing to participate and the exclusion criteria were female students unwilling to participate. Questionnaire based responses were obtained from 289 female students. Data was entered in SPSS version 27.0 and analyzed.

Results: It was observed that 8% females were known to have PCOS. There was a significant relation between PCOS and weight gain (p= 0.024), family history of PCOS (p= 0.039) and family history of hypertension (p= 0.018). A significant relation was noted between PCOS and irregular periods (p= 0.009), acne (p= 0.040) and excessive hair growth on the body (p=0.003).

Conclusion: PCOS was found to be prevalent. Weight, family history of PCOS and family history of hypertension were found to be the main risk factors whereas irregular periods, acne and hirsutism were the main clinical features observed.

Keywords:
Polycystic Ovary Syndrome, Medical students, Risk factors, Prevalence, Awareness

INTRODUCTION

Polycystic ovary syndrome (PCOS) is among the most frequent causes of infertility within the female population, affecting 4-18% of the women in reproductive age worldwide.[1] Higher incidence of PCOS has been observed in medical students resulting in increased number of visits to gynaecology department.[2] Some apparent manifestations of hyperandrogenism include obesity, increased subcutaneous and abdominal fat deposition, hirsutism, clitoris enlargement, deep voice, acne, and so on.[3] The etiology behind PCOS is unknown. However, hormonal imbalances are believed to play a significant part in this disease. Some other factors which may be responsible are having a first-degree relative with positive family history of PCOS, Cushing's syndrome, insulin resistance, CAH (congenital adrenal hyperplasia), thyroid gland dysfunction, androgen-secreting tumors, and poor lifestyle habits.[4] PCOS affects the harmony between female gonadal and pituitary hormonal profiles (FSH, LH). It places the utilization affected female at increased risk of developing infertility, anxiety, depressive disorders and altered glucose by the body. The long-term consequences include the development of endometrial tumors, hyperplasia, and cancer.[5] Polycystic Ovary Syndrome (POS) is classified by WHO as a group II Ovulation disorder (hypothalamic-pituitary-ovarian axis dysfunctions).[6]

Although there have been ample studies regarding PCOS and its prevalence among young females including university students, limited data on the same in medical students is available in indexed literature. The study environment and the challenges that medical students face are different from that of other professional degrees. The aims of this study were to evaluate the prevalence of PCOS and to identify its risk factors

SUBJECTS AND METHODS

A cross-sectional study was carried out to determine prevalence and risk factors of PCOS among medical students in CMH Lahore medical college & institute of dentistry, Lahore, Pakistan. The approval for research

was taken from CMH LMC Ethical Review Committee (vide number/ID: 692/ERC/CMH/LMC). The study was conducted among female medical students studying at CMH-LMC between February and March 2023. The calculated sample size was 289[2], having 95% confidence level and 6% margin of error. Inclusion criteria were female students who were willing to participate, and the exclusion criteria were students unwilling to participate. Female medical students of MBBS, BDS, Nursing and Allied health sciences were given questionnaires. Consent was obtained prior to the filling of forms. Pilot study was done for assessing the validity of the criteria to be applied. The reliability of the questionnaire was calculated by Cronbach alpha (reliability was 71%). Data was analyzed using SPSS version 27.0. Descriptive analysis of qualitative variables were calculated as frequency and percentages and quantitative variables as of mean and standard deviation. Chi square test of significance was applied to see significance of association between risk factors and PCOS. P-value < 0.05 was considered as statistically significant.

RESULTS

From a total of 289 participants 23(8%) had already been diagnosed with PCOS. Total 35 (12.1%) out of 289 participants weighed less than 45 kilograms (kg), 51(17.6%) weighed between 46 and 50 kg, 92(31.8%) weighed between 51 and 55 kg, 59(20.4%) weighed between 56 and 60 kg and 52(18%) weighed more than 60 kg.

Table 1: Demographic characteristics of study participants (N=289)

Characteristics	N	Percentage
Year of Study		
First Year	97	33.6
Second Year	62	21.5
Third Year	36	12.5
Fourth Year	54	18.7
Fifth Year	40	13.8
Discipline		
MBBS	124	42.9
BDS	58	20.1
Nursing	25	8.7
Allied Health Sciences	82	28.4
Age (years)		
<18	19	6.6
18-22	233	80.6
23-26	35	12.1
>26	2	0.7
Weight (kilograms)		
Less than 45	35	12.1
46-50	51	17.6
51-55	92	31.8
56-60	59	20.4
Greater than 60	52	18.0
PCOS	23	8

Table 2: Association of risk factors with PCOS (N=289)

Characteristics	Total	Diagnosed with PCOS	Percentage	p-value
Weight (kilograms)				
Less than 45	35	0	0	0.024
46-50	51	1	2	
51-55	92	10	10.9	
56-60	59	9	15.3	
Greater than 60	52	3	5.8	
Family history of PCOS	36	6	16.7	0.039
Family history of hypertension	158	18	11.4	0.018
Sign/Symptom				
Irregular periods	93	13	14	0.009
Acne	95	12	12.6	0.040
History of excessive hair growth on body	72	13	18.1	0.003

None of the participants weighing less than 45 kg were known to suffer from PCOS. One (2%) participant weighing between 46-50 kg had been diagnosed with PCOS, 10(10.9%) participants weighing between 51-55 kg had been diagnosed with PCOS, 9 (15.3%) participants with weight between 56-60 kg had been diagnosed with PCOS and 3 (5.8%) participants with weight more than 60 kg were suffering from PCOS (p= 0.024). Demographic characteristics of study participants are summarized in Table 1.

A total of 36 (12.5%) participants had a family history of PCOS out of which 6 (16.7%) participants had been diagnosed with PCOS (p=0.039). Family history of hypertension was reported in 158 (54.7%) participants, 18(11.4%) of which had been diagnosed with PCOS (p=0.018). Risk factors are summarized in Table 2.

Out of the total sample size 93 (32.2%) individuals were experiencing irregular periods, 13(14%) of these had been diagnosed with PCOS (p= 0.009). Among the study participants 95(32.9%) complained of acne, 12 (12.6%) of which had been diagnosed with PCOS. This relation was found to be significant (p= 0.040). Total 72 (24.9%) participants had a history of increased hair on their bodies. 13(18.1%) of these had been diagnosed with PCOS (p= 0.003).

DISCUSSION

With the increasing incidence of PCOS in society, women are facing distress due to infertility, hirsutism and other unpleasant signs and symptoms. In this study we aimed to look into the risk factors that may be contributing to PCOS and its progression among

female medical students of MBBS, BDS, Nursing and Allied Health Sciences of CMH Lahore Medical College.

The correlations between higher weight (p=0.024), those having positive family history for PCOS (p=0.039) and those experiencing irregular periods (p=0.009) were all found to be statistically significant in the study sample. Increasing weight leads to obesity. Obesity is found very commonly worldwide these days. In countries like the USA it is thought to be approximately 60-70%. Abdominal obesity has been linked to the majority of cases of PCOS.[7] Adipose tissue peripherally converts the estrogen to androgens via the enzyme aromatase. Increased levels of androgens then circulate leading to the clinical presentation witnessed in affected individuals.[7] A study concluded that when each phenotype's obese and lean participants were compared, obese patients of each primary phenotype (A, B, or C) had considerably (p= 0.01) higher levels of insulin, Homeostatic Model Assessment for Insulin Resistance (HOMA-IR), and triglyceride circulation levels and notably (p= 0.01) lower Anti Mullerian Hormone(AMH) and High Density Lipoprotein Cholesterol (HDL.C) circulating levels.[8] This supports results of this study as the relation with high weight is seen to be significant. Another study showed that acne and hirsutism were frequently seen in PCOS diagnosed females with high weight in comparison with average-weighing females and control participants. PCOS patients had a considerably higher number of ovarian-follicles organized peripherally and increased ovarian-volume on ultrasonography. When individuals were compared to controls, the LH: FSH ratio was considerably greater in these cases.[9] Genetic factors have been linked to the pathophysiology of PCOS and are believed to affect the PCOS phenotype in at least 10% of cases. Genome-wide association studies (GWAS) identify a number of chromosomal regions and potential gene alterations that are linked to the PCOS-carrying families.[10] One study has reported an increased risk [RR=1.07(CI:0.709-1.619)] of PCOS in participants with positive family as compared to those without.[11] Another study has also described the pathophysiology of various genes and how their mutations increase familial risk of PCOS.[12] These studies are in accordance to our study where a significant association is found between positive family history and PCOS (p= 0.039). Unhealthy lifestyle choices, increased intake of sugary rich food and processed carbohydrates have been linked to the increased prevalence of PCOS in an individual, but the

family history is yet to be proven.[13,14] However, present study has shown that family history of PCOS (p= 0.043) as well as diabetes (p= 0.003) are significantly associated with the increased consumption of fast food. The pathophysiology is yet to be proven but it can be assumed that families who are consuming fast food and other sugary, processed food over generations tend to develop PCOS. Positive history of diabetes mellitus in family has also been correlated to PCOS prevalence in many studies.[15] However this study has not shown any such significant correlation (p= 0.378). Polycystic ovarian syndrome (PCOS) has been linked to several serious metabolic and reproductive problems. Menstrual irregularities, in the form of oligomenorrhoea or amenorrhoea, is a characteristic clinical feature of PCOS in women.[16] Oligomenorrhea can be defined as irregular and inconsistent menstruation wherein a woman reports the length of a menstrual cycle greater than 35 days or 4-9 menstrual cycles in a year.[17] Primary amenorrhea is defined as the lifelong absence of menses. However, the remission of previously regular or irregular menses for a period of 3 months or 6 months respectively is a characteristic of secondary amenorrhea.[18]

In the present study it has been observed that PCOS was prevalent (14%) among participants suffering from irregular periods (p= 0.009). Another study had a similar finding according to which menstrual disturbances were one of the most commonly (40.5%) reported problems among participants having PCOS.[19] A meta-analysis study highlighted the prevalence of oligomenorrhea to be 79% among their study participants suffering from PCOS.[20] In PCOS, acne vulgaris may indicate the presence of underlying endocrine pathologies, such as hyperandrogenism.[21] Severe acne is associated with hirsutism, oligomenorrhea or amenorrhea, androgenic alopecia, and seborrhea.[22] Acne was a clinical feature in 12.6% of girls who were diagnosed with PCOS (p= 0.0401). Approximately 95% of the patients having hirsutism are diagnosed with PCOS. Hirsutism and excessive growth of hair on body is due to increase androgen levels.[23] Some studies also support our results (p= 0.003). Around 65-75% of the women who are diagnosed with PCOS present with hirsutism.[24] Vascular features of the arterial walls, as well as the expression of molecules related to mechanisms that cause atherosclerosis may be directly influenced by androgen excess in PCOS, increasing the risk of hypertension.[25] This study has yielded a significant result between association of family history of hypertension and PCOS (p= 0.018). One

study observed that a family history of hypertension affects the phenotype of PCOS and that there was a high prevalence of family history of hypertension among women with PCOS.[26] More recent research indicates that post-menopausal women with PCOS throughout their reproductive years might develop hypertension.[27] Thus, it can be said that women with PCOS develop hypertension later in their lives. Increased intake of fats and decreased intake of carbohydrates are associated with weight gain, insulin and androgen concentrations which causes increased prevalence of PCOS.[28] In this study, 8.6% of the participants indicated increased consumption of dietary and bakery products (p=0.561). A correlation has been observed linking dietary practices and PCOS. There are negative effects on reproductive health of food insecurity and unhealthy dietary practices. According to a study, the women diagnosed with PCOS have increased intake of western dietary pattern along with less plant based diet. There is significant evidence that correlates Mediterranean style diet to PCOS prevalence indicating that assessment of dietary intake and body composition evaluation is necessary for management of PCOS.[29] This study didn't show significant correlation between intake of chicken or red meat to PCOS (p=0.760).

Adopting unhealthy dietary habits like consuming a large proportion of junk in a routine diet, increasing fast food and soft drinks consumption is contributing to increased prevalence of PCOS among adolescent females due to unhealthy dietary practices.[30] However, in this study 8.5% of participants claimed that they have increased consumption of fast food out of which 16.7% had been diagnosed with PCOS (p=0.760).

This study was carried out on a limited sample size within the confines of a single medical college. Our study has yielded significant correlations and findings despite this. It is recommended that further studies be conducted, in light of these findings, with a larger sample size and involving multiple study centers.

CONCLUSION
The present study concluded that there is noteworthy prevalence of PCOS among students of medical college of Lahore, Pakistan. Weight, family history of PCOS and family history of hypertension were found to be the main risk factors associated with PCOS. Irregular periods, acne and history of excessive hair growth on the body were main clinical features observed in PCOS patients.

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