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Original Research Article

Prevalence and risk factors of polycystic ovary syndrome among reproductive-aged women

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ABSTRACT

Background: PCOS is one of the most common reproductive and hormonal health issues that Bangladeshi women and young girls' experience, yet many remain unaware of their condition until later in life. This study assessed the prevalence of and examined the factors of polycystic ovary syndrome (PCOS) among reproductive-aged women.
Methods: This study cross-sectional included 500 patients diagnosed with PCOS who visited the department of obstetrics and gynecology, BSMMU, Dhaka, Bangladesh. This 2-years-long study included reproductive-aged women who were suffering from PCOS. Data were collected using a structured questionnaire that was administered to participants. The prevalence percentage of physician-diagnosed PCOS was calculated. A multivariable logistic regression model was employed to determine the adjusted odds ratios (aOR) and the corresponding 95% confidence intervals (CI) for the factors significantly associated with PCOS status.
Results: Out of the 500 participants, the majority were single (85%), and the age group of 21 to 25 years comprised 56% of the participants. The prevalence of polycystic ovary syndrome (PCOS) was found to be 61% out of 500 participants affected. The risk factors that were significantly associated with PCOS included. Menstrual irregularities [adjusted odds ratio (aOR) =7.67; 95% confidence interval (CI): 3.72-15.83], family history of PCOS (aOR =5.11; 95% CI: 2.32-11.31), Hirsutism (aOR=3.55; 95% CI: 2.06-6.21) and Male pattern baldness (aOR=2.06; 95% CI: 1.19-3.58).
Conclusions: This study revealed a moderately high prevalence of PCOS. Menstrual irregularities, obesity, a family history of PCOS, hirsutism, and baldness were significantly associated with the status of PCOS in the study sample.

Keywords: Baldness, Menstrual irregularities, Polycystic ovary syndrome, Prevalence, Risk factors

INTRODUCTION

Polycystic Ovary Syndrome (PCOS) is the most common endocrine disorder among women of reproductive age. It is characterized by a hormonal imbalance that includes at least one polycystic ovary, along with ovulatory dysfunction and excessive production of androgens.[1,2] The causes of PCOS are multifactorial, involving both genetic and environmental factors, such as obesity and physical inactivity. Fortunately, the reproductive and metabolic features of PCOS can be somewhat reversed through lifestyle modifications.[3] The high prevalence of PCOS, along with its serious long-term health consequences, makes it a significant public health concern. By age 30, approximately 25% to 30% of women with PCOS show impaired glucose tolerance, and about 8% of affected women are at risk of developing type 2 diabetes mellitus each year, which increases their risk of hypertension. Additionally, chronic anovulation can lead to higher rates of infertility and an increased risk of endometrial cancer.[4] According to data from the World Health Organization (WHO), globally, around 116 million women (3.4%) are affected by PCOS.[5] A review comparing the prevalence of PCOS among different ethnic groups found that Middle Eastern women have the highest prevalence (16%, according to the Rotterdam criteria), followed by Chinese women (5.6%) and other groups.[6] A meta-analysis identified a prevalence of 11.9% among middle eastern

populations, with a notably higher prevalence of 18.8% among women in the gulf region.[7] Another study conducted among female university students in Palestine reported a prevalence of 7.3%.[8] Risk factors for PCOS include physical inactivity, irregular menstrual cycles, and overweight/obesity (defined as a waist-hip ratio greater than 0.85).[9,10] However, it has been shown that lifestyle changes and weight management can help reduce the symptoms of PCOS and reverse the hormonal imbalances that contribute to its development.[11] The present study aims to research the prevalence and risk factors of PCOS among reproductive-aged women. Ethical clearance and written consent were assured before the study.

Objectives

General objective

The primary aim of this study was to evaluate the prevalence of polycystic ovary syndrome among Bangladeshi women.

Specific objective

This study targeted to evaluate the prevalence and risk factors of PCOS among Bangladeshi reproductive-aged women.

METHODS

This 2 years cross-sectional study included a total of 500 patients diagnosed with PCOS. These patients visited the department of obstetrics and gynecology, BSMMU, Dhaka, Bangladesh, from January 2018 to December 2020. The present study included all adult female patients of reproductive age, 18 years to 35 years.

Inclusion criteria

The current study included adult patients who were aged between 18 to 35 years, diagnosed with PCOS, menstrual irregularity and hyperandrogenism, hirsutism (the location and severity of thick hair growth), acne (five or more pimples), and male pattern baldness.

Exclusion criteria

Patients who were critically ill, became pregnant during the study, left the study and below 18 years or over 35 were excluded from this study.

A structured questionnaire was developed on age group, marital status, and occupation. The variables significantly (p £ 0.150) related to PCOS status were subjected to univariable and multivariable logistic regression analyses. For the selection of final multivariable logistic regression model, a backward stepwise procedure was used, and the variables significantly ($p<0.001$) associated with PCOS status were retained in the final model. Adjusted odds ratios (aOR) and their corresponding 95% confidence intervals (CI) were derived from the model coefficients and their standard errors for the variables in the final model and used to interpret the results. Chi-squared analysis was used to test the statistical significance of the association of demographics and hypothesised risk factors with PCOS status. Microsoft Office and SPSS were used for data analysis.

RESULTS

5% of participants were aged between 18 and 20 years and 56% were between 21 and 25 years of age. Most participants were single (85%) and university students (61%) (Table 1).

Table 1: Sociodemographic characteristics of the study patients.

Variables		N	%
Age (in years)	18-20	25	5
	21-25	280	56
	26-30	180	36
	31-35	15	3
Marital status	Single	425	85
	Married	75	15
Occupation	University student	305	61
	Service	35	7
	Housewives	75	15
	No mention	85	17

Table-2: Distribution of polycystic ovary syndrome-related variables in the study sample.

PCOS-related health variables		N	%
PCOS diagnosis by physician	Yes	80	16
	No	420	84
PCOS treatment	Yes	55	11
	No	250	50
Hypothyroidism	Yes	35	7
	No	465	93
Hyperprolactinemia	Yes	40	8
	No	460	92
Menses irregularities	Infrequent menstruation	240	48
	Frequent menstruation	185	37
	Normal	25	5
Hirsutism	Yes	160	32
	No	240	68
Acne experienced	Yes	370	74
	No	130	26
Baldness experienced	Yes	130	26
	No	370	74
Difficulty in losing weight	Yes	385	77
	No	115	23
Discolouration	Yes	195	39
	No	305	61

Table 3: Univariable logistic regression analysis of various risk factors for polycystic ovary syndrome.

Predictors of PCOS	Unadjusted OR (95% C)	P value
Age (completed years) (18-25 versus ≥35)	0.86 (0.28-2.1 1)	0.612
Hypothyroidism (yes versus no)	1.69 (0.82-3.45)	0.151
Hyperprolactinemia (yes versus no)	2.43 (1.49-3.64)	<0.001
Menstrual irregularity (yes versus no)	14.64 (7.71-27.80)	<0.001
Hirsutism (yes versus no)	6.93 (4.28-1 1.21)	<0.001
Acne experienced (yes versus no)	1.77 (1.01-3.1 1)	0.045
Acne grading (≥5 pimples) (yes versus no)	1.74 (1.06-2.87)	0.028
Acne diagnosis (yes versus no)	1.97 (1.26-3.07)	0.003
Baldness (yes versus no)	3.60 (2.29-5.67)	<0.001
Difficulty in losing weight (yes versus no)	8.71 (4.09-18.14)	<0.001
Discoloration of various body parts	2.62 (1.68-4.10)	<0.001
PCOS family history (yes versus no)	4.67 (2.79-7.70)	<0.001
Type 2 diabetes mellitus (yes versus no)	5.26 (1.05-26.45)	0.044

Table 4: Multivariable logistic regression model risk factors for polycystic ovary syndrome.

Predictors of polycystic ovary syndrome (PCOS)	Adjusted odds ratio (95% confidence interval)	P value
Menstrual irregularity (yes versus no)	7.67 (3.72-15.83)	<0.001
Family history of PCOS (yes versus no)	5.11 (2.32-1 1.31)	<0.001
Hyperprolactinemia (yes versus no)	3.39 (1.93-6.29)	<0.001
Hirsutism (yes versus no)	3.55 (2.06-6.21)	<0.001
Baldness (yes versus no)	2.06 (1.19-3.58)	0.01

Among the patients, PCOS was never previously diagnosed by physicians earlier (84%) but many of them were suffering from menses irregularities (48% and 37%) (Table 2). Family history of PCOS (yes versus no) and menstrual irregularity (yes versus no) were significant for both univariable logistic regression analysis and multivariable logistic regression model analysis (Tables 3 and 4).

DISCUSSION

The prevalence of physician-diagnosed PCOS (polycystic ovary syndrome) among female students in this study was 61%. This result is comparable with findings from a study conducted by Ding and colleagues, which reported a 16% prevalence of PCOS among Middle Eastern women. Additionally, a recent study from Saudi Arabia found a 16% prevalence of PCOS among female university students aged 21 to 25 years.[13] The consistency in these findings may be due to the use of similar methods across the studies, particularly the self-administered questionnaire used to assess PCOS prevalence in female university students. Another study prospectively estimated the prevalence of PCOS by selecting women in an unbiased manner from a group of 154 consecutive Caucasian blood donors at a hospital in Madrid, Spain. Using the National Institutes of Health (NIH) diagnostic criteria, this study reported a PCOS prevalence of 6.5%.[14] A review of ethnic comparisons of PCOS susceptibility across four groups- Middle Eastern, Caucasian, African American, and Chinese- showed the highest prevalence among African American women at 7.4%, followed by Middle Eastern women at 5.6%, both assessed using NIH criteria.[15] Moreover, two studies from Iran reported PCOS prevalence rates of 11.7% and 7%, also based on NIH criteria.[16,17] A community-based study in Sri Lanka found a prevalence of 6.3% among women aged 15 to 39 years, using the same diagnostic standards.[18] The variation in results among these studies may be attributed to differences in age groups, ethnic backgrounds, lifestyle factors, and the use of different diagnostic criteria. In the current study sample, the prevalence of infrequent menstruation was 48%, while the prevalence of frequent menstruation was 37%. A previous study involving young adult Korean females, which included 462 participants, found that 0.9% experienced frequent menstruation (defined as occurring less than 21 days apart) and 6.1% experienced infrequent menstruation (occurring more than 35 days apart).[19] Additionally, another study on 170 Indian women of reproductive age reported a 68% prevalence of menstrual irregularities.[11] The differences in the prevalence rates between this study and previous ones may be due to variations in the age of the participants, as well as lifestyle and environmental factors.

Among the study participants, the prevalence rates for hirsutism, acne, male pattern baldness, difficulty in losing weight, and skin discolouration were 32%, 74%, 26%, 77%, and 39%, respectively. A previous study indicated that 37.0% of African American females of reproductive age reported being bothered by excess hair, while 10% were diagnosed with hirsutism based on the modified

Ferriman-Gallwey pictorial assessment.[20] The discrepancy in hirsutism prevalence may be attributed to the fact that this study relied on self-reports without verifying participants' medical records. The prevalence of acne in current study was 74.0%, aligning with findings from a Malaysian study that reported a 75.8% prevalence of acne among high school and university students. Conversely, a meta-analysis of 25 studies conducted in China, involving 83,008 subjects, found that the overall prevalence of acne across all age groups was only 10.2%.[21,22] These variations in results can be attributed to differing settings, contrasting age groups, and the diagnostic methods used. Additionally, an earlier study in India found that the prevalence of male pattern baldness and skin discoloration among randomly selected females of reproductive age was 25.0% and 30.0%, respectively, which is similar to this research findings.[11]

The multivariable logistic regression model indicated that respondents had significantly higher odds of having polycystic ovary syndrome (PCOS) if they reported experiencing hyperprolactinemia. A recent study in Middle Eastern region found that hyperprolactinemia occurs frequently (in 37% of cases) among patients with PCOS.[23] Additionally, a pathological increase in circulating prolactin levels can result from various factors, including prolactin adenomas, medications that cause hyperprolactinemia, macroprolactin, or could even be due to idiopathic hyperprolactinemia. Further etiological studies are necessary to determine the specific causes of hyperprolactinemia in order to reduce the burden of PCOS.[24,25] The data also revealed that participants were more likely to be diagnosed with PCOS if they experienced menstrual irregularities. A cohort study in India that involved participants aged 15 to 17 reported a significantly higher risk of PCOS among those with confirmed menstrual irregularities compared to those without.[26] This health issue among young adults needs to be addressed promptly and should attract the attention of public health practitioners. Moreover, the study found that participants with a family history of PCOS had significantly higher odds of being diagnosed with the condition. This finding aligns with previous research, which indicated that patients with PCOS were more likely to have mothers and/or sisters who also had PCOS compared to those without the condition.[27]

The final multivariable logistic regression model indicated that participants who reported experiencing hirsutism had higher odds of being diagnosed with PCOS. Previous research has shown that women with PCOS have a higher frequency of hirsutism compared to those without PCOS, despite both groups being similar in terms of age, body mass index, oral contraceptive usage, acne, and menstrual patterns.[28] The presence of hirsutism, along with menstrual irregularities, is considered a cardinal sign of PCOS.[29] Additionally, the present study found that women with male pattern baldness were more likely to have received a diagnosis of PCOS than those without male pattern baldness. There are only a few studies that specifically examine male pattern baldness (also known as androgenic alopecia) in women with PCOS. Consistent with present findings, a study from Turkey reported a much higher prevalence (34.7%) of androgenic alopecia in women with PCOS compared to those without. A case-control study also found that women with PCOS had a higher prevalence of male pattern baldness than control participants, highlighting that many women who present with androgenic alopecia as their primary concern may also have PCOS.[30,31]

A large population and longer study duration may affect the overall outcome of the study.

CONCLUSION

This study found a moderately high prevalence of polycystic ovary syndrome (PCOS) among female university students. The research identified several significant risk factors for PCOS in the study population, including menstrual irregularities, difficulty in losing weight or obesity, acne, a family history of PCOS, and male pattern baldness. Raising awareness about this condition and encouraging women experiencing PCOS-related symptoms to seek timely medical care could help reduce the extent of this ailment and its associated psychological burden within this and similar populations in the region. If these initiatives are implemented, future studies could explore their impact.

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