

## Prevalence and Correlates of Polycystic Ovarian Syndrome among Women Attending Infertility Clinic

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**ABSTRACT:** Polycystic ovarian syndrome (PCOS) is a complex endocrine disorder which affects 5% to 10% of women worldwide. The disease is caused by insulin resistant that results in hyperinsulinaemia, and further stimulates the excessive production of androgen and luteinizing hormone. Hyperandrogenism which is referred to the excessive production of androgen leads to the clinical conditions like acne, obesity, alopecia and irregular menstruation. Previous studies have shown the risk factors of PCOS include age, ethnicity, obesity, smoking, alcohol consumption and menstrual problem. A cross sectional study was conducted at infertility clinic in Hospital Serdang. Simple random sampling was adopted to recruit 138 women who attended the infertile clinic. Data including sociodemographic data, lifestyle factors, medical disorders, gynaecology disorders, family medical history, menstrual problem, diagnostic criteria of PCOS, metabolic parameters, and causes of infertility, were retrieved from medical record. Chi square test and SPSS version 21 was used for data analysis. Among 138 participants, 37.7% are diagnosed with PCOS and 62.3% are not diagnosed with PCOS. Among PCOS patients, 92.3% are found to age less than 35 years old, 90.4% Malay, 75% with menstrual problem and 80.8% obese. Age, menstrual problem, and obesity were significantly associated with PCOS diagnosis. Measures like medical education and healthy lifestyle should be implemented to prevent the complications of PCOS.

**KEYWORDS:** *Polycystic ovarian syndrome, Prevalence, Associated factors*

### I. INTRODUCTION

Polycystic ovarian syndrome (PCOS) is a common yet complex endocrine condition that affects 5% to 10% of women in childbearing age [1]. It is associated with gynaecologic, reproductive and metabolic co-morbidities that have a great impact in the patients' entire lifespan [2]. Insulin resistance is known to be the pathophysiological fundamental of this disorder which results in hyperinsulinaemia that leads to further stimulation of the production of ovarian androgen and luteinizing hormone (LH). Therefore, permanent hormonal imbalance will be resulted in PCOS patients.

The underlying conditions include hyperandrogenism, irregular menstruation cycle which can either be oligomenorrhea or amenorrhea and also polycystic ovaries. The leading cause of PCOS, hyperandrogenism, also results in other conditions such as hirsutism, acne, obesity, alopecia and irregular menstruation. Among the different conditions caused by PCOS, infertility is the most common reason for women to seek medical help [3]. However, in addition to PCOS, there are also other conditions that cause infertility, such as endometriosis, tubal factor, anovulation, male factor and other unexplained factor.

The aim of the present study was to determine the prevalence of PCOS and its associated factors among women attending infertility clinic at Hospital Serdang. Hospital Serdang is a government funded local hospital which located in Serdang, Selangor. Present study aimed to examine the relationship between PCOS and a variety of associative factors. The associative factors are sociodemographic factors which comprised of age and ethnicity, lifestyle related factors such as obesity, alcohol consumption and smoking status of PCOS patients and finally the menstrual problems.

## II. METHODS AND MATERIALS

### 2.1 Subjects

Retrospective approach was used in the current study. We retrieved medical record of 138 patients who attended infertility clinic in Hospital Serdang from year of 2011 to June 2014.

### 2.2 Laboratory measurements

The study was conducted by using proforma to collect the information of PCOS patients and other infertile patients. Patients' socio demographic, causes of infertility, lifestyle-related risk factor, medical history, gynaecology history and metabolic parameter are recorded in the proforma.

### 2.3 Statistical analysis

Data collected was then analysed by using SPSS version 21. The prevalence of PCOS among participants was established. We used independent sample t test and chi squared test to examine the relationship between various associated factors and PCOS.

## III. RESULTS

### 3.1 Prevalence of PCOS and other causes of infertility among women attended fertility clinic.

Among 138 patients recruited, prevalence of PCOS (n=52, 37.7%) was lower than non-PCOS (n=86, 62.3%). In regards of other causes of infertility, the most common among non-PCOS patients was unexplained infertility (n=28, 27.5%). The prevalence of PCOS and other causes of infertility are presented in Table 1.

Table 1: Prevalence of PCOS and other causes of infertility among women (n=138) attended infertility clinic in Hospital Serdang.

Infertility	n	%
PCOS	52	37.7
Non-PCOS	86	62.3
Tubal factor	11	7.9
Endometriosis	23	16.7
Male factor	23	16.7
Unexplained	38	27.5

### 3.2 Sociodemographics, menstrual problem and lifestyle related data of infertile and PCOS patients.

Among the recruited infertile patients, 77.5% are reported to age less than 35 years old and the mean age of the patients was 31.82 (S.D. = 4.5) years old. Majority of the participants were Malay (n=120, 87%). The non-Malay infertile patients are reported to make up the 13% (n=18) of the participants. More than half of the infertile patients are reported to have menstrual problem (n=71, 51.4%), whereas the 52.9% (n=73) of the infertile patients were not obese.

Among 52 PCOS patients, 92.5% (n=48) were less than 35 years old with a mean age of 29.9 (S.D.=3.9). Most PCOS patients were Malay (n=47, 90.4%) while 39 of them (75%) are reported to have the menstrual problem, while only 13 PCOS (25%) patients did not presented with menstrual problem. Notably, the majority of the patients were obese (n=42, 80.8%).

Among the recruited infertile patients, none of the participants are reported as alcohol consumers and smokers. Please refer to Table 2 for more results.

Table 2: Sociodemographics, menstrual problem and lifestyle related factor of infertile and PCOS patients.

		Infertile (n=138) n(%)	PCOS(n=52) n(%)	
<b>Age (years)*</b>		31.82(4.5) <sup>1</sup>	29.9(3.9) <sup>1</sup>	
<35		107(77.5)	48(92.5)	
≥35		31(7.7)	4(7.7)	
<b>Ethnicity</b>				
Malay		120(87)	47(90.4)	Non-malay
18(13)	5(9.6)			
<b>Menstrual problem</b>	Yes	71(51.4)	39(75)	
	No	67(48.6)	13(25)	
<b>Obesity</b>	Yes	65(47.1)	42(80.8)	
	No	73(52.9)	10(19.2)	

<sup>1</sup> Mean (Standard Deviation).

### 3.3 Diagnostic criteria of PCOS

There are four criteria used to diagnose patients with PCOS. They include (1) anovulation, (2) biochemical hyperandrogenism, (3) clinical hyperandrogenism and (4) ultrasound features. Finding shows that 27 (19.6%) out of 52 PCOS patients are diagnosed with ultrasound features, while the only 2 (1.4%) PCOS patients are presented with biochemical hyperandrogenism. The result of diagnostic criteria is presented in Table 3.

Table 3: Diagnostic criteria of PCOS patients.

Criteria of PCOS	Frequency (n)	Percentage (%)
Anovulation	23	16.7
Biochemical Hyperandrogenism	2	1.4
Clinical Hyperandrogenism	10	7.2
Ultrasound Features	27	19.6

### 3.4 Association between PCOS and sociodemographics, menstrual problem and lifestyle related factors.

Finding from current study shown that, there was a significant association between age group and diagnosis of PCOS ( $\chi^2(1) = 10.45, p < 0.01$ ). However, there was no significant relationship between ethnicity and women with PCOS ( $\chi^2(1) = 0.87, p = 0.440$ ). Besides, there was a significant relationship found between menstrual problem and PCOS patient ( $\chi^2(1) = 18.53, p < 0.01$ ) as well as obesity and PCOS women ( $\chi^2(1) = 37.96, p = 0.001$ ). These results are presented in Table 4 below.

Table 4: The association between socio-demographic characteristics, menstrual problem and lifestyle related factor and PCOS patients.

	PCOS		$X^2$	df	p-value
	Yes n(%)	No n(%)			
<b>Socio-demographic</b>					
<b>Age</b>					
<35	48(44.9)	59(55.1)	10.45	1	<0.01
≥35	4(12.9)	27(87.1)			
<b>Ethnicity</b>					
Malay	47(39.2)	73(60.8)	0.87	1	0.44
Non-malay	5(27.8)	13(72.2)			
<b>Menstrual problem</b>					
Yes	39(54.9)	32(45.1)	18.53	1	<0.01
No	13(19.4)	54(80.6)			
<b>Obesity</b>					
Obese	42 (64.6)	23 (35.4)	37.96	1	<0.01
Non obese	10 (13.7)	63 (86.3)			

## IV. DISCUSSION

The primary aim of this study is to examine the prevalence of PCOS among infertile women attended infertility clinic as well as its associated factors. Finding from current study shows that patients with PCOS diagnosis are the minorities (n=52, 37.7%) whereas the non-PCOS patients made up the majorities.

Results from current study is consistent with the finding of a previous study by Khaduri and colleagues [4] in Middle East, where they found patients that have been diagnosed with PCOS were lesser than non-PCOS patients among their 3644 infertile patients sample. Other factors such as including factors, endometriosis, male factor and unexplained factors among our participants were also being examined as infertility can also be affected by other factors. In current study, the most prevalent factor of infertility was unexplained factor (n=38, 27.5%), followed by endometriosis (n=23, 16.7%), male factor (n=23, 16.7%), and tubal factor (n=11, 7.9%). Result of current study differs with the finding by Roupa and colleagues [5] which study was conducted in Greece. The study found most common causes of female infertility was tubal factor (n=30, 27.4%) followed by unexplained (n=27, 24.5%) [5]. The differences might be due to the different living environment such as weather, level of education and socioeconomic status between Malaysia and Greece [5].

Regarding sociodemographic data of infertile patients, data of current study indicated that there were more infertile patients younger than 35 years old (n=107, 77.5%) when compared to those with more than or equal to 35 years old. It is consistent with the finding of a previous research conducted in Italy where the percentage of infertility among patients were less than 35 years old which was 22% was higher if compared to those more than 35 years old which only accounted for 18% [6].

The infertile patients attended infertility clinic were mostly Malay (n=120, 87%). This finding might be due to fact that Hospital Serdang is mostly visited by Malay patients as compared to other ethnicity. Apart from that, Malay population is of the largest ethnicity group in Malaysia.

In addition to the infertility, PCOS is also examined in the current study. For PCOS patients, patients younger than 35 years old were more prevalent with PCOS diagnosis (n=48, 92.3%). 7.7% of them are reported to age more than or equal to 35 years old. The mean age of our PCOS patients was 29.9 years old. It is consistent with the finding of a study conducted in Czech Republic where the mean age of PCOS patients was 29 [9]. For ethnicity distribution of PCOS patients, there were a majority of Malay patients (n=47, 90.4%) and only a 9.6% were non-Malay.

In current study, majority of infertile patients had menstrual problem (n=71, 51.4%). Similarly, among PCOS patients, more PCOS patients presented with menstrual problem (n=39, 75%) compared to the patient without menstrual problem (n=13, 25%). A study conducted in United Kingdom also stated that there was a higher number of PCOS patients with menstrual problem (i.e. oligomenorrhea) which is 47% compared to 29.7% that had a normal menstrual cycle [8]. Lifestyle related factors were also being examined in the current research. Three lifestyle related factors, i.e. BMI, smoking, and alcohol consumption status, were examined in current study. None of the PCOS patients reported having consumed alcohol and smoking. Nevertheless, our participants were mostly non-obese (n=73, 52.9%) compared to obese patients. However, among PCOS patients in current study, there were more number of obese patients (n=42, 80.8%). This finding could indicate obesity as a risk factor for PCOS, which is consistent with a study by Moran and colleagues [9] in Australia, which found that women with PCOS to have a higher proportion in obese (n=152, 62%) when being compared to non-obese PCOS patients.

Followed Rotterdam diagnostic criteria of PCOS, majority of PCOS women are diagnosed with ultrasound features (n=27, 19.6%) followed by anovulation (n=23, 16.7%), hyperandrogenism (n=10, 7.2%) and biochemical hyperandrogenism (n=2, 1.4%). It is consistent with a study in Turkey [10], where the most PCOS patients has been diagnosed with ultrasound features (n=69, 17.6%). However, it was reported that the biochemical hyperandrogenism were the second highest of the diagnostic criteria for PCOS patients [10].

Current study showed that there was no association between ethnicity and PCOS patients (p=0.44). The possible reason could be due to the imbalance ethnicity representation in our sample since the majority of the patients were Malay. However, there was a significant association between age and PCOS (p <0.01). Patients with age group less than 35 years old were more likely to have PCOS (which are 77.5%) if compared to patients with age group more than 35 years old (which are 22.5%). These finding is consistence with a study by Jacoba and colleagues where they found that the younger age group of infertile patients were more likely to have PCOS [11].

Besides the association of menstrual problem and PCOS patients, current study also found a significant relationship between menstrual problem and women with PCOS (p = 0.001). 54.9% of PCOS patient are presented with menstrual problem while only 19.4% are reported to not have any menstrual problem. It is consistent with a study by Balen and colleagues where they found that women with greater BMI to have a likelihood of having irregular menstrual cycle and PCOS diagnosis [8]. Findings from their study is resonant with current findings on the association between obesity and PCOS (p<0.01) [8]. In current study, there were 64.6% of PCOS patients with obese while only 13.7% were non-obese.

## V. CONCLUSION

Current study found a significant association between age, menstrual problem, obesity and women of PCOS. Therefore, intervention such as education to maintain healthy lifestyle should be implemented to the public especially for women of reproductive age. As such, prevention as well as early detection and treatment should be given to the patients to limit the progression of the disease and the development of complications.

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### **Ethical**

Approval was obtained from Jawatankuasa Etika Universiti Putra Malaysia (JKEUPM) and National Medical Research Record (NMRR).

### **Declaration of Conflict of Interest**

The authors of the article declare that there is no conflict of interest regarding publication of this article.

## REFERENCES

- [1] Ehrmann. D, Polycystic Ovary Syndrome. *New Journal of Medicine*, 352(12), 2005, 1223-1236.
- [2] Azziz. R, Carmina E, Dewailly D et al. The Androgen Excess and PCOS Society criteria for the polycystic ovary syndrome: the complete task force report. *Fertil Steril*. 91(2), 2009, 456-488.
- [3] Ovesen. P, Moller. N, Greisen. S, and Ingerslev. H, (Polycystic ovary syndrome I. Clinical presentation and treatment) *Ugeskrift for Laeger*, 160(3), 1998, 260-264.
- [4] Al Khaduri. M, Al Farsi. Y, Al Najjar. T, and Gowri. V, Hospital-based prevalence of polycystic ovarian syndrome among Omani women. *Middle East Fertility Society Journal*, 2013.
- [5] Roupa. Z, Polikandrioti. M, Sotiropoulou. P, Faros. E, Koulouri. A, Wozniak. G, and Gourni. M, Causes of infertility in women at reproductive age. *Health Science Journal*, 3(2), 2009, 80-87.
- [6] Dunson. D, Baird. D, and Colombo. B, Increased infertility with age in men and women. *Obstetrics and Gynecology*, 103(1), 2004, 51-56.
- [7] Haakova. L, Cibula. D, Rezabek. K, Hill. M., Fanta. M., and Zivny. J, Pregnancy outcome in women with PCOS and in controls matched by age and weight. *Human Reproduction*, 18(7), 2003, 1438-1441.
- [8] Balen. A, Conway. G, Kaltsas. G, Techatrasak. K, Manning. P, West. C, and Jacobs. H, Andrology: Polycystic ovary syndrome: the spectrum of the disorder in 1741 patients. *Human Reproduction*, 10(8), 1995, 2107-2111.
- [9] Moran. L, Ranasinha. S, Zoungas. S, McNaughton. S, Brown. W, and Teede. H, The contribution of diet, physical activity and sedentary behaviour to body mass index in women with and without polycystic ovary syndrome. *Human Reproduction*, 28(8), 2013, pp.2276-2283.
- [10] Yildiz. B, Bozdog. G, Yapici. Z, Esinler. I, and Yarali. H, Prevalence, phenotype and cardiometabolic risk of polycystic ovary syndrome under different diagnostic criteria. *Human Reproduction*, 27(10), 2012 3067-3073.
- [11] Jacoba. GD, Chrit. MS, Paul. MM, Bruce. HR and Dave. HS. Comparison of MRI-assessed body fat content between lean women with polycystic ovary syndrome (PCOS) and matched controls: less visceral fat with PCOS. *Hum. Reprod.* (2011) 26 (6):1495-1500.doi: 10.1093/humrep/der070