

Original Research Article

Prevalence of polycystic ovarian syndrome and its relationship with body mass index and stress in women attending a tertiary fertility center in Malaysia

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Abstract

Purpose: To assess the prevalence of polycystic ovary syndrome (PCOS) among women attending the International Islamic University Malaysia Fertility (IIUM) Center in Kuantan, Pahang, and to explore how lifestyle factors relate to its cause.

Methods: This study utilized a cross-sectional design to assess the common occurrence of polycystic ovarian syndrome and its related outcomes in a specified population. Consequently, it explores the connections between contributing factors, like weight and lifestyle, and polycystic ovary syndrome.

Results: Of the 759 female patients who visited the IIUM Fertility Center, 57 were diagnosed with PCOS, accounting for 7.5 % (57/759). Among the 40 women with PCOS who participated in the study, 18 (45 %) were categorized as having a high BMI, 16 (40 %) were classified as overweight, while 6 (15 %) were regarded as having a normal BMI. With respect to the stress levels, the medium-stress category reported the highest number, accounting for 22 patients, or 55 %, while the high-stress group had 18 patients, representing 45 %. Remarkably, no patients fell into the low-stress category, as none scored within that range. Furthermore, no significant correlation was identified between obesity and stress scores, as the *p*-value was above 0.05.

Conclusion: Many women who have been diagnosed with PCOS have visited the IIUM Fertility Center in Kuantan, Pahang. While the reported 7.5 % prevalence of PCOS might seem minor in comparison to other fertility issues, this study focused solely on one particular center.

Keywords: Prevalence, Polycystic ovarian syndrome, BMI, Stress

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INTRODUCTION

Over the recent decades, the occurrence of diseases affecting humans has significantly risen. Polycystic ovarian syndrome (PCOS) is acknowledged as one of the common disorders in the endocrine system, and it is a prevalent gynecological and endocrine condition that can lead to infertility [1]. It presents various clinical

symptoms, including irregular menstrual cycles, amenorrhea, hormonal imbalances, hirsutism, acne, weight gain and fertility challenges. This condition is characterized by hormonal imbalance, insulin resistance, inflammation and oxidative stress. Nevertheless, the specific mechanisms underlying this disorder are not fully understood [2]. Recent reports indicate that oxidative stress might play a role in the pathophysiology of PCOS, as women with the

syndrome demonstrate a significant elevation in oxidative stress, which may ultimately be responsible for a worsening picture of hormonal disturbances, inflammation and insulin resistance [3].

A previous study indicates that physical exercise may be used as an independent treatment for women affected with PCOS. Polycystic ovary syndrome is diagnosed according to established guidelines, notably the Rotterdam and the National Institutes of Health criteria. Diagnosis usually consists of identification of oligo- or anovulation, signs of hyperandrogenism, and polycystic ovaries visible on ultrasound. These are characterized by the presence of at least eight follicle cysts, less than 10 mm in diameter, along with an increase in ovarian stroma [4]. A separate study from India indicated that India and Iran have the highest rates of PCOS, followed closely by Denmark and Brazil [5].

The incidence of PCOS with depressive symptoms varies widely across countries and regions, while the prevalence of depression in PCOS patients ranges from 37 % to 52 %. In conflict areas such as Syria and Jordan, it is estimated that more than 65 % of women with PCOS experience depression, with some estimates suggesting that this number may be higher. A survey in Pakistan found that 80 % of women with PCOS showed signs of depression, while studies from China revealed a 39 % depression rate in PCOS patients [6]. In comparison, the prevalence of PCOS among 675 female University staff in Malaysia was 12.6 % [7].

Studies suggest that women with a higher body mass index (BMI) are at greater risk of developing PCOS, as excess weight can disrupt hormonal balance and exacerbate symptoms [8]. Physical activity, such as aerobic and resistance exercise, increases insulin sensitivity, promotes weight loss, and improves metabolic and reproductive outcomes in women with PCOS [9]. Furthermore, the quality and quantity of food intake play a critical role in managing symptoms and enhancing fertility. Understanding how lifestyle factors influence PCOS enables healthcare providers to create personalized treatment plans that address the unique needs of each patient. This holistic approach to PCOS management demonstrates how lifestyle modifications can significantly enhance outcomes and improve the quality of life for women with the condition [10]. This study aimed to assess the prevalence of PCOS among women attending the International Islamic University Malaysia (IIUM) Fertility Center in

Kuantan, Pahang, and explore lifestyle factors related to its etiology.

METHODS

The questionnaire consisted of two parts; Part A examined socio-demographic information, with a particular focus on BMI, while Part B assessed how stress associated with PCOS affects quality of life [11]. To facilitate understanding and meet participants' preferences, a bilingual (English and Malay) questionnaire was used. The PCOS Questionnaire (PCOSQ) was composed of 26 items that examined health-related quality of life (HRQoL). Its validity and reliability have been affirmed in earlier studies [12]. This self-administered, multidimensional tool was used to determine the quality of life for women with PCOS. The PCOSQ encompasses five domains, including emotions (eight items), body hair (five items), weight (five items), infertility (four items), and menstrual issues (four items). Patients selected the option that best represented their feelings over the past two weeks. Each item was rated using a structured response scale, typically ranging from low to high impact or severity, allowing participants to indicate the extent to which specific symptoms or issues affect them. The overall stress score was calculated by summing or averaging the responses across relevant items, with higher scores reflecting greater levels of stress or poorer HRQoL. This scoring method enabled a quantitative evaluation of the physical, emotional and social dimensions of life affected by PCOS [13].

Study design and setting

This study used a cross-sectional design because it provides effective results quickly. This method assessed the prevalence of PCOS, its associated outcomes within a specific population and also investigated the association between factors such as weight and lifestyle and PCOS. The IIUM Ethics Committee approved this research under IREC No. 387, and authorization was secured from the IIUM Fertility Center. Prior to participation, individuals were required to sign a participation agreement (consent form). The personal information was anonymized to ensure that data could be used for analysis without revealing their identities.

Inclusion and exclusion criteria

The study participants were selected according to specific criteria: a confirmed diagnosis of PCOS, willingness to participate in the study, and sufficient language or cognitive skills to complete the questionnaire accurately. Exclusion

criteria included women who declined to participate and individuals with language or mental challenges that impeded reliable completion of the questionnaire.

Sample size

To determine the necessary sample size, the Raosoft sample size calculator was used [14]. For this calculation, a 5 % margin of error and a 90 % confidence interval were chosen. In addition, the response distribution was set at 95 %, resulting in an estimated sample size of 49 patients.

Sampling method

This study used a purposive sampling method to collect data. The method involved selecting a limited number of patients with PCOS to participate in the study. The researchers enrolled available participants until they reached the target sample size. Individuals who met the specified criteria were selected and volunteered based on inclusion and exclusion criteria. Out of a total of 759 patients, 57 individuals with PCOS, confirmed by a specialist physician through ultrasound, hormonal analysis, and clinical examination at the IIUM Infertility Center, were included and invited to participate in the study; however, only 40 of them responded positively to the invitation.

Data collection

The self-administered questionnaire facilitated data collection. Each respondent was approached individually and given a brief overview of the surveys. Before participation, they were informed of the research's objectives and the confidentiality agreement. Completed questionnaires were collected on the same day. Participants were guaranteed that their data and outcomes would stay confidential and be utilized solely for academic purposes. In addition, respondents' BMI was obtained from their medical records at the IIUM Fertility Center. The measurements recorded in the patient files were conducted by a trained nurse following standard clinical procedures for height and weight assessment.

Statistical analysis

The raw data were imported into the Statistical Package for Social Sciences (SPSS) software version 20.0 for analysis. Descriptive statistics were performed to summarize the study sample using frequency and percentage. The Chi-square test was employed to investigate the relationship

between all independent and dependent variables and to identify any associations. Group comparisons were evaluated using Pearson's Chi-square (χ^2) test, with $p < 0.05$ deemed statistically significant.

RESULTS

Prevalence of women diagnosed with PCOS at the IIUM fertility center

Among 759 patients examined at the IIUM Fertility Center, 57 were diagnosed with PCOS, accounting for 7.5 % (Table 1).

Table 1: Prevalence of PCOS in the study subjects

Category	Frequency	Percentage (%)
Non-PCOS	702	92.5
PCOS	57	7.5

Socio-demographic characteristics of participants

The 40 participants' demographic details revealed that more than half of the patients (55.0 %) were between the ages of 29 and 39, followed by those aged 18 – 28 years (27.5 %) and participants aged 40 years and above (17.5 %). The majority of respondents identified as Malay (62.5 %), with Indian (22.5 %) and Chinese (15.0 %) ethnicities comprising the remainder. In terms of educational attainment, most participants reported holding a bachelor's degree (62.5 %), while 30.0 % had completed secondary education and 7.5 % possessed a master's degree or higher. With respect to the time since diagnosis, 62.5 % had received their diagnosis 1 – 5 years prior, compared to 27.5 % who had been diagnosed more than five years earlier, and 10.0 % who had been diagnosed within the past year (Table 2).

Frequency of BMI of women diagnosed with PCOS at the IIUM fertility center

Among the 40 women with PCOS, 18 (45 %) were categorized as having a high BMI, 16 (40 %) were classified as overweight, and just 6 (15 %) were regarded as having a normal BMI (Table 3).

Stress score among women diagnosed with PCOS at the IIUM fertility center

The participants responded to multiple questions about their emotional state and were classified into three groups. The scoring ranges are designated as follows: Low (26 - 58), Medium (59 - 94), and High (95 - 130). Among the groups,

the medium stress category reported the highest number, accounting for 22 patients or 55 %. The high-stress group had 18 patients, representing 45 %. Remarkably, no patients fell into the low-stress category, as none scored within that range (Table 4).

Table 2: Socio-demographic characteristics of participants

Demographic characteristics (n = 40)	Number of participants (%)
Age	
18-28	11 (27.5)
29-39	22 (55.0)
> 40	7 (17.5)
Ethnicity	
Malay	25 (62.5)
Indian	9 (22.5)
Chinses	6 (15.0)
Educational level	
Secondary school	12 (30.0)
Bachelor's degree	25 (62.5)
Master's degree and above	3 (7.50)
When was the diagnosis made?	
Less than 1 year	4 (10.0)
1-5 years	25 (62.5)
More than 5 years	11 (27.5)

Table 3: Frequency of BMI in patients with PCOS

BMI category	Frequency	Percentage
Normal (18.5–24.9)	6	15
Overweight (25.0–29.9)	16	40
High (≥ 30.0)	18	45

Table 4: Frequency of stress score

Stress level	Frequency	Percentage
Medium	22	55
High	18	45

Association between stress levels and obesity in PCOS patients

No significant correlation was identified between obesity and stress scores, as the *p-value* was above 0.05. The strongest association for non-obese individuals with moderate stress levels was 59.1 %, representing a frequency of 13. This was followed by a 40.9 % association, with non-obese individuals exhibiting high-stress scores, corresponding to a frequency of 9. The associations between obesity and stress scores were comparable for moderate and high-stress levels, each showing a frequency of 9 and a percentage of 50 %. The evaluation of this association involved Pearson's Chi-square test ($\chi^2 = 0.331$; Table 5).

Table 5: Association between obesity and stress score

Category	Stress score		P-value
	Medium (frequency)	High (frequency)	
Non-obese & overweight	13 (59.1 %)	9 (40.9 %)	> 0.05
Obese	9 (50.0 %)	9 (50.0 %)	> 0.05

DISCUSSION

This study found that approximately 7.5 % of women at the IIUM Fertility Center had PCOS, while 92.5 % of respondents were non-PCOS and displayed no symptoms. The prevalence identified aligns with the range reported in studies from other countries, although it remains notably high. A survey conducted among Health Sciences students in South India revealed a PCOS prevalence rate of 9.13 % [15]. In a similar study involving a random sample of Omani women visiting the hospital, it was found that 7 % were diagnosed with PCOS [4]. A systematic review indicated that the prevalence of PCOS in adolescents, based on NIH criteria, stands at 3.39 %. Furthermore, a report originating from the Middle East and North Africa region in 2019 recorded a 37.9 % increase in incidence since 1990 [16]. Differences in percentages and populations across study settings may affect prevalence variations. Furthermore, the differing results of PCOS in various nations indicate that incidence variations rely on diagnostic characteristics, societal perceptions of infertility and the understanding of PCOS's underlying causes [16].

The current study revealed that 85 % of participants were classified as overweight based on BMI, while just 15 % were deemed to have a normal BMI. This aligns with results from earlier research, indicating that obesity can play a significant role in the condition. An analysis of previous studies using enhanced recruitment methods showed a significant positive correlation between mean BMI or obesity prevalence and the prevalence of PCOS when the Rotterdam criteria and Androgen Excess and PCOS Society criteria were applied. Overall, some researchers found that a 1 % increase in obesity prevalence corresponded to approximately a 0.4 % increase in PCOS prevalence according to the Rotterdam criteria [17].

With respect to the stress score of patients with PCOS, the medium-stress category had the largest representation among the participants, with 22 patients, or 55 %, while the high-stress group included 18 patients, or 45 %. The findings presented here are consistent with previous

studies suggesting that stress, often viewed as an invisible but pervasive factor, plays a significant role in the onset and exacerbation of many physical, emotional and psychological conditions, especially in the contemporary context [18]. Notably, PCOS is closely linked to how stress affects the human body. When exposed to stress, the body reacts by raising levels of hormones, particularly cortisol and adrenaline, known as the “fight or flight” hormones [19,20]. Cortisol stimulates appetite, which can lead to obesity over time [21,22]. However, no significant correlation was identified between obesity and stress scores, as the *p-value* was above 0.05. The strongest association for non-obese individuals with moderate stress levels was 59.1 %, representing a frequency of 13. It is possible that the small number of respondents might influence the fair representation of the frequency and percentage correlation between obesity and stress scores. Azziz's research emphasized that the prevalence of PCOS among women was mainly affected by the number of participants, as it consisted solely of individuals already diagnosed with the condition [23].

Limitations of the study

This study has several limitations, including the use of secondary data from medical records, a limited sample size and a restricted scope of information collected due to time constraints, which may affect the generalizability of the findings.

CONCLUSION

Many women who have been diagnosed with PCOS have visited the IIUM Fertility Center in Kuantan, Pahang. While the reported 7.5 % prevalence of PCOS might seem minor in comparison to other fertility issues, this study focuses solely on one particular center. Thus, it may indicate that such conditions could become a significant fertility concern in Malaysia. The latest research helps clarify the understanding of PCOS by consolidating its various aspects. Increased research on PCOS as a distinct reproductive disorder is essential for identifying its long-term causes in women. Communities and healthcare providers must remain vigilant and proactive in addressing this condition. Current research findings pave the way for further in-depth research into the connections between PCOS and lifestyle factors, as obesity and stress levels contribute to its etiology. Gaining insights into these underlying concepts can assist in building and maintaining better health.

DECLARATIONS

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Ethical approval

The IIUM Ethics Committee approved this research under IREC No. 387, and authorization was secured from the IIUM Fertility Center. Prior to participation, individuals were required to sign a participation agreement (consent form).

Availability of data and materials

The datasets used and/or analyzed during the current study are available from the corresponding author upon reasonable request.

Conflict of interest

There is no conflict of interest associated with this work.

Contribution of authors

The authors declare that all the authors were involved in the conceptualization, methodology, investigation and writing processes, and all reviewed and approved the final manuscript.

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