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THE RELATIONSHIP BETWEEN OBESITY, MENSTRUAL CYCLE, AND POLYCYSTIC OVARY SYNDROME CASES

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ABSTRAK : UBUNGAN OBESITAS, SIKLUS MENSTRUASI, DAN KASUS SINDROM OVARIUM POLIKISTIK

Latar belakang: Kesehatan reproduksi pada wanita merupakan suatu hal yang sangat penting karena tidak hanya berfungsi sebagai alat reproduksi saja, namun juga menjadi salah satu faktor penentu status kesehatan pada wanita. Salah satu masalah yang cukup sering terjadi pada reproduksi wanita adalah *polycystic ovary syndrome* (PCOS). WHO (2023) memperkirakan ada sekitar 8-13% wanita usia subur yang mengalami PCOS di seluruh dunia. Di Indonesia terdapat peningkatan angka kejadian PCOS, dari 4%-6% pada tahun 1990 (Amelia, 2020) menjadi 5-10% (Sari *et al.,* 2023). Penyebab pasti PCOS masih terus di selidiki dari banyaknya riset yang telah di lakukan PCOS, obesitas cukup memiliki peranan penting dalam kasus PCOS. Dampak buruk yang akan timbul jika kondisi PCOS tidak di perbaiki adalah sebanyak 53% wanita diperkirakan mengalami infertilitas, 28% mengalami obesitas, 13% mengalami penyakit jantung, dan 6% menimbulkan diabetes tipe 2 (Ajmal, Khan, & Shaikh, 2019).

Tujuan: Penelitian ini bertujuan untuk mengetahui hubungan obesitas dan siklus mesntruasi terhadap kasus PCOS di RS "BS" tahun 2023.

Metodelogi: Jenin penelitian ini adalah kuantitatif dengan desain *case control* dengan perbandingan 1:1. Sampel penelitian ini berjumlah 52 responden baik pada *case* maupun *control*. Teknik pengambilan sampel adalah dengan menggunakan sampel jenuh. Data di analisis dengan menggunakan statistik *chi square* untuk mengetahui hubungan antar variabel.

Hasil penelitian: Hasil uji statistik didapatkan p-*value* ≤ α (0,05) sehingga menunjukan bahwa terdapat hubungan obesitas dan siklus menstruasi terhadap kasus PCOS di RS "BS" tahun 2023.

Simpulan: Obesitas dan siklus menstruasi memiliki hubungan dengan kasus PCOS.

Saran: Diharapkan edukasi terkait dengan PCOS dapat di galakkan mengingat dampak buruk bagi kesehatan wanita.

Kata kunci : Obesitas, siklus menstruasi, PCOS

ABSTRACT

Background: Reproductive health in women is a very important thing because it not only functions as a reproductive tool, but also becomes one of the determining factors of health status in women. One of the most common problems in female reproduction is polycystic ovary syndrome (PCOS). It is estimated that there are about 8-13% of women of childbearing age who experience PCOS worldwide. In Indonesia there has been an increase in the incidence of PCOS, from 4%-6% in 1990 to 5- 10%. The exact cause of PCOS is still being investigated from the many studies that have been conducted on PCOS, obesity plays an important role in PCOS cases. The adverse effects that will arise if the PCOS condition is not corrected are as many as 53% of women are estimated to experience infertility, 28% are obese, 13% experience heart disease, and 6% cause type 2 diabetes.

Aim: This study aims to determine the relationship of obesity and menstrual cycle to PCOS cases in "BS" Hospital in 2023.

Methods: This type of research is quantitative with a case control design with a ratio of 1: 1. The sample of this study amounted to 52 respondents in both case and control. The sampling technique is to use saturated samples. Data were analyzed using chi square statistics to determine the relationship between variables.

Results: The statistical test results obtained p-value ≤ α (0.05) thus indicating that there is a relationship between obesity and menstrual cycle to PCOS cases in "BS" Hospital in 2023.

Conclusion: Obesity and menstrual cycle have an association with PCOS cases.

Recommendation: It is hoped that education related to PCOS can be encouraged considering the negative impact on women's health.

Key words: obesity, menstruation cycle, PCOS

INTRODUCTION

Reproductive health is crucial for women as it not only serves as a reproductive tool but also significantly impacts women's overall health. Issues affecting female reproductive health may stem from various factors such as infections, organ damage, metabolic disorders, hormonal imbalances, and unhealthy lifestyles. One of the most common problems in female reproductive health is polycystic ovary syndrome (PCOS), which is often linked to hormonal changes, metabolic disorders, and weight gain or obesity. According to the World Health Organization (WHO) in 2023, approximately 8-13% of women of childbearing age worldwide are estimated to have PCOS, with a potential for even higher numbers as about 70% of PCOS cases go undetected. In different regions, the prevalence of PCOS varies. In Europe, around 26% of women are affected, while in America, the estimated incidence is between 5-10%. The prevalence of PCOS in Beijing is reported to be as high as 44.9% (Masulili, 2023), and in Southern India, there is a reported diagnosis rate of 9.13% (Jabeen, et al., 2022).

In Indonesia, there has been a noticeable increase in the incidence of PCOS, rising from 4%-6% in 1990 (Amelia, 2020) to 12-20% (Sari et al., 2023). Research by Masulili (2023) indicated that 78.8% of women treated at a clinic in Palembang experienced PCOS from 2014 to 2017. In addition, there were 102 PCOS cases at Sanglah Denpasar General Hospital in October-November 2018, and 141 PCOS diagnoses at Fatmawati General Hospital during the period of 2020-2022. The increasing incidence of PCOS is a concerning trend due to its impact on women's quality of life.

The cause of PCOS is still under investigation, but several studies have linked it to hyperinsulinemia, hyperandrogenism, and obesity (Yuanyuan, et al., 2022). Research by Wang et al. (2021) revealed that increased BMI is associated with a 9% higher risk of PCOS, and approximately 60% of women with overweight or obese status were diagnosed with PCOS. Additionally, Purwati & Muslikhah (2021) found that 52.3% of PCOS cases occurred in individuals with obesity. The prevalence of PCOS in women with BMI <25 kg/m2 was 4.3%, while it increased to 14% in women with BMI >30 kg/m2 (Hoeger et al., 2021).

If left unaddressed, PCOS can lead to significant adverse effects, with an estimated 53% of women experiencing infertility, 28% obesity, 13% heart disease, and 6% type 2 diabetes (Ajmal, Khan, & Shaikh, 2019). Due to the serious health implications, proper treatment for PCOS is crucial.

According to Cena, Chiovato, & Nappi (2020), making dietary improvements, engaging in physical activity, and adopting healthy lifestyle changes can help manage PCOS. It has been demonstrated that a 5-10% weight loss can significantly alleviate PCOS symptoms (Gu et al., 2022). Weight loss and dietary improvements can modify metabolic pathways in the body, which may help reduce PCOS symptoms (Ajmal, Khan, & Shaikh, 2019).

Polycystic ovary syndrome (PCOS) is a hormonal disorder that often affects women of reproductive age. Approximately 8-13% of women of childbearing age are diagnosed with PCOS, while another 70% of women have PCOS but go undetected (WHO, 2023).

According to the Ministry of Health of the Republic of Indonesia (Kemenkes RI, 2022), polycystic ovary syndrome (PCOS) is a reproductive problem that often occurs in women at a prevalence rate of 1.8%-15%. To diagnose PCOS, two of the following three criteria must be met: increased levels of androgen hormones, ovulation disorders, and the presence of small cyst-shaped egg images.

Initially described in 1935 by Irving F. Stein and Michael L. Leventhal, the hallmarks of PCOS include oligomenorrhea, hirsutism (excessive hair growth), and obesity. Modern research recognizes PCOS as a heterogeneous disorder that leads to excess androgen production, mainly from the ovaries, and is associated with insulin resistance (Itriyeva, 2022).

PCOS is often linked to endocrine and metabolic disorders. Patients with PCOS typically have elevated levels of androgen hormones, known as hyperandrogenism. This hormonal imbalance is also associated with increased insulin levels, which can lead to excessive production of androgen hormones by the ovaries and adrenal glands/kidneys. This excess androgen can cause hirsutism, leading to the growth of hair in atypical areas. Additionally, hyperandrogenism disrupts the secretion of FSH, a hormone essential for follicle growth in the ovaries, resulting in disrupted follicular growth, lack of dominant follicles, and anovulation (Itriveya, 2022). This is why ultrasound examinations often reveal small cysts, which are characteristic of PCOS.

According to Gotera and Nugraha (2023), metabolic syndrome is a condition characterized by disorders of glucose regulation, insulin resistance,

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hypertension, and dyslipidemia. In the case of PCOS, metabolic syndrome is associated with obesity and insulin resistance, which can lead to hyperglycemia and, if left untreated, may progress to type 2 diabetes mellitus (type 2 DM). The prevalence of metabolic syndrome in PCOS ranges from 33% to 46%. Insulin resistance and hyperinsulinism are believed to be the underlying causes of PCOS. Numerous studies have demonstrated that obesity has adverse effects on the female reproductive system, as it correlates with high insulin levels in the blood. Additionally, in obese conditions, excess adipose tissue converts androgens into excess estrogen, disrupting the function of the HPO (hypothalamus-pituitary-ovary) axis, which is responsible for regulating the menstrual cycle and leading to ovulation and menstrual disorders (Cena, Chiovato, & Nappi, 2020).

The cause of PCOS is still unknown, but it is thought that there are several factors that can contribute to its development. Insulin, the main hormone responsible for glucose metabolism, also affects carbohydrate, fat, and protein metabolism. In patients with high insulin levels, hyperinsulinemia occurs, leading to excessive androgen production. This excess androgen inhibits egg maturation in the ovaries, potentially leading to PCOS (Gu et al., 2022).

Another cause of PCOS is hyperandrogen, which clinically leads to symptoms such as hirsutism (excessive female hair growth in areas where it usually grows in men) and acne. Hyperinsulinemia disrupts the hypothalamic-pituitary-ovarian (HPO) axis that regulates the menstrual cycle. The combination of high insulin levels and disruption of the HPO axis causes an overproduction of androgens, ultimately resulting in hyperandrogenism. High androgen levels are found in 75%-90% of PCOS patients. This hormonal imbalance causes a deficiency of FSH, a hormone responsible for egg maturation in the ovaries. FSH deficiency leads to follicles stalling, resulting in the formation of cystic structures along the periphery of the ovary, resembling a string of pearls (Itriyeva, 2022).

The Ministry of Health (2020) defines obesity as a medical condition characterized by an excessive accumulation of body fat that adversely affects health. An individual is considered obese if their body mass index (BMI) is greater than 30.

Obesity is linked to PCOS due to the heightened risk of metabolic syndrome, which disrupts the HPO (hypothalamic-pituitary-ovarian) axis activity. Obesity can lead to hyperinsulinemia and increased androgen production, resulting in hyperandrogenism. Hyperinsulinemia and hyperandrogenism can hinder egg maturation, ultimately contributing to the development of PCOS (Gu et al., 2022).

RESEARCH METHODS

The research in this study utilized observational analytic with a case-control approach. The case population included all women who sought consultation at the gynecology clinic at "BS" Hospital during 2023. The study's case sample comprised 52 women diagnosed with PCOS, while the control sample consisted of 52 women without a PCOS diagnosis. An observation sheet served as the research instrument, and bivariate analysis was conducted using the Chi Square statistical test.

RESEARCH RESULTS

Univariate Analysis

Table 1
Frequency Distribution of PCOS Cases at "BS" Hospital in 2023

Distribution	n	%
PCOS (Case)	52	50
No PCOS (Control)	52	50

Based on table 1, there were 52 respondents who experienced PCOS, and 52 respondents who did not.

Table 2
Frequency Distribution of Obesity at "BS" Hospital in 2023

Distribution	n	%
Obese	39	37,5
Non-Obese	65	62,5

Based on table 2, 65 (62.5%) respondents were not obese, while 39 (37.5%) were obese.

Based on table 4.3, out of 104 respondents, 70 (67.3%) had irregular menstrual cycles, while 34 (32.7%) had regular menstrual cycles.

Table 3
Frequency Distribution of Menstrual Cycle at "BS" Hospital in 2023

Distribution	n	%
Regular	34	32,7
Irregular	70	67,3

Bivariate Analysis

According to table 4, out of 52 respondents with PCOS, 31 (59.6%) were obese and 21 (40.4%) were not obese. In the control group (no PCOS), 44 (84.6%) were not obese and 8 (15.4%) were obese. The Chi Square test resulted in a p-value of 0.000, which is less than the significance level (α) of 0.05. Therefore, we reject the null hypothesis (H0) and accept the alternative hypothesis (Ha), indicating a relationship between obesity and PCOS cases.

Based on the statistical test, the odds ratio value is 8.119, indicating that women who are obese have 8 times greater chances of experiencing PCOS compared to women who are not obese.

Table 4
Correlation between Obesity and PCOS Cases at "BS" Hospital in 2023

Obese	Case (PCOS)		Control (no PCOS)		Total		*p-value*	OR (95% CI)
	f	%	f	%	f	%		
Yes	31	59,6	8	15,4	39	75	0,000	8,119
No	21	40,4	44	84,6	65	125		

Table 5
Correlation between Menstrual Cycle and PCOS Cases at "BS" Hospital in 2023

Menstrual Cycle	Case (PCOS)		Control (no PCOS)		Total		*p-value*	OR (95% CI)
	f	%	f	%	f	%		
Regular	9	17,3	25	48,1	34	65,4	0,001	0,226
Irregular	43	82,7	27	51,9	70	134,6		

According to table 5, out of 52 PCOS cases, 43 (82.7%) respondents had irregular menstrual cycles and 9 (17.3%) had regular menstrual cycles. In the control group (no PCOS), 27 (51.9%) respondents had irregular menstrual cycles and 25 (48.1%) had regular menstrual cycles. The Chi Square test resulted in a p-value of 0.001, which is less than the significance level (α) of 0.05. Therefore, we reject the null hypothesis (H0) and accept the alternative hypothesis (Ha), indicating that there is a relationship between menstrual cycle and PCOS cases.

Based on the statistical test results, the odds ratio is 0.226. This means that women with regular menstrual cycles are 0.2 times less likely to experience PCOS compared to women with irregular menstrual cycles.

DISCUSSIONS

Correlation between Obesity and PCOS Cases at "BS" Hospital in 2023

Based on the results of the Chi Square test in table 4.4, the p-value (0.000) is less than the significance level α (0.05), indicating a significant relationship between obesity and PCOS. The odds ratio value shows that women with obesity have 8 times the potential to experience PCOS compared to those who are not obese. Similar findings were reported in previous studies. For example, Wang et al. (2021) found that 60% of women with PCOS were obese and suggested that an increase in BMI points could increase the risk of PCOS by 9%. Additionally, Hoeger et al. (2021) stated that women with a BMI ≥ 30 kg/m2 had a 14% prevalence of PCOS. Similarly, Purwati & Muslikhah's (2021) research found that 52.3% of PCOS cases occurred in women with obese status.

Obesity is linked to PCOS due to an increased risk of metabolic syndrome, which can cause hyperinsulinemia. Additionally, obesity can lead to increased androgen production, resulting in hyperandrogenism. Both hyperinsulinemia and hyperandrogenism can hinder egg maturation, contributing to PCOS (Gu et al., 2022).

Researchers believe that obesity is a causative factor of PCOS because it is closely associated with metabolic syndrome, leading to disturbances in glucose regulation and increased blood insulin levels, known as hyperinsulinemia.

Hyperinsulinemia prompts the ovaries and adrenals to overproduce androgens, resulting in hyperandrogenism. This combination disrupts the hypothalamic-pituitary-ovarian (HPO) axis, which plays a role in regulating the menstrual cycle. The disruption of the HPO axis can lead to a deficiency in FSH (Follicle-stimulating hormone), halting follicle growth in the ovaries. This results in the absence of a dominant follicle and gives rise to the ultrasound appearance of cysts or small follicles of similar size, which is characteristic of PCOS.

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Correlation between Menstrual Cycle and PCOS Cases at "BS" Hospital in 2023

According to the statistical test results in table 4.6, the p-value (0.001) ≤ α (0.05) suggests that there is a relationship between the menstrual cycle and PCOS. A normal menstrual cycle is defined as having an interval between cycles of 21-35 days (Ministry of Health, 2019). Fitriani et al. (2023) found that 77.8% of women with irregular cycles experienced PCOS, likely due to disturbances in the egg maturation process. Additionally, in Mardiastuti's research (2020), it was discovered that 88% of 263 women with PCOS experienced irregular menstrual cycles.

The menstrual cycle begins with the release of the hormone GnRH (Gonadotropin Releasing Hormone) from the hypothalamus. This hormone stimulates the anterior pituitary gland to produce the hormones FSH and LH, which in turn affect the follicles in the ovaries. The small follicles grow, with one becoming dominant. When the dominant follicle reaches its maximum size, ovulation occurs. If fertilization does not happen, menstruation follows.

Researchers believe that in cases of PCOS, there is a hormonal imbalance linked to metabolic syndrome and other hormonal disorders. The high levels of androgens and insulin result in a deficiency of FSH hormone, leading to a halt in follicular growth in the ovaries. This disruption in follicular maturation causes irregularities in the menstrual cycle in PCOS cases.

CONCLUSION

1. There is a correlation between obesity and PCOS cases at "BS" Hospital in 2023.
2. There is a correlation between menstrual cycle and PCOS cases at "BS" Hospital in 2023.

SUGGESTION

It is hoped that education related to PCOS can be encouraged considering the negative impact on women's health.

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