

Assessment Of Risk Factors for Polycystic Ovarian Syndrome Among Women of Reproductive Age in Lahore

Rumaisa Jamshaid¹, Dr. Muhammad Naeem², Dr. Abdul Majeed Akhtar³, Hajra Nadeem Maan⁴, Dr. Amna Jalal Goraya⁵, Dr. Awais Gohar⁶

^{1, 2, 3,4,5,6}University Of Lahore Email: 70125354@student.uol.edu.pk

Abstracts: Polycystic ovarian syndrome (PCOs) is the most common hormonal disease of present era among the women of reproductive age. It has prevalence of 5-15% worldwide and in Pakistan its prevalence is approx. 52%. Which can be due to multiple risk factors and can cause multiple symptoms. However, no study in past showed exact cause of PCOs. The objective of the study was to access the risk factors for polycystic ovarian syndrome among women of reproductive age in Lahore. We conducted a Case-Control study. Cases were defined as women diagnosed with PCOS, while controls were age-matched women without a PCOS diagnosis. We emphasis more on dietary factors, socioeconomic status and BMI. Data on diet, health, and physical activity were collected from the questionnaire and analyzed using SPSS version 21. Odd ratio and Chi-square test was used to determine statistical significance with p-value < 0.05. The total of 68 cases and 68 controls were included in the study. We found that the most of the participants were young, mean age of the participants was 26.34 ± 6.63 years. There were significant differences between cases and controls in their income status ($p=0.075$), BMI ($p=0.013$), Family history (OR=2.826), conception difficulty ($p=0.012$), infertility treatment ($p=0.011$), irregular menstrual problems (OR=12.536), hirsutism (OR=10.086), U/S diagnosis (OR=33.970) and dietary factors including sweets/deserts ($p=0.004$) and dairy products ($p=0.006$). Our study concluded that socioeconomic status, BMI, reproductive health factors and diet are associated with PCOS in women in Lahore. Key factors such as family history, menstrual irregularities, hirsutism, and specific dietary habits were notably associated with higher risk. So, these results can be important for early detection and treatment of PCOS.

Keywords: Polycystic Ovarian Syndrome, Lahore, Reproductive age, BMI, Lahore.

1. INTRODUCTION

Polycystic ovarian syndrome (PCOS) is the most common hormonal disorder affecting women of childbearing age worldwide. Many symptoms, such as irregular menstrual cycles, hyper-androgenism, and ovarian cysts, are indicative of PCOS. PCOS severely harms women's health and fertility. Numerous genetic, environmental, and lifestyle factors interplay in a complex way to cause PCOS. The Rotterdam criteria, which comprise two of the following three symptoms i.e., hyper-androgenism, oligo-or anovulation, and polycystic ovaries is most often applied to diagnose PCOs. This condition is hormonal in nature and can cause numerous metabolic and reproductive issues in women. The most common issue that affects women is infertility, which can lead to other conditions including depression, anxiety, diabetes, and obesity etc. Pakistan has a relatively high PCOS prevalence rate, and there aren't many thorough studies on the risk factors for this illness in a particular demographic especially in Lahore. One of Pakistan's biggest cities, Lahore, has distinct demographic and sociocultural characteristics that could affect the incidence and consequences of PCOS. We attempted to clarify and highlight the risk factors related to PCOs through our study. The study aims to assess the risk factors of PCOS in this population (Lahore) among women of reproductive age, with a focus on identifying BMI, socio-demographic factors and dietary factors. By defining the risk factors of PCOS and offering the framework for public health interventions aimed at lowering the risk of PCOS in women in Lahore, this study hopes to advance our understanding of the condition.

2. MATERIEL AND METHODS

2.1. Study Design

This study was case-control study

2.2. Setting

The study was done on women reproductive age in Lahore who were referred to gynecological OPD of Family Health Hospital Lahore {A project of Rehnuma Family Planning Association (FPA)}.from November 2023 to February 2024 after the approval from the MS Dr. Nadeem Khalid of FHH.

2.3. Sampling Method

Data was collected through non-probability purposive sampling approach.

2.4. Sample Size

The total sample size of 136 patients was calculated, 68 cases of polycystic ovary and 68 controls without the disease were selected by matching based on age, gender, socioeconomic and marital status.

2.5. Participants

All women with reproductive age (e.g., 15-49 years old), who were visiting gynecological OPD of family health hospital Lahore, who were diagnosed with PCOS according to the recognized diagnostic criteria and who were provided with informed consent to participate in the study, ensuring they understand the study's purpose, procedures, and potential risks. Women who fall outside the specified age range, pregnant women, [as pregnancy can affect hormonal levels and PCOS symptoms.], severe comorbidities or medical conditions, hormonal medications (e.g., oral contraceptives, hormone replacement therapy) that may influence PCOS symptoms and women who had undergone previous ovarian surgeries were excluded from the study.

2.6. Procedure

The PCOS patients was diagnosed using the Rotterdam consensus for PCOS. I.e. if two of the following conditions a) irregular menstruation b) hirsutism and c) diagnosed on U/S, PCOS was diagnosed. With several clinical and biochemical symptoms including acne or alopecia, weight gain, difficulty in losing weight, pelvic pain. The risk factor score was determined through a questionnaire and interview by the researcher to collect data. The questionnaire was based on following parts such as: Part 1: Socioeconomic Factors including age, education, marital status, employment, and residency. Part 2: Reproductive health which include Gravida, Parity, History of Abortion, difficulty in conceiving, use of any family planning method, years of marriage, age of menarche. Part 3: Family history of PCOS, Medical history, patient's lifestyle which include any physical exercise, smoking or drugs habit. Part 4: Body Mass Index were taken by body weight (kg) and height (cm) and age. Part 5: dietary habits (intake of carbohydrates, protein, micronutrients, fats, beverages consumption and eating habits etc.). SPSS version 21 was used to analyze data, first descriptive statistics was applied where needed and then Chi-square test, odds ratios and confidence intervals of 95% were calculated to assess the probability of PCOS. The level of significance was fixed at $P < 0.05$. To assess the probability of PCOS, odds ratios and confidence intervals of 95% were calculated.

3. RESULTS AND DISCUSSIONS

The most participants were in the 25-29 age group (27.9%), followed by the 20-24 age group (19.2%) and the 30-34 age group (20.6%). The mean age of participants was 26.34 ± 6.63 years. The mean age for Menarche was almost similar in patients with PCOs (12.64 years in cases) and controls without PCOs (12.61 years in controls). See figure (1).

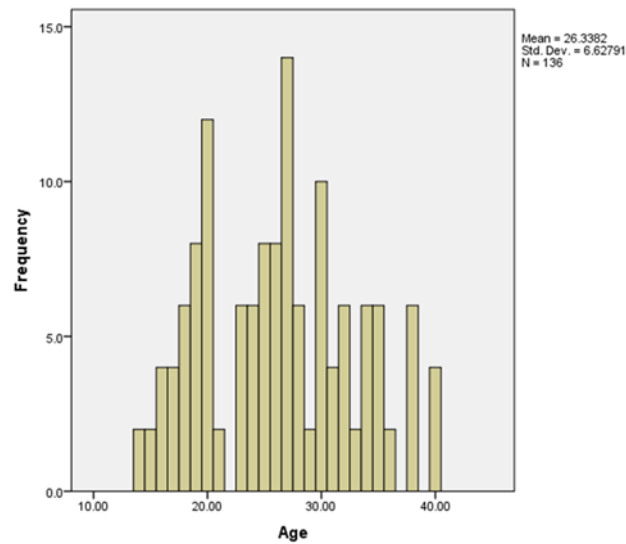


Figure 1. Histogram displaying mean age for study participants

Regarding BMI, among the cases, 2.9% were classified as underweight, 32.4% as healthy weight, 27.9% as overweight, and 36.8% as obese. In comparison, among the control group, 1.5% were underweight, 47.1% were healthy weight, 38.2% were overweight, and 13.2% were obese. See figure (2). Overall, the majority of participants in both groups were classified as either healthy weight or overweight. In case groups overwhelming majority of participants were from urban areas 46 (67.6%), while the rest were from rural areas 22 (32.4%). In comparison, the proportion of people living in urban areas was higher in the control group 54 (79.4%) and the proportion of people living in rural areas was lower 14 (20.6%).

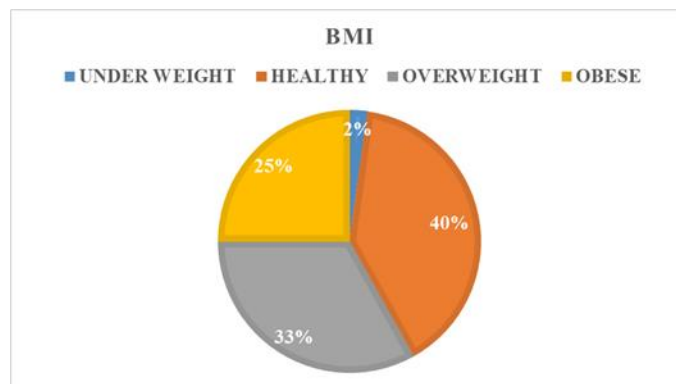


Figure (2): Pie chart showing distribution of body mass index (BMI)

Income status analysis showed a significance difference ($p = X 0.075$), with the < 40,000 income category having the highest representation (31.7%) compared to 50,000-100,000 (58.8%) and >100,000 (9.5%). There was a statistically significant difference ($p= 0.013$) in BMI categories between the groups. See table (1).

Table (1): Comparison of Socio-Demographic Factors and BMI between women with polycystic ovarian syndrome (cases) and healthy women (controls) groups.

Variables	Cases n = 68 NO. (%)	Controls n = 68 NO. (%)	Total n = 136 NO. (%)	X ² test, *p- value
Age (Mean ±SD)	26.33 ± 6.65	26.33 ± 6.65	26.33 ± 6.62	
AGE GROUPS				
14-19	13 (19.1)	13 (19.1)	26 (19.2)	1.000
20-24	13 (19.1)	13 (19.1)	26 (19.2)	
25-29	19 (27.9)	19 (27.9)	38 (27.9)	
30-34	14 (20.6)	14 (20.6)	28 (20.6)	
35-39	7 (10.3)	7 (10.3)	14 (10.2)	
40-44	2 (3.0)	2 (3.0)	4 (3.0)	
INCOME STATUS				
< 40,000	27 (19.9)	16 (11.8)	43 (31.7)	0.075
50,000-100,000	37 (27.2)	43 (31.6)	80 (58.8)	
>100,000	4 (2.9)	9 (6.6)	13 (9.5)	
EDUCATION LEVEL				
Illiterate	9 (6.6)	11 (8.1)	20 (14.7)	0.221
Primary	26 (19.1)	17 (12.5)	43 (31.6)	
Middle	24 (17.6)	34 (25.0)	58 (42.6)	
High School	9 (6.6)	6 (4.4)	15 (11.0)	
BMI CATEGORIES				
Underweight	2 (1.5)	1 (0.7)	3 (2.2)	0.013
Healthy	22 (16.2)	32 (23.5)	54 (39.7)	
Overweight	19 (14.0)	26 (19.1)	45 (33.1)	
Obese	25 (18.4)	9 (6.6)	34 (25.0)	

Significance level: p – value ≤ 0.05

The study participants with a family history of PCOS were significantly more likely had PCOS (cases) than controls (17.6% vs. 8.1%), (p = 0.011), with OR = 2.826, (95% CI = 1.251 - 6.384) indicates that participants with family history of PCOS are three times more likely to have PCOS, However, family history had shown that there were no significant differences in family history of both cases and controls with or without comorbid conditions like diabetes (p = 0.165), HTN (p = 0.298), infertility (p = 0.307), or marital status (p = 1.000). difficulty in conception (p=0.012) and infertility treatment (p = 0.011) were significant to PCOs. See table (2).

Table (2): Comparison of Residence, Exercise &F/H of PCOS, Diabetes, HTN, Infertility, clinical symptoms (Irregular periods, Hirsutism, Skin darkening, U/S diagnosis) and marital status between cases and controls

Variables	Cases n = 68 NO. (%)	Controls n = 68 NO. (%)	OR	95 % CI	X ² test, *p- value
RESIDENCY					
Urban	46 (33.8)	54 (39.7)	0.542	0.249 - 1.179	0.120
Rural	22 (16.2)	14 (10.3)			
PHYSICAL EXERCISE					
Yes	24 (17.6)	23 (16.9)	1.067	0.526 - 2.164	0.857
No	44 (32.4)	45 (33.1)			
F/H PCOS					
Yes	24 (17.6)	11 (8.1)	2.826	1.251 - 6.384	0.011
No	44 (32.4)	57 (41.9)			
F/H DIABETES					
Yes	33 (24.3)	25 (18.4)	1.622	0.818 - 3.217	0.165
No	35 (25.7)	43 (31.6)			
F/H HTN					
Yes	42 (30.9)	36 (26.5)	1.436	0.726 - 2.842	0.298
No	26 (19.1)	32 (23.5)			
F/H INFERTILITY					
Yes	18 (13.2)	13 (9.6)	1.523	0.678 - 3.423	0.307
No	50 (36.8)	55 (40.4)			

IRREGULAR PERIODS					
Yes	54 (39.7)	16 (11.8)	12.536	5.565 - 28.238	0.000
No	14 (10.3)	52 (38.2)			
HIRUTISM					
Yes	39 (28.7)	8 (5.9)	10.086	4.182 - 24.327	0.000
No	29 (21.3)	60 (44.1)			
SKIN DARKENING					
Yes	21 (15.4)	13 (9.6)	1.890	0.855 - 4.181	0.113
No	47 (34.6)	55 (40.4)			
U/S DIAGNOSIS					
Yes	59 (43.4)	11 (8.1)	33.970	13.096 - 88.116	0.000
No	9 (6.6)	57 (41.9)			
MARITAL STATUS					
Single	13 (19.1)	13 (19.1)	1.000	0.425- 2.351	1.000
Married	55 (80.9)	55 (80.9)			

*Significance level: p – value ≤ 0.05

Clinical symptoms such as irregular periods, hirsutism, skin darkening, and U/S diagnosis of PCOS were found to be significantly associated among cases than controls. The abortion rate in patients with PCOs were almost similar to controls, i.e. 22 participants from each group, and abortion was not significant PCOs (p=0.770). However, difficulty in conception (p=0.012) and infertility treatment (p = 0.011) were significant to PCOs in table (3). 34 and 29 participants with conception difficulty and infertility involved in case groups. Gravida had no significant association with PCOs (p = 0.233). The findings suggest that a higher proportion of controls 42 (56.8%) reported being pregnant at least once compared to cases 32 (43.2%).

Higher proportion of controls reported never consuming sweets or desserts compared to cases (11.8% cases, 36.8% controls,). There was a significant association (p = 0.004) of sweets/deserts with PCOS. Among fats intake, there were no significant differences in the consumption of meat/poultry/fish or fried/junk but dairy products with (p=0.006) was significant to PCOs. See table (4).

Table (3): Comparison of Reproductive health variables between cases and controls.

Variables	Cases n = 68 NO. (%)	Controls n = 68 NO. (%)	Total n = 136 NO. (%)	X ² test, *p- value
Menarche (Mean ±SD)	12.64±1.32	12.61±1.34	12.6±1.33	
Abortion in:				
Unmarried	13 (56.5%)	10 (43.5%)	23 (16.9%)	0.770
Married				
Yes	22 (50.0%)	22 (50.0%)	44 (32.4%)	
No	33 (47.8%)	36 (52.2%)	69 (50.7%)	
Gravida:				
Unmarried	13 (56.5%)	10 (43.5%)	23 (16.9%)	0.233
Married				
Yes	32 (43.2%)	42 (56.8%)	74 (54.4%)	
No	23 (59.0%)	16 (41.0%)	39 (28.7%)	
Conception difficulty				
Unmarried	13 (56.5%)	10 (43.5%)	23 (16.9%)	0.012
Married				
Yes	34 (63.0%)	20 (37.0%)	54 (39.7%)	
No	21 (35.6%)	38 (64.4%)	59 (43.4%)	
Infertility treatment				
Unmarried	13 (56.5%)	10 (43.5%)	23 (16.9%)	0.011
Married				
Yes	29 (65.9%)	15 (34.1%)	44 (32.4%)	
No	26 (37.7%)	43 (62.3%)	69 (50.7%)	

*Significance level: p – value ≤ 0.05

Table (4): Comparison of Dietary factors variables between cases and controls

	Variables	Cases n = 68 NO. (%)	Controls n = 68 NO. (%)	Total n = 136 NO. (%)	χ^2 test, *p- value
CARBOHYDRATES	Bread/Rice/Grains				0.315
	Never				
	Rarely	5 (7.4%)	1 (1.5%)	6 (4.4%)	
	Oftenly	8 (11.8%)	5 (7.4%)	13 (9.6%)	
	Always	123 (90.4%)	123 (90.4%)	246 (90.4%)	
	Sweets/Deserts				0.004
	Never	25 (36.8%)	8 (11.8%)	33 (24.3%)	
	Rarely	15 (22.1%)	26 (38.2%)	41 (30.1%)	
	Oftenly	13 (19.1%)	20 (29.4%)	33 (24.3%)	
	Always	15 (22.1%)	14 (20.6%)	29 (21.3%)	
FATS	Meat/Poultry/Fish				0.418
	Never	4 (5.9%)	2 (2.9%)	6 (4.4%)	
	Rarely	15 (22.1%)	10 (14.7%)	25 (18.4%)	
	Oftenly	36 (52.9%)	45 (66.2%)	81 (59.6%)	
	Always	13 (19.1%)	11 (16.2%)	24 (17.6%)	
	Dairy Products				0.006
	Never	23 (33.8%)	13 (19.1%)	36 (26.5%)	
	Rarely	17 (25.0%)	8 (11.8%)	25 (18.4%)	
	Oftenly	12 (17.6%)	13 (19.1%)	25 (18.4%)	
	Always	16 (23.5%)	34 (50.0%)	50 (36.8%)	
	Fried Junk				0.030
	Never	8 (11.8%)	3 (4.4%)	11 (8.1%)	
	Rarely	16 (23.5%)	30 (44.1%)	46 (33.8%)	
	Oftenly	30 (44.1%)	28 (41.2%)	58 (42.6%)	
Always	14 (20.6%)	7 (10.3%)	21 (15.4%)		
FIBRES	Fruits				0.126
	Never	13 (19.1%)	6 (8.8%)	19 (14.0%)	
	Rarely	22 (32.4%)	16 (23.5%)	38 (27.9%)	
	Oftenly	17 (25.0%)	25 (36.8%)	42 (30.9%)	
	Always	16 (23.5%)	21 (30.9%)	37 (27.2%)	
	Vegees				0.651
	Never	8 (11.8%)	4 (5.9%)	12 (8.8%)	
	Rarely	7 (10.3%)	6 (8.8%)	13 (9.6%)	
	Oftenly	24 (35.3%)	26 (38.2%)	50 (36.8%)	
	Always	29 (42.6%)	32 (47.1%)	61 (44.9%)	
MICRONUTRIENTS	Vit. D food				0.279
	Never	29 (42.6%)	21 (30.9%)	50 (36.8%)	
	Rarely	24 (35.3%)	23 (33.8%)	47 (34.6%)	
	Oftenly	11 (16.2%)	15 (22.1%)	26 (19.1%)	
	Always	4 (5.9%)	9 (13.2%)	13 (9.6%)	
BEVERAGES	Tea				0.154
	Never	12 (17.6%)	12 (17.6%)	24 (17.6%)	
	Rarely	5 (7.4%)	11 (16.2%)	16 (11.8%)	
	Oftenly	9 (13.2%)	3 (4.4%)	12 (8.8%)	
	Always	42 (61.8%)	42 (61.8%)	84 (61.8%)	
	Drinks				0.307
	Never	31 (45.6%)	34 (50.0%)	65 (47.8%)	
	Rarely	12 (17.6%)	16 (23.5%)	28 (20.6%)	
	Oftenly	18 (26.5%)	16 (23.5%)	34 (25.0%)	
	Always	7 (10.3%)	2 (2.9%)	9 (6.6%)	
	Coffee				0.184
	Never	54 (79.4%)	57 (83.8%)	111 (81.6%)	
	Rarely	8 (11.8%)	6 (8.8%)	14 (10.3%)	
	Oftenly	5 (7.4%)	1 (1.5%)	6 (4.4%)	
	Always	1 (1.5%)	4 (5.9%)	5 (3.7%)	
	Fresh juices				0.143
	Never	37 (54.4%)	26 (38.2%)	63 (46.3%)	
	Rarely	12 (17.6%)	15 (22.1%)	27 (19.9%)	
	Oftenly	15 (22.1%)	25 (36.8%)	40 (29.4%)	
Always	4 (5.9%)	2 (2.9%)	6 (4.4%)		

Overall, the results findings suggest that income status, BMI, F/H of PCOs, irregular menstrual cycle, hirsutism, infertility treatment, difficulty in conception had significant association with PCOS. Further, there may be differences in dietary habits between individuals with and without PCOS, particularly in the consumption of sweets/desserts, dairy food. These differences may have implications for the management and prevention of PCOS. The results of this investigation provide important new insights into the complex relationships between clinical, lifestyle, and socio-demographic variables linked to polycystic ovarian syndrome (PCOS). Although PCOS is commonly understood to be a hormonal and metabolic condition, research results point to a wider role for family history, nutrition, and socioeconomic position in the disease's development. The majority of participants in our study, with a mean age of 26.34 ± 6.63 years, belonged to the 25–29 age group. This result is in line with current research that showed women who are fertile have a higher chance of developing PCOS. In our study, there was a correlation between PCOS and body mass index (BMI). Insulin resistance is believed to be exacerbated by obesity and can worsen symptoms of PCOS. Particularly for those who are overweight or obese, public health initiatives focused on weight management through food and exercise treatments may help lessen the effects of PCOS. The likelihood show that a person's socioeconomic level may have an impact on stress, lifestyle decisions, and access to healthcare all of which may exacerbate PCOS. The fact that more people in the case (67.6%) and control (79.4%) groups were urban dwellers suggests that urbanization, which is linked to a higher prevalence of unhealthy habits and processed food consumption, may be a contributing factor to the higher incidence of PCOS in urban areas. This is consistent with results from other urbanized research that have shown a connection between the prevalence of PCOS and living in an urban location. There was a strong correlation between PCOS and family history; cases were three times more likely to have a history of PCOS in their family (OR = 2.826, 95% CI = 1.251 - 6.384). This highlights the hereditary susceptibility to PCOS and highlights the importance of early screening and counselling for those who have a family history of the condition. Surprisingly, there were no appreciable differences between patients and controls for associated diseases such diabetes, hypertension, and infertility. This could be a reflection of PCOS's complexity, as it manifests itself in a variety of phenotypes and comorbidities. The lack of strong correlations with these illnesses may also imply that various groups experience PCOS in different ways, which reinforces the need for more study in this field. PCOS was substantially linked to both treatment for infertility and difficulties conceiving. This is consistent with the knowledge that anovulation and irregular menstrual cycles caused by PCOS are major contributors to infertility. The significance of managing reproductive health as part of PCOS care is further supported by our findings. Reproductive therapy and access to fertility treatments should be made available to PCOS women in order to help them control their symptoms and enhance their quality of life. The link between food choices and PCOS was one of our study's key findings. In particular, compared to those with PCOS, individuals in the control group were more inclined to stay away from desserts and sweets. Furthermore, there was a significant correlation found between PCOS and dairy consumption, but not between the consumption of other fats such meat, poultry, fish, or junk food and PCOS. These results imply that specific dietary decisions, especially those involving sugar and high-fat dairy products, may affect the onset or severity of PCOS. Healthcare professionals should think include nutritional counselling in the treatment of women with PCOS, since diet plays an increasingly vital part in managing PCOS.

CONCLUSIONS

Our research revealed a number of significant variables, such as BMI, family history, socioeconomic status, and eating patterns that are linked to PCOS. These findings have significant public health consequences and add to the expanding field of research on PCOS. The prevalence of PCOS could be considerably decreased with weight-management, dietary changes, and early screening for women with a family history of the condition. To fully understand the broad spectrum of risk factors for PCOS and to investigate the significance of socio-demographic factors, particularly in diverse cultural and economic situations, more study is required.

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