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Frequency of Phenotypic Features in Women Having PCOS Presenting in A Tertiary Care Hospital of Azad Jammu & Kashmir

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ABSTRACT

Background: Polycystic ovary syndrome is a common endocrine disorder in reproductive-age females with diverse clinical phenotypes of menstrual irregularity, acne, hirsutism, and obesity. Explanation of phenotypic variation and sociodemographic associations is necessary for early identification and targeted interventions. **Objective:** To determine the frequency of phenotypical features in women having PCOS presenting in tertiary care hospital of AJK. **Study Design:** Cross-sectional study. **Duration and Place of Study:** Department of Gynecology and Obstetrics, AIMS Hospital, Muzaffarabad, from March 2025 to May 2025. **Methodology:** A total of 160 women aged 15–45 years presenting with clinical features of PCOS were enrolled using WHO sample size calculation. Exclusions included pregnancy, chronic medical disorders, pelvic inflammatory disease, and uterine/ovarian pathology. Diagnosis of PCOS was based on Rotterdam criteria. Data included sociodemographics, menstrual and clinical history, physical examination, ultrasonography, and hormonal assays. **Results:** Mean age was 31.01±7.93 years with mean BMI 34.64±5.79 kg/m^2. Irregular menstrual cycles were observed in 71.3%, acne in 67.5%, hirsutism in 27.5%, and obesity in 80.0% of participants. Significant associations were found between irregular cycles and socioeconomic status ($p=0.004$) and education ($p=0.012$). Acne and hirsutism showed significant associations with socioeconomic status ($p<0.001$ and $p=0.014$, respectively). Obesity correlated significantly with BMI ($p<0.001$) and education ($p<0.001$). **Conclusion:** PCOS presents predominantly with obesity, menstrual irregularity, and acne.

INTRODUCTION

Polycystic ovarian syndrome is a highly prevalent endocrine disease in reproductive-age females and is caused by a multifactorial etiology of genes, hormones, and environment.[1,2] All of the classic triad of anovulation, hyperandrogenism, and polycystic ovarian morphology are not present in all females with the syndrome.[3] The syndrome does not only accompany reproductive difficulties of infertility and habitual pregnancy loss but is also linked with a variety of different metabolic disorders of insulin resistance and dyslipidemia and risk of developing type 2 diabetes mellitus.[4,5] Moreover, the condition is also increasingly characterized by severe psychological and social implications in that the symptoms of the condition often interfere with quality of life and body image and long-term health outcomes.[6] Early identification and specific management strategies are therefore in order in order to minimize the short- and long-term implications of the syndrome.

Phenotypic expression of PCOS is highly variable with low percentages of the females exhibiting mild symptoms and the rest with more striking and noticeable ones.[7] One of them is Acne which is a very frequent cutaneous symptom that is a secondary effect of the androgenic stimulation of the activity of the sebaceous glands and often terminates in refractory and stubborn lesions of the chest and back and face.[8] Another characteristic presentation is that of hirsutism, a mixture of pigmentation of coarse hair growth in a male pattern often in the upper lip, chin, chest, or abdomen.[8] Both acne and hirsutism are physically torturous and very often lead to emotional and psychologically troublesome illnesses in the form of withdrawal from the public and low self-esteem. These and other indicators make it clear that not only is it necessary to treat the hormonal imbalance but also it is necessary to provide support that addresses the psychosocial characteristic of the disease.

Obesity is another very frequent condition of PCOS and is able to take a prominent role in the clinical picture by emphasizing insulin resistance and hyperandrogenism.[9] Excess weight also introduces a very high risk of cardiovascular disease and of ovulatory failure and therefore of infertility.[10] Irregularity of the menstrual cycle is also a frequent feature from oligomenorrheic cycles through amenorrhea and of chronic anovulation and of the spectrum of oligomenorhea-amenorrhea

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respectively.[11] Such irregularity of the menstrual cycle is not only a risk for infertility but also increases the risk of hyperplasia of the endometrium and in the more severe form of endometrial carcinoma due to prolonged unopposed estrogen exposure.[12] With the obesity, acne and hirsutism and menstrual irregularity form the prominent patterns of the phenotypes of PCOS and shed light on the relationships inextricably complex between the disorders of the reproductive system and of the metabolic and of the cosmetically relevant ones and require a multidisciplinary and integrated approach to management.[13]

A study undertaken in Pakistan evaluated the clinical manifestations of polycystic ovary syndrome (PCOS) among women and demonstrated a high prevalence of characteristic features. The findings indicated that obesity was observed in 80% of participants, menstrual irregularities in 71.8%, and acne in 67.3%.[14] In addition, evidence from another study reported the overall prevalence of hirsutism to be 27.4% in women.[15]

There is a strong requirement to examine polycystic ovarian syndrome and phenotypic expressions of the disease in females from Muzaffarabad, Kashmir, because available evidence from the region is limited. Variation in lifestyle habits, dietary habits, and socio-cultural variables may affect the epidemiological pattern and clinical presentation of the disease but are not examined in a systematic way in the regional population. Moreover, lack of adequate awareness and limited access to high-level specialized care services results in delayed diagnosis and suboptimal care and therefore the disease burden is aggravated. A focused study in this environment would provide regionally relevant information, enhance knowledge of the phenotypic spectrum, and contribute to the development of custom-designed interventions.

METHODOLOGY

This cross-sectional investigation was conducted in the Department of Gynecology and Obstetrics at AIMS Hospital, Muzaffarabad, Azad Kashmir, between March 2025 and May 2025. A total of 160 participants were recruited, with sample size calculated using the WHO calculator at a 95% confidence level, 7% precision, and an expected prevalence of 27.4%.[15] Approval from the institutional ethics review committee was obtained prior to data collection. Women aged 15 to 45 years who presented with at least one clinical manifestation suggestive of polycystic ovarian syndrome were considered eligible. Exclusions were applied to pregnant women, individuals with chronic conditions such as hypertension, diabetes, or cardiovascular disease, those with uterine or ovarian masses, pelvic inflammatory disease, and women on long-term medication. Informed written consent was secured from all participants, and strict confidentiality was maintained.

Sociodemographic information such as age, marital status, education, socioeconomic background, weight, height, and body mass index was recorded. Detailed menstrual and medical histories were obtained, and physical examination included assessment of acne, hirsutism, and body measurements. Pelvic ultrasonography was performed, where the presence of twelve or more follicles sized 2–9 mm or an ovarian volume greater than 10 ml in at least one ovary was considered diagnostic of polycystic ovarian morphology. Hormonal testing included serum follicle-stimulating hormone, luteinizing hormone, and testosterone levels, performed during the early follicular phase (days 2–3 of the menstrual cycle) using chemiluminescent immunoassay.

For study purposes, polycystic ovarian syndrome was confirmed if two out of three criteria were met: oligo/anovulation defined as menstrual cycles longer than 35 days or fewer than eight cycles per year, biochemical hyperandrogenism defined as serum testosterone >70 ng/dl, or polycystic ovarian morphology on ultrasound. Acne was characterized by the presence of comedones, papules, pustules, or nodules. Hirsutism was assessed by the modified Ferriman-Gallwey score, with a score of four or greater indicating abnormal hair growth. Menstrual irregularity referred to cycles shorter than 21 days, longer than 35 days, absence of three or more consecutive cycles, or markedly abnormal bleeding volume. Obesity was identified as body mass index exceeding 25 kg/m^2, calculated by dividing body weight in kilograms by the square of height in meters.

Data analysis was performed using SPSS version 23. Continuous variables were expressed as mean ± standard deviation. Categorical variables were presented as frequencies and percentages. Age, body mass index, socioeconomic status, education was controlled through stratification. Following stratification, chi-square testing was applied, with a p-value ≤0.05 considered statistically significant.

RESULTS

The mean age was 31.01±7.93 years, with a mean weight of 85.49±15.90 kg, height of 1.57±0.07 m, and BMI of 34.64±5.79 kg/m^2 (as shown in Table I). Hormonal profiles demonstrated FSH levels of 5.50±1.16 IU/L, LH levels of 9.62±2.68 IU/L, and testosterone levels of 80.61±11.81 ng/dL (as shown in Table I). Educational distribution revealed that 60 participants (37.5%) had no formal education, 30 (18.8%) had primary education, 44 (27.5%) completed matric, 18 (11.3%) had secondary education, and 8 (5.0%) achieved higher education (as shown in Table I). Socioeconomic stratification showed 108 participants (67.5%) from low socioeconomic status, 40 (25.0%) from middle class, and 12 (7.5%) from high socioeconomic backgrounds (as shown in Table I).

Table I

Patient Demographics

Demographics	Mean ± SD
Age (years)	31.01±7.93
Weight (kg)	85.49±15.90
Height (m)	1.57±0.07
BMI (kg/m^2)	34.64±5.79
FSH (IU/L)	5.50±1.16
LH (IU/L)	9.62±2.68
Testosterone (ng/dL)	80.61±11.81
Education Level	
No formal education n (%)	60 (37.5%)
Primary education n (%)	30 (18.8%)
Matric n (%)	44 (27.5%)
Secondary Education n (%)	18 (11.3%)
Higher Education n (%)	8 (5.0%)

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Socioeconomic Status	
Low n (%)	108 (67.5%)
Middle n (%)	40 (25.0%)
High n (%)	12 (7.5%)

Phenotypic feature analysis revealed that irregular menstrual cycles affected 114 participants (71.30%), while 46 (28.70%) had regular cycles (as shown in Table II). Acne was present in 108 participants (67.50%) and absent in 52 (32.50%) (as shown in Table II). Hirsutism manifested in 44 participants (27.50%), with 116 (72.50%) showing no signs (as shown in Table II). Obesity was observed in 128 participants (80.00%), while 32 (20.00%) were non-obese (as shown in Table II).

Table II

Frequency of Phenotypic Features in Women Having PCOS

Phenotypic Features	Frequency	% age
Irregular Menstrual Cycle		
Yes	114	71.30%
No	46	28.70%
Total	160	100%
Acne		
Yes	108	67.50%
No	52	32.50%
Total	160	100%
Hirsutism		
Yes	44	27.50%
No	116	72.50%
Total	160	100%
Obesity		
Yes	128	80.00%
No	32	20.00%
Total	160	100%

Cross-sectional analysis demonstrated several significant associations between phenotypic features and demographic factors. Irregular menstrual cycles showed no significant association with age groups (p=0.958) or BMI categories (p=1.000), but demonstrated significant associations with socioeconomic status (p=0.004) and education level (p=0.012) (as shown in Table III). Among socioeconomic groups, middle-class women had the highest prevalence of irregular cycles (90.0%), followed by low socioeconomic status (66.7%) and high socioeconomic status (50.0%) (as shown in Table III). Educational analysis revealed matric-educated women had the highest irregular cycle prevalence (90.9%), while those with no formal education had the lowest (60.0%) (as shown in Table III).

Acne prevalence showed no significant association with age (p=0.813) or BMI (p=0.779), but demonstrated a highly significant association with socioeconomic status (p<0.001) and borderline significance with education (p=0.057) (as shown in Table III). Low socioeconomic status women exhibited the highest acne prevalence (77.8%), compared to middle (45.0%) and high (50.0%) socioeconomic groups (as shown in Table III). Hirsutism demonstrated no significant associations with age (p=0.272) or BMI (p=0.178), but showed significant association with socioeconomic status (p=0.014) and non-significant association with education (p=0.312) (as shown in Table III). Middle socioeconomic status women had the highest hirsutism prevalence (45.0%), followed by low (22.2%) and high (16.7%) socioeconomic groups (as shown in Table III).

Obesity analysis revealed no significant association with age (p=0.752) but highly significant associations with BMI categories (p<0.001), non-significant association with socioeconomic status (p=1.000), and highly significant association with education level (p<0.001) (as shown in Table III). Women with BMI >25 kg/m^2 showed 87.7% obesity prevalence compared to 0.0% in those with BMI ≤25 kg/m^2 (as shown in Table III). Educational analysis revealed that women with primary education and higher education both demonstrated 100.0% obesity prevalence, while those with matric education showed the lowest prevalence at 59.1% (as shown in Table III).

Table III

Association of Phenotypic Features with Demographic Factors

Demographic Factors		Irregular Menstrual Cycle		Acne		Hirsutism		Obesity	
		Yes n(%)	No n(%)	Yes n(%)	No n(%)	Yes n(%)	No n(%)	Yes n(%)	No n(%)
Age (years)	≤30	54 (71.1%)	22 (28.9%)	52 (68.4%)	24 (31.6%)	24 (31.6%)	52 (68.4%)	60 (78.9%)	16 (21.1%)
	>30	60 (71.4%)	24 (28.6%)	56 (66.7%)	28 (33.3%)	20 (23.8%)	64 (76.2%)	68 (81.0%)	16 (19.0%)
p-value		0.958		0.813		0.272		0.752	
BMI (Kg/m^2)	≤25	10 (71.4%)	4 (28.6%)	10 (71.4%)	4 (28.6%)	6 (42.9%)	8 (57.1%)	0 (0.0%)	14 (100.0%)
	>25	104 (71.2%)	42 (28.8%)	98 (67.1%)	48 (32.9%)	38 (26.0%)	108 (74.0%)	128 (87.7%)	18 (12.3%)
p-value		1.000*		0.779*		0.178		<0.001*	
Socioeconomic Status	Low	72 (66.7%)	36 (33.3%)	84 (77.8%)	24 (22.2%)	24 (22.2%)	84 (77.8%)	86 (79.6%)	22 (20.4%)
	Middle	36 (90.0%)	4 (10.0%)	18 (45.0%)	22 (55.0%)	18 (45.0%)	22 (55.0%)	32 (80.0%)	8 (20.0%)
	High	6 (50.0%)	6 (50.0%)	6 (50.0%)	6 (50.0%)	2 (16.7%)	10 (83.3%)	10 (83.3%)	2 (16.7%)
p-value		0.004*		<0.001		0.014*		1.000*	
Education	No formal education	36 (60.0%)	24 (40.0%)	44 (73.3%)	16 (26.7%)	14 (23.3%)	46 (76.7%)	48 (80.0%)	12 (20.0%)
	Primary education	20 (66.7%)	10 (33.3%)	18 (60.0%)	12 (40.0%)	10 (33.3%)	20 (66.7%)	30 (100.0%)	0 (0.0%)
	Matric	40 (90.9%)	4 (9.1%)	34 (77.3%)	10 (22.7%)	14 (31.8%)	30 (68.2%)	26 (59.1%)	18 (40.9%)

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	Secondary Education	12 (66.7%)	6 (33.3%)	8 (44.4%)	10 (55.6%)	6 (33.3%)	12 (66.7%)	16 (88.9%)	2 (11.1%)
	Higher Education	6 (75.0%)	2 (25.0%)	4 (50.0%)	4 (50.0%)	0 (0.0%)	8 (100.0%)	8 (100.0%)	0 (0.0%)
p-value		0.012*		0.057*		0.312*		<0.001*	

***Fischer Exact Test**

DISCUSSION

High prevalence of irregular menstrual cycles (71.3%) is a reflection of the fundamental disruption of the hypothalamic-pituitary-ovarian axis that is fundamental to the disease of PCOS, with ovulation and follicular maturation derailed under the influence of hyperandrogenism and insulin resistance. High prevalence of acne (67.5%) is explained by increased activity of the sebaceous glands under the stimulus of hyperandrogenism in the form of increased testosterone (80.61±11.81 ng/dL), driving the production of sebum and forming inflammatory acne lesions.

The elevated BMI (34.64±5.79 kg/m^2) and rate of obesity (80.0%) show the strong metabolic component of PCOS in which insulin resistance is a pattern of persistent weight gain and further hormonal disruption. Insulin resistance maintains lipogenesis and inhibits lipolysis and concomitantly fosters ovarian androgen production through elevated theca cell steroidogenesis. The relatively low rate of hirsutism (27.5%) compared with other features perhaps is a result of ethnic variation in sensitivity of hair follicles to androgens and gene polymorphisms that effect the activity of the 5α-reductase and convert the less active testosterone to the more active dihydrotestosterone.

The mean age of participants (31.01±7.93 years) in our study was comparable to Bahadori et al.[16] who reported ages ranging from 29.18±5.71 to 31.67±5.05 years across different phenotypes, and Ashrafi et al. [17] with ages between 26.76±5.81 and 29.86±4.84 years. However, our cohort was older than those reported by Rozati et al. [18] (27.29±7.14 years), Elasam et al. [19] (median 26.0 years), and Rahim et al. [20] (25.34±4.79 years), suggesting possible regional or healthcare-seeking behavior differences. The higher mean BMI in our study (34.64±5.79 kg/m^2) compared to Bahadori et al. [16] (25.60-27.21 kg/m^2 across phenotypes), Ashrafi et al. [17] (27.97-29.63 kg/m^2), and Rahim et al. [20] (calculated BMI approximately 26.9 kg/m^2) indicates a more metabolically compromised population, which aligns with Qiao's observation [21] that South Asian women develop insulin resistance at lower BMI thresholds.

Our acne prevalence (67.5%) was notably higher than reported by Rozati et al. [18] (6%), Elasam et al. [19] (46.5%), and Kemfang et al. [22] (20.3%), but the wide variation likely reflects differences in diagnostic criteria, population characteristics, and possibly ethnic variations in androgen sensitivity. Conversely, our hirsutism prevalence (27.5%) was lower than Elasam et al. [19] (27.4%), Rahim et al. [20] (76.80%), and Kemfang et al. [22] (62.9%), supporting Qiao's assertion [21] that South Asian and certain ethnic populations may exhibit different patterns of androgen-related manifestations due to varying 5α-reductase activity and hair follicle sensitivity.

The obesity prevalence in our study (80.0%) was substantially higher than most reported studies, including Bahadori et al. [16] (60%), Elasam et al. [19] (42.4%), and Kemfang et al. [22] (43%), but aligns with the upper range described by Baba [23] for certain populations (80-90% in the United States). This suggests that our study population may represent a more severe metabolic phenotype, possibly reflecting advanced disease progression or population-specific genetic predisposition to metabolic dysfunction. The hormonal profile with FSH (5.50±1.16 IU/L) and LH (9.62±2.68 IU/L) levels were generally consistent with Kemfang et al. [22] (FSH 5.51±4.09, LH 9.65±8.4 IU/L) but lower than Rahim et al. [20] (FSH 7.29±2.27, LH 12.12±9.55 IU/L), indicating relatively preserved gonadotropin dynamics in our cohort.

The strong relationship between socioeconomic status and multiple phenotypic characteristics in our study lends empirical support to the socioeconomic determinants of the severity of PCOS. We observed higher prevalence of acne (77.8% vs 45.0% in the middle class) and varied patterns of irregular menstrual cycles in lower socioeconomic groups and may account for them through chronic stress-induced elevation of cortisol level, low quality of dietary intake with high glycemic index foods and lack of access to early medical care. The educative gradients found in our study, especially the paradox that matric-educated women had a significantly higher rate of irregular cycles (90.9%) compared with uneducated ones (60.0%) suggest varied healthcare seeking attitude, work-related stress patterns or lifestyle changes with educative progressions. These sociodemographic relationships that are not highly reported in the preceding studies prove the significance of taking into account the social determinants in the assessment of the patterns of manifesting the PCOS across varied communities. Kheirollahi et al. [24] and Espinosa et al.[25] observed mainly the distributions of the phenotypes and not the sociodemographic relationships and our study supports the supposition that the social factors hold a stake equally in the phenotyping of the patterns of the presentation of the PCOS.

Several study limitations should be considered. Single center design may limit the application of results to larger groups of people because our cohort is comprised of attenders at a specific health center and therefore may present a selection bias towards more severe disease or select socioeconomic groups. Cross-sectional study design does not permit the study of temporal relationships between demographic variables and phenotypic maturation with time. Further, the study did not involve standardized phenotyping using Rotterdam criteria that could have provided more detailed information on phenotype-related correlations with demographic variables. The fairly small study population under particular demographic subgroups, and in particular under higher education and under high socioeconomic status, may have limited the power of statistics to reveal pertinent associations.

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CONCLUSION

We found in our research that the phenotypic presentation of females with PCOS demonstrates robust associations with sociodemographic variables, particularly socioeconomic status and level of education. Irregular menstrual cycles, acne, hirsutism, and obesity presented varied patterns of prevalence across varied demographic subgroups with lower socioeconomic status always being associated with higher symptom burden.

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