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## DIFFERENCES IN AGE AND BODY MASS INDEX OF WOMEN WITH POLYCYSTIC OVARY SYNDROME ATTENDING IN VITRO FERTILIZATION (IVF) PROGRAM

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**Abstract: Nutritional status in this case BMI in women is very important in relation to infertility problems in women of reproductive age.** Polycystic ovary syndrome (PCOS), is a reproductive problem with hormonal disorders. Infertility Female with PCOS is associated with anovulation, high LH and hyperandrogenism. The purpose of this study was to analyze differences in age and body mass index (BMI) of PCOS women undergoing in vitro fertilization (IVF). This was an observational analytic study. The subjects of the study were women aged 30-40 years who undergoing IVF-assisted fertilization program at Yasmin Clinic - RSCM Kencana who was diagnosed as PCOS. As a comparison are women 30-40 years who have infertility problems but not PCOS who underwent IVF-assisted fertilization program. Women diagnosed with PCOS based on the Rotterdam 2003 consensus definition, and reinforced with ultrasound examinations that show polycystic ovary symptoms. Diagnosis is performed by a specialist in Obstetrics and Gynecology. Age data is taken from medical record and IMT data is calculated based on formula  $\text{body weight/height}^2$ . Data analysis was done by unpaired t test. Mean age of study subjects:  $32.21 \pm 0.99$  years female PCOS and  $32.80 \pm 0.516$  years of non-PCOS group of women, unpaired t-test results were not significantly different ( $p > 0.05$ ). Mass Index PCOS group  $24.425 \pm 0.585$  Kg/m<sup>2</sup> and  $22.840 \pm 0.494$  Kg/m<sup>2</sup> non-PCOS group, unpaired t-test results were significantly different ( $p < 0.05$ ). Conclusion of this research was in the PCOS women group had significantly higher BMI rates than the group non PCOS woman.

**Keywords:** Body Mass Index, age, Polycystic ovary syndrome.

## INTRODUCTION

Polycystic ovary syndrome (PCOS) is one of the most common endocrine disorders found in women of reproductive age. Since it was discovered by Stein and Leventhal in 1935, it was initially explained that PCOS is a collection of symptoms consisting of amenorrhea, irregular menstruation, infertility, hirsutism and obesity.<sup>1</sup> The most internationally accepted definition at this time for Polycystic Ovary Syndrome (PCOS) is the one adopted from ESHRE/ASRM Rotterdam consensus (2003). In this consensus, two of the three diagnostic criteria are: (1) oligoamenorrhoea or anovulation, (2) hyperandrogen symptoms both clinically and biochemically, (3) polycystic ovary morphology with ultrasound.<sup>2</sup>

However, there are still many controversies and unknowns about the situation. This disorder is found in about 5-10% of women of reproductive age. The causes of PCOS to date have not been fully understood and various sources explain due to complex interactions between genetic and environmental factors. With the development of technology, the focus of research to find the cause of PCOS is constantly changing, from ovarian factors, hypothalamic-pituitary axis, to impaired insulin activity. These three factors interact in the regulation of ovarian function.<sup>3,4</sup>

Polycystic ovary syndrome is one of the causes of infertility due to failure of ovulation, ovum release of the ovary. Polycystic ovary syndrome is defined as a collection of symptoms characterized by chronic anovulation (not chronic ovoid release) with endocrine changes (such as hyper-insulinemia and hyperandrogenemia). Some of the long-term complications that can occur in people with polycystic ovary syndrome include an increased risk of type 2 diabetes mellitus, impaired glucose tolerance (insulin resistance), abnormal blood lipid levels (dyslipidemia), cardiovascular disease,

uterine thickening, and infertility. Polycystic ovary syndrome usually occurs in reproductive age (between 15 to 40 years).<sup>5</sup> From 35 to 65% of patients with PCOS are obese. In addition to PCOS, the success of pregnancy is affected by obesity, overweight and increased BMI. So it can be said that women with obesity have a low chance of having a pregnancy and a high rate of miscarriage after fertility treatment.<sup>6</sup>

This study was conducted at Fertility Yasmin Clinic - RSCM Kencana Jakarta, where the in vitro fertilization program process to help infertile couples due to PCOS to get children. PCOS women who had received medical treatment before but could not get pregnant had to undergo assisted reproductive process through IVF. On that basis, this study was conducted to analyze differences in age and BMI in women with PCOS who undergo in vitro fertilization program (IVF).

## RESEARCH METHODS

This research was an observational analytic research. The subjects were women aged 30-40 years who underwent IVF-assisted fertilization program at Yasmin Clinic - RSCM Kencana diagnosed as PCOS patients. Age range above is selected based on data of age distribution of patients who undergo IVF program. For comparison, women 30-40 years who had infertility problems but not PCOS who underwent IVF-assisted fertilization program. Women diagnosed with PCOS based on the Rotterdam consensus definition 2003, and reinforced with ultrasound examinations that show polycystic ovary symptoms. Diagnosis is performed by a specialist in Obstetrics and Gynecology. Age data obtained from the existing medical record at Yasmin Clinic - RSCM Kencana. IMT data obtained by using the following formula:

$$IMT = \frac{\text{Weight (Kg)}}{\text{Height (m)} \times \text{Height (m)}}$$

Previously we measured body weight and height of women undergoing in vitro fertilization program (IVF).

Statistical analysis used was unpaired t test between age and IMT from subjects with PCOS and not PCOS undergoing in vitro fertilization (IVF) program using SPSS. A p value <0.05 is considered meaningful.

### RESULT AND DISCUSSION

The subjects were women aged 30-40 years who underwent IVF-assisted fertilization program at Yasmin Clinic –

RSCM Kencana diagnosed as PCOS patients. Women diagnosed with PCOS based on the Rotterdam 2003 consensus definition.

The control group were women ages 30-40 who had fertility problems but were not PCOS and were undergoing IVF-assisted fertilization program, causing infertility problems in the comparison group including male factor, tubal factor, hydrosalping and idiopathic infertility. The total number of study subjects was 142 people consisting of 66 people (46.6%) female PCOS and 76 people (53.5%) women not PCOS.

Table .1. Characteristics of research subjects in the PCOS group and not PCOS

Paramater	Group		p value
	PCOS	Non PCOS	
Age(year)	32,21 ± 0,499 (n=66)	32,80 ± 0,516 (n=76)	0,416
BMI (Kg/m <sup>2</sup> )	24,425 ± 0,585 (n=53)	22,84 ± 0,494 (n=59)	0,034

Data is presented in mean ± SEM (Standard Error Mean)  
T-independent test, significant at p <0.05; n = number of subjects

Table 1 gives information on the characteristics of the study subjects as: 1) The mean age of the study sample was 32.21 ± 0.99 years for the female PCOS group and 32.80 ± 0.516 years for the non-PCOS women group, this indicated that the age range the subjects of the study were the reproductive age. The unpaired t-test results showed no significant difference between the two groups (p> 0.05); 2) The mean body mass index for the PCOS women group was 24.425 ± 0.585 Kg/m2 and the non-PCOS group was 22.840 ± 0.494 kg / m2, unpaired t-test results showed significant differences between the two groups (p <0 , 05)

This study shows that the age range of women with PCOS and not PCOS is the age of reproduction. The unpaired t-test results showed that the mean age between the two

groups was not significantly different (p> 0.05). This is caused by the selection of research subjects based on inclusion criteria, women who are undergoing IVF-assisted reproduction programs aged 30-40 years. This situation was a weakness of this study so that there were no differences in age factors between the two study groups, making it difficult to distinguish the age of the subjects.

In women of reproductive age spread throughout the world, fewer than 20% have polycystic syndrome.<sup>7</sup> Epidemiological studies show that about 5% - 10% of women of reproductive age suffer from PCOS.<sup>8</sup>

According to the MOH RI (2013) age range of women of reproductive age (reproductive age) is 20-45 years. This is in accordance with previous studies which

suggest that PCOS occurs in 5-10% of women of reproductive age.<sup>9,10</sup>

Nutritional status based on BMI in this study showed that the mean value of BMI in women with PCOS is higher than not PCOS. However, when included in the category of nutritional status based on BMI according to Asia Pacific, the average female PCOS is included in overweight groups. The unpaired t-test results showed significant differences between the two groups ( $p < 0.05$ ). So it can be concluded that the mean BMI in women PCOS higher than women not PCOS. In the PCOS women group, a mean BMI score  $\geq 23$  indicates an overweight group. This condition can increase the risk of obesity in the PCOS women group. Obesity is reported to occur in half of the PCOS population. However, in this study the association between obesity with PCOS has not been strong enough.

PCOS can be described as an oligogenic disorder in which the interaction of a number of genetic and environmental factors determine the heterogeneous, clinical, and biochemical phenotype. Although the genetic etiology of PCOS remains unknown, a family history of PCOS is relatively common; however, familial links to PCOS are unclear. The pathophysiology of PCOS involves primary defects in the hypothalamic-pituitary axis, insulin secretion and action, and ovarian function.<sup>11</sup>

Although the cause of PCOS is unknown, PCOS has been linked to insulin resistance and obesity.<sup>11</sup> Obesity can be a problem in the reproductive system in women, especially in terms of menstruation, infertility, and pregnancy. Previous research has shown a clear relationship between fluctuations in certain hormone levels and weight, including female reproductive hormones: estrogen and progesterone. Women with excessive weight often experience ovulation disorders, because

being overweight can affect estrogen levels in the body and reduce the ability to conceive.

Obesity will lead to chronic hyperinsulin (insulin resistance), this condition will stimulate ovarian excess ovarian cells to produce androgens. This inhibits the production of SHBG which causes free androgen to increase. In the periphery, the androgens will be aromatized to estrogen so that high estrogen can cause LH pulsation abnormalities resulting in increased LH secretion that results in hyperandrogenism. This condition causes unovulation which is one of the characteristics of PCOS, which leads to infertility in these women.<sup>12</sup>

Estrogen is a group of steroid hormones synthesized by the ovaries in women. In women they play an important role in ovulation, menstrual cycle and secondary sexual character development. Decreased estrogen levels lead to increased body fat reserves, more specifically in the abdominal area, resulting in weight gain. Estrogen deficiency causes metabolic dysfunction that may increase the risk of obesity. In women, progesterone is synthesized in the ovaries and placentas during pregnancy. In women, progesterone affects appetite and weight. Decreased serum progesterone levels lead to increased adiposity and thus weight gain increases. The decrease in hormones can be caused by endocrine imbalances and hormonal disorders such as polycystic ovary syndrome (PCOS) in women.

Another hormone associated with obesity is insulin. The association with insulin function is expected; insulin helps to regulate ovarian function, and the ovaries respond to excess insulin by producing androgens, which can lead to anovulation.<sup>11</sup>

Insulin is a peptide hormone synthesized by the pancreas, and plays the most important role in the metabolism of carbohydrates and fats. Disorders in this function due to reduced insulin production or due to insulin resistance. Insulin resistance may be the

4 result of endocrine disorders such as PCOS, genetic predisposition, unhealthy diet and lifestyle.

The presence of obesity adds to the clinical risks of PCOS, which is because obesity correlates with a decrease in SHBG (Sex Hormon Binding Globulin), which causes elevated levels of testosterone in the circulation. Obesity causes an increase in dyslipidemia that increases the risk of cardiovascular disease. Obesity is also associated with insulin resistance so that people with PCOS will be at high risk of Diabetes mellitus type II. Dyslipidemia, insulin resistance, and obesity are related to each other and work together not only cause metabolic disorders but also directly or indirectly cause reproductive problems ie ovulatory disturbances such as anovulation and / or oligo-ovulation.<sup>13,14</sup>

3 The association between obesity and infertility is partially associated with oligo-ovulation or anovulation. PCOS (Polycystic ovarian syndrome) is commonly associated with ovulatory dysfunction, hyperandrogenemia, and ovarian PCOS appearance on ultrasound examination and is often associated with a BMI value > 25 kg / m<sup>2</sup>. The study, conducted in 1741 women with PCOS in the UK, got 70% of menstrual cycle disorders; Obese women with PCOS had a high prevalence of menstrual cycle disturbance (78%).<sup>15</sup> Similar results were obtained in 263 women with PCOS; obese women with PCOS experienced 88% menstrual dysfunction, while non obese women were about 72%.<sup>16</sup> Research in the United States found that more than half of patients with PCOS were overweight or obese.<sup>17,18</sup>

Obesity leads to hyperinsulinaemia and insulin resistance. Changes in insulin metabolism cause decreased SHBG, hyperandrogenemia, and functional impairment of the IGF system, leading to increased incidence of menstrual and

ovulatory disorders in women.<sup>19</sup> Obesity, insulin resistance, hyperinsulinemia, glucose intolerance and type 2 diabetes mellitus have a major impact on overall health, especially the impact on the development of heart disease. Women with PCOS who have the above endocrine disorders may be accompanied by increased blood pressure, elevated LDL cholesterol and decreased HDL cholesterol. These conditions are all at risk for developing cardiovascular disease significantly. Therefore, in the early stages of handling cases with PCOS, lifestyle changes are always made that will reduce insulin resistance and hyperinsulinemia, which will ultimately improve reproductive function.<sup>20,21</sup>

## CONCLUSION

The conclusions of this study were there's no difference based on age between PCOS women and non PCOS women, as well as BMI data of study subjects which showed that in the PCOS women group had significantly higher BMI rates than the group non PCOS woman.

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