

The Impact of Lifestyle Factors on Infertility in Women with PCOS: A study in Community Based Medical College, Bangladesh

*Busreea RA¹, Begum F², Siddika M³, Jahan A⁴

Abstract

Polycystic Ovary Syndrome (PCOS) is a prevalent endocrine disorder among women of reproductive age and a leading cause of anovulatory infertility. Emerging evidence suggests that modifiable lifestyle factors, including obesity, physical activity, diet, and sleep patterns, may influence reproductive outcomes in this population. This study aimed to evaluate the impact of lifestyle factors on infertility among women with PCOS and to identify modifiable determinants that may contribute to reproductive dysfunction. This cross-sectional study was conducted from January to December 2025 at the Community Based Medical College, Bangladesh. A total of 167 women aged 18–40 years, diagnosed with PCOS according to the Rotterdam criteria, were included. Participants with other causes of infertility, chronic medical conditions, pregnancy, or prior pelvic surgery were excluded. Data were collected using a structured questionnaire covering socio-demographic characteristics, menstrual and reproductive history, and lifestyle behaviors. Anthropometric measurements were obtained following standardized procedures, and body mass index (BMI) was calculated. Lifestyle factors assessed included physical activity, dietary patterns, and sleep quality. Infertility was categorized as primary, secondary, or absent. Associations between lifestyle factors and infertility were analyzed using chi-square tests, odds ratios (OR) with 95% confidence intervals (CI), and logistic regression to determine independent predictors. The mean age of participants was 29.4 ± 4.8 years, and the mean BMI was 27.8 ± 3.6 kg/m². Primary infertility was observed in 56.3% of women, secondary infertility in 28.7%, and 15.0% reported no infertility. Menstrual irregularities were common, with oligomenorrhea (46.7%) and amenorrhea (24.0%). Lifestyle behaviors varied, with 31.1% reporting regular exercise, 36.5% following a healthy diet, and 52.7% experiencing inadequate sleep. Obesity (OR 2.48, 95% CI 1.30–4.70, $p=0.004$) and physical inactivity (OR 2.19, 95% CI 1.14–4.21, $p=0.017$) emerged as independent predictors of infertility. Unhealthy diet showed a marginal association (OR 1.88, 95% CI 1.01–3.51, $p=0.041$), whereas poor sleep did not reach statistical significance. Modifiable lifestyle factors, particularly obesity and physical inactivity, play a critical role in infertility among women with PCOS. Interventions targeting weight management, regular physical activity, and healthy dietary habits may improve reproductive outcomes and overall metabolic health. These findings support the integration of lifestyle-focused strategies alongside conventional medical management for comprehensive care in women with PCOS.

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Introduction

Infertility is widely recognized as a significant reproductive health concern affecting couples across the globe. Clinically, infertility refers to the inability to achieve pregnancy after twelve months of regular, unprotected sexual intercourse. Current estimates suggest that approximately 10–15% of couples experience infertility at some stage of their reproductive lives, indicating the considerable magnitude of this condition worldwide.¹ Beyond the biological implications, infertility frequently carries psychological and social consequences, particularly in cultures where childbearing is closely associated with family stability and social expectations. Women,

1. *Dr. Reeva Aireen Busreea, Associate Professor, Department of Obstetrics and Gynaecology, Community Based Medical College and Hospital, Bangladesh.
2. Dr. Ferdousi Begum, Associate Professor, Department of Obstetrics and Gynaecology, Community Based Medical College and Hospital, Bangladesh.
3. Dr. Mohosina Siddika, Associate Professor, Department of Obstetrics and Gynaecology, Community Based Medical College and Hospital, Bangladesh.
4. Dr. Akter Jahan, Associate Professor, Department of Obstetrics and Gynaecology, Community Based Medical College and Hospital, Bangladesh.

Address of Correspondence:

Email: dr.reeva.islam@gmail.com

in particular, often experience emotional stress, social pressure, and reduced quality of life when fertility problems arise. Among the diverse causes of female infertility, Polycystic Ovary Syndrome (PCOS) is considered one of the most common endocrine disorders affecting women of reproductive age. PCOS is a multifaceted condition characterized by hormonal imbalance and metabolic abnormalities that disrupt normal reproductive function. According to the widely accepted Rotterdam diagnostic criteria, PCOS is identified by the presence of at least two of the following features: hyperandrogenism, ovulatory dysfunction, and polycystic ovarian morphology detected through imaging.² Epidemiological studies indicate that the prevalence of PCOS ranges from approximately 6% to 20% among women of reproductive age, depending on the population studied and the diagnostic criteria applied.³ Because ovulatory dysfunction is a central feature of this condition, PCOS represents a major contributor to anovulatory infertility. The mechanisms responsible for infertility in women with PCOS are complex and involve interactions between endocrine, metabolic, and environmental factors. One of the key pathophysiological features of PCOS is excessive androgen production, which interferes with the normal process of follicular maturation and ovulation.⁴ Additionally, disturbances in the hypothalamic–pituitary–ovarian axis further impair the regulation of reproductive hormones. Insulin resistance, which is commonly observed in individuals with PCOS, also plays a pivotal role in the development of both metabolic and reproductive abnormalities. Elevated insulin levels stimulate ovarian androgen production and exacerbate hormonal imbalance, thereby contributing to ovulatory dysfunction and reduced fertility potential.⁵ In recent years, attention has increasingly focused on the influence of modifiable

lifestyle factors in the development and progression of PCOS and its reproductive consequences. Lifestyle characteristics such as body weight, dietary habits, physical activity, and sleep patterns are now recognized as important determinants of metabolic health in women with PCOS.⁶ These factors may either aggravate endocrine disturbances or contribute to their improvement depending on individual behavioral patterns. Obesity is frequently reported among women with PCOS and is strongly associated with insulin resistance and hyperandrogenism. Excess adipose tissue contributes to chronic low-grade inflammation and metabolic dysregulation, which may worsen ovulatory disturbances and decrease fertility potential.⁷ Evidence indicates that women with PCOS who are overweight or obese are more likely to experience irregular menstrual cycles and reduced ovulatory frequency compared with women who maintain a healthy body mass index. Physical activity is another lifestyle factor that can significantly influence reproductive outcomes. Sedentary behavior may contribute to weight gain and metabolic dysfunction, thereby exacerbating the hormonal disturbances observed in PCOS. Conversely, regular physical exercise has been shown to improve insulin sensitivity, assist in weight management, and promote more regular ovulatory cycles.⁸ Consequently, lifestyle modification programs emphasizing increased physical activity and behavioral change are commonly recommended as part of the first-line management of PCOS-related infertility. Dietary patterns may also play a crucial role in metabolic regulation among women with PCOS. Diets characterized by excessive intake of refined carbohydrates, processed foods, and saturated fats have been associated with increased insulin resistance and metabolic imbalance.⁹ In contrast, balanced nutritional patterns that emphasize whole

grains, fruits, vegetables, and lean protein sources may contribute to improved metabolic profiles and better reproductive outcomes. In addition to nutrition and physical activity, emerging evidence suggests that sleep quality and psychosocial stress may also influence reproductive health. Sleep disturbances appear to be more prevalent among women with PCOS and may contribute to hormonal dysregulation and metabolic abnormalities that negatively affect fertility.¹⁰ Despite increasing recognition of these factors, the relationship between lifestyle behaviors and infertility among women with PCOS has not been fully explored in many populations, particularly in developing countries. Given the growing prevalence of PCOS and the potential role of modifiable lifestyle determinants, it is essential to better understand how these factors influence reproductive outcomes. Identifying lifestyle behaviors associated with infertility may provide valuable insights for preventive strategies and clinical management. Therefore, the present study aims to evaluate the impact of lifestyle factors on infertility among women diagnosed with PCOS, with particular emphasis on identifying modifiable determinants that may influence reproductive health.

Methods

A cross-sectional study was conducted from January to December 2025 at the Community Based Medical College, Bangladesh, to assess the impact of lifestyle factors on infertility among women with Polycystic Ovary Syndrome (PCOS). A total of 167 women aged 18–40 years, diagnosed according to the Rotterdam criteria, were included. Women with other known causes of infertility, chronic medical conditions, pregnancy, or prior pelvic surgery were excluded to minimize confounding. Written informed consent was obtained from all participants. Data were collected

using a structured questionnaire capturing socio-demographic characteristics (age, education, occupation), reproductive history, menstrual patterns, and lifestyle factors, including physical activity, dietary habits, and sleep quality. Physical activity was classified as regular, irregular, or absent; dietary patterns as healthy, mixed, or fast-food dominant; and sleep as adequate or inadequate. Anthropometric measurements, including height and weight, were taken following standardized procedures, and body mass index (BMI) was calculated and categorized according to WHO criteria. The primary outcome was infertility, categorized as primary, secondary, or absent. Descriptive statistics summarized continuous variables as mean $\pm$ standard deviation and categorical variables as frequencies and percentages. Associations between lifestyle factors and infertility were analyzed using odds ratios (OR) with 95% confidence intervals (CI), chi-square tests, and logistic regression to identify independent predictors. Analyses were performed using SPSS version 26.0, with $p < 0.05$ considered statistically significant. This approach enabled a systematic evaluation of modifiable lifestyle factors and their influence on reproductive outcomes in women with PCOS.

Results

A total of 167 women with PCOS were included in the study. The socio-demographic profile of participants is summarized in Fig. 1. The majority of women were aged 26–30 years (37.1%), followed by 31–35 years (26.9%) and 18–25 years (22.8%). Participants were predominantly educated at a higher level (44.3%), while 38.3% had secondary education and 17.4% primary education (Fig. 2). More than half of the participants were housewives (57.5%), with the

remainder engaged in service (24.6%) or business (18.0%) (Fig. 3). Clinical characteristics are presented in Table 1. The mean age of participants was 29.4 ± 4.8 years, with an average BMI of 27.8 ± 3.6 kg/m². The mean duration of infertility was 3.1 ± 1.7 years, and the average menstrual cycle length was 38.2 ± 6.5 days. Menstrual irregularities were common (Table 1), with oligomenorrhea reported in 46.7% of participants, amenorrhea in 24.0%, and only 29.3% demonstrating regular cycles. Lifestyle behaviors varied among participants (Table 2). Regular physical activity was reported by 31.1%, whereas 28.7% reported no exercise. Dietary patterns were mixed in 43.7% of women, while 36.5% followed a healthy diet and 19.8% consumed a predominantly fast-food diet. Inadequate sleep was reported by 52.7% of participants. Infertility patterns are shown in Table 5. Primary infertility was observed in 56.3% of participants, secondary infertility in 28.7%, and 15.0% reported no infertility (Table 3). Associations between lifestyle factors and infertility (Table 4) indicated that obesity, physical inactivity, unhealthy diet, and poor sleep were significantly associated with infertility ($p < 0.05$). Women with obesity had a threefold higher odd of infertility (OR 3.1, 95% CI 1.5–6.4), while physical inactivity, unhealthy diet, and poor sleep were associated with increased odds of 2.7, 2.1, and 2.2, respectively. Logistic regression analysis (Table 5) identified obesity (OR 2.48, 95% CI 1.30–4.70, $p = 0.004$) and physical inactivity (OR 2.19, 95% CI 1.14–4.21, $p = 0.017$) as independent predictors of infertility. Unhealthy diet showed a marginal association (OR 1.88, 95% CI 1.01–3.51, $p = 0.041$), whereas poor sleep did not reach statistical significance (OR 1.77, 95% CI 0.94–3.35, $p = 0.072$). Overall, these findings highlight that modifiable lifestyle factors, particularly obesity and physical inactivity, play a significant role in the infertility

observed among women with PCOS, emphasizing the importance of targeted lifestyle interventions for improving reproductive outcomes.

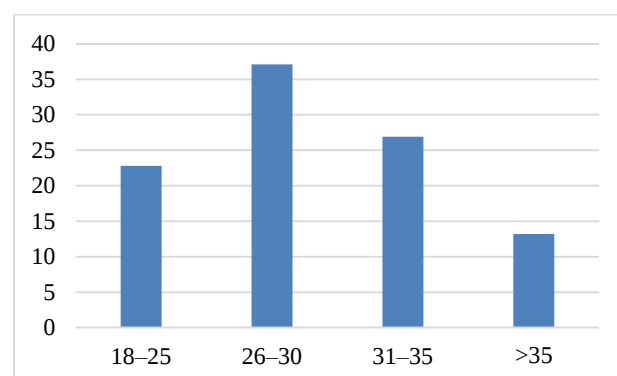


Figure 1. Column Chart Showed Age-wise Frequency of Participants

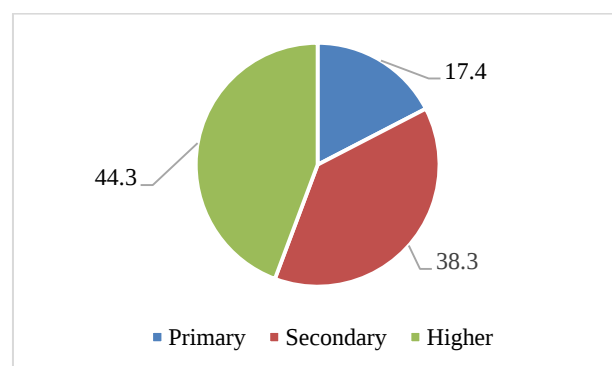


Figure 2. Pie Chart Showed Gender-wise Frequency of Participants

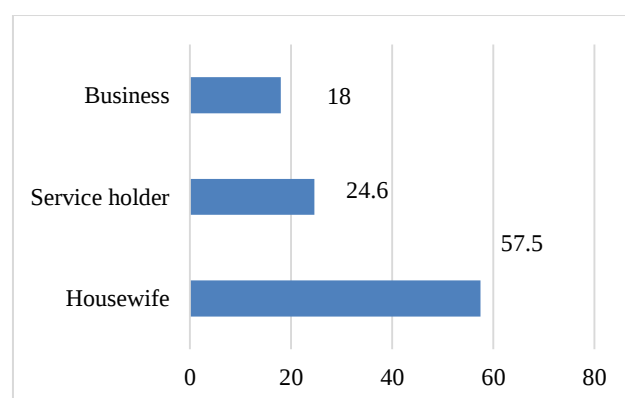


Figure 3. Bar Chart Showed Educational-wise Frequency of Participants

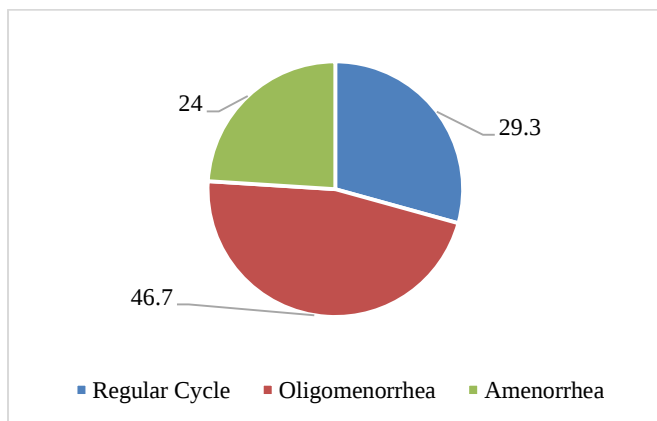


Figure 4. Bar Chart Showed Menstrual Characteristics of the Study Participants

Table 1: Clinical Characteristics of Women with PCOS (n=167)

Variables	Mean $\pm$ SD
Age (years)	29.4 $\pm$ 4.8
BMI (kg/m ²)	27.8 $\pm$ 3.6
Duration of Infertility (years)	3.1 $\pm$ 1.7
Menstrual Cycle Length (days)	38.2 $\pm$ 6.5

Table 2: Distribution of Lifestyle Factors among Women with PCOS (n=167)

Lifestyle Factors	Frequency	Percentage
Physical Activity		
Regular Exercise	52	31.1
Irregular Exercise	67	40.1
No Exercise	48	28.7
Dietary Pattern		
Healthy Diet	61	36.5
Mixed Diet	73	43.7
Fast Food Dominant	33	19.8
Sleep Pattern		
Adequate Sleep	79	47.3
Inadequate Sleep	88	52.7

Table 3: Infertility Status among Women with PCOS (n=167)

Infertility Type	Frequency	Percentage
Primary Infertility	94	56.3
Secondary Infertility	48	28.7
No Infertility	25	15.0
Total	167	100

Table 4: Association between Lifestyle Factors and Infertility

Lifestyle Factor	Infertility Present n (%)	Infertility Absent n (%)	OR	95% CI	p-value
Obesity	74 (63.2)	14 (28.0)	3.1	1.5–6.4	0.002
Physical Inactivity	81 (69.2)	19 (38.0)	2.7	1.3–5.5	0.006
Unhealthy Diet	69 (58.9)	18 (36.0)	2.1	1.1–4.2	0.021
Poor Sleep	73 (62.4)	21 (42.0)	2.2	1.1–4.5	0.018

Table 5: Logistic Regression Analysis of Lifestyle Predictors of Infertility

Variables	β	OR	95% CI	p-value
Obesity	0.91	2.48	1.30–4.70	0.004
Physical Inactivity	0.78	2.19	1.14–4.21	0.017
Unhealthy Diet	0.63	1.88	1.01–3.51	0.041
Poor Sleep	0.57	1.77	0.94–3.35	0.072

Discussion

The present study evaluated the impact of lifestyle factors on infertility among women with PCOS, revealing that obesity and physical inactivity are the most significant predictors of reproductive dysfunction. Consistent with prior reports, the majority of participants were young adults aged 26–30 years, reflecting the age group at peak reproductive activity and emphasizing the clinical relevance of addressing modifiable risk factors early in life.^{11,12} The high prevalence of menstrual irregularities, including oligomenorrhea and amenorrhea, aligns with existing evidence highlighting ovulatory dysfunction as a central feature of PCOS-related infertility.^{13,14} Our findings demonstrate that obesity significantly increases the odds of infertility, a result corroborated by previous studies reporting that excess adiposity

exacerbates insulin resistance, hyperandrogenism, and anovulatory cycles.¹⁵⁻¹⁷ Physical inactivity emerged as an independent predictor, reinforcing the concept that sedentary behavior not only contributes to weight gain but also directly impairs metabolic and reproductive homeostasis.^{18,19} These findings highlight the need for early implementation of lifestyle interventions focusing on regular physical activity to improve fertility outcomes in women with PCOS.^{20,21} Dietary patterns also showed a notable association with infertility, with fast-food–dominant and unbalanced diets linked to higher odds of reproductive dysfunction. This supports prior research suggesting that diets high in refined carbohydrates and saturated fats aggravate insulin resistance and hormonal imbalance, whereas nutrient-dense diets may improve ovulatory function.^{16,17,22} Interestingly, inadequate sleep was common in this cohort and was associated with infertility in univariate analysis, although its effect was not statistically significant in multivariate models. Sleep disturbances have been previously implicated in hormonal dysregulation and altered hypothalamic–pituitary–ovarian axis activity, suggesting a potential contributory role that warrants further investigation.^{19,20} The current study also highlights a research gap in the integration of lifestyle modification into routine clinical management for PCOS-related infertility. While pharmacological treatments such as clomiphene citrate and letrozole remain standard for ovulation induction, lifestyle interventions—including weight reduction, exercise, and dietary counseling—are often underemphasized in clinical practice, particularly in low-resource settings.²¹⁻²³ Our findings suggest that addressing modifiable behaviors may not only enhance fertility outcomes but also reduce long-term cardiometabolic risk, thereby providing dual benefits.^{24,25} Comparing with international data, the prevalence of primary infertility in our cohort (56.3%) is slightly higher than

reported in some studies, reflecting potential differences in genetic, environmental, and lifestyle factors across populations.^{24,25} The heterogeneity of PCOS phenotypes underscores the importance of personalized management strategies, tailored to the patient's metabolic and reproductive profile. This study has several strengths, including a relatively large community-based sample, comprehensive assessment of lifestyle factors, and the use of standardized criteria for PCOS diagnosis. However, certain limitations must be acknowledged. The cross-sectional design precludes causal inference, and reliance on self-reported lifestyle behaviors may introduce recall bias. Additionally, other potential confounders, such as psychosocial stress and environmental exposures, were not fully explored and may contribute to infertility in this population. In conclusion, the findings of this study underscore the critical influence of modifiable lifestyle factors on infertility among women with PCOS. Obesity and physical inactivity were identified as independent predictors of reproductive dysfunction, while dietary patterns and sleep quality demonstrated contributory effects. These results highlight the urgent need for integrated lifestyle-focused interventions as part of comprehensive PCOS management. Further longitudinal studies are warranted to clarify causal relationships and to develop context-specific strategies for optimizing fertility outcomes.

Conclusion

This study demonstrates that modifiable lifestyle factors play a pivotal role in the reproductive health of women with PCOS. Obesity and physical inactivity emerged as the strongest independent predictors of infertility, emphasizing the importance of weight management and regular exercise in this population. Additionally, dietary habits and sleep quality were identified as contributory factors influencing fertility

outcomes. These findings underscore the need for comprehensive, individualized interventions that integrate lifestyle modification alongside conventional medical treatment to optimize reproductive potential. By highlighting the interplay between lifestyle behaviors and infertility, this research provides evidence for clinicians and public health practitioners to design targeted strategies aimed at improving ovulatory function and overall metabolic health. Future longitudinal studies are warranted to confirm causal relationships and to evaluate the effectiveness of structured lifestyle interventions on fertility outcomes in diverse PCOS populations. Ultimately, proactive management of lifestyle factors offers a promising approach to enhance reproductive success and long-term health in women affected by PCOS.

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