Research Article

Comparison of Maternal and Neonatal Outcomes in Adolescent and Adult Pregnancies in West Java in 2024: A Retrospective Cross-Sectional Study

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Received: December 29, 2025 | Accepted: March 11, 2026 | Published: March 13, 2026

Abstract
Objective: To identify differences in maternal and neonatal outcomes between adolescent pregnancy (ages 16 – 19 years) and adult pregnancy (ages 20 – 35 years) in West Java in 2024.
Methods: A retrospective cross-sectional study analyzed 654 singleton pregnancies (adolescents: 16 – 19 years; adults: 20 – 35 years) at Dr. Hasan Sadikin and Cibabat General Hospitals from January to December 2024. Data were analyzed using Chi-square, Fisher's exact, and Mann-Whitney U tests.
Results: Compared to adults, adolescents showed higher rates of preterm delivery (54.5% vs. 49.8%), premature rupture of membranes (30.3% vs. 14.0%), and unintended pregnancies (12.12% vs. 0.64%). Placental abnormalities were observed in 48.9% of adults, compared with 0% of adolescents (p=0.004). No significant differences in neonatal outcomes were found in birth weight (p=0.674), length (p=0.738), APGAR score at 1 minute (p=0.051), and APGAR score at 5 minutes (p=0.137).
Conclusion: Adolescent pregnancies have higher maternal complication risks but do not show significant differences in key neonatal outcomes compared to adults.

Keywords: Adolescent pregnancy; maternal outcome; neonatal outcome; preterm delivery; West Java

Perbandingan Luaran Maternal dan Neonatal antara Kehamilan Remaja dan Kehamilan Dewasa di Jawa Barat Tahun 2024: Studi *Retrospective Cross-Sectional*

Abstrak
Tujuan: Penelitian ini bertujuan untuk mengidentifikasi perbedaan luaran maternal dan neonatal antara kehamilan remaja (usia 16 – 19 tahun) dan kehamilan dewasa (usia 20 - 35 tahun) di Jawa Barat pada tahun 2024.
Metode: Metode penelitian ini adalah *retrospective cross-sectional* yang menganalisis 654 kehamilan tunggal (remaja: 16 – 19 tahun; dewasa: 20 – 35 tahun) di Rumah Sakit Umum Dr. Hasan Sadikin dan RSUD Cibabat, Bandung, pada periode Januari–Desember 2024. Data dianalisis menggunakan uji *Chi-square*, *Fisher's exact*, dan *Mann–Whitney*.
Hasil: Remaja memiliki insiden lebih tinggi untuk *preterm delivery* (54,5% vs. 49,8%), *premature rupture of membranes* (30,3% vs. 14,0%), dan *unintended pregnancy* (12,12% vs. 0,64%). Kelainan plasenta ditemukan pada 48,9% dewasa vs. 0% remaja (p=0,004). Tidak ada perbedaan signifikan pada luaran neonatal: berat lahir (p=0,674), panjang badan (p=0,738), APGAR 1 menit (p=0,051), APGAR 5 menit (p=0,137).
Simpulan: Kehamilan remaja memiliki risiko komplikasi maternal lebih tinggi tetapi tidak berbeda signifikan pada hasil neonatal utama dibandingkan kehamilan dewasa.

Kata kunci: Kehamilan remaja; Jawa Barat; luaran maternal; luaran neonatal; persalinan prematur.

 DOI:10.24198/obgynia.v9i1.1057

Introduction

According to the Indonesian Ministry of Health, adolescent pregnancy is defined as pregnancy in women aged 10-19 years; however, this study focuses on the subgroup aged 16-19 years. Globally, approximately 11% of all births occur in adolescents aged 15-19 years, with an estimated 21 million pregnancies each year.[1-3] A 2019 study reported a global prevalence of 84.7 per 1,000, with complications such as 26.4% maternal anemia and 21.0% low birth weight neonates.[4]

The Asia-Pacific region accounts for the largest share of adolescent pregnancies worldwide, exceeding that of Africa.[4] Adolescent mothers face higher risks of maternal complications such as preterm labor, anemia, intrauterine growth restriction, and stillbirth, along with negative neonatal outcomes due to their physiological immaturity.[4]

Indonesia shows a high rate of adolescent pregnancy, requiring urgent action.[5,6] However, there is a specific knowledge gap regarding the comparison of maternal and neonatal outcomes between adolescent (16-19 years) and adult (20-35 years) pregnancies in West Java in 2024, especially at referral hospitals like Dr. Hasan Sadikin and Cibabat. This study aims to fill that gap to help develop comprehensive prevention programs.

Methods

This study used a retrospective cross-sectional design conducted at Dr. Hasan Sadikin General Hospital, Bandung, and Cibabat General Hospital from January to December 2024. The population included all patients with singleton pregnancies admitted to both institutions, categorized into adolescent (ages 16-19 years) and adult (ages 20-35 years) groups.

Inclusion criteria consisted of singleton pregnancies with maternal ages of 16-19 years (adolescent group) or 20-35 years (adult group), along with complete medical records. Meanwhile, exclusion criteria included incomplete medical records (54 cases were excluded), ruptured membranes before admission, fetal congenital anomalies, and adverse obstetric conditions that hindered analysis. Sampling was conducted using a total sampling technique based on these criteria.

Data were collected retrospectively through review of medical records and information extraction forms. The research team managed the data, verified it with the supervisor, and used a 10% sample with double-entry to reduce information bias.

Data analysis employed both descriptive and inferential statistical analysis. Descriptive univariate analysis was performed to outline the basic characteristics of the data, with categorical data presented as frequencies and proportions. Bivariate analysis used Chi-square or Fisher's exact test to examine the relationship between categorical variables across the two groups, while continuous variables were analyzed using either an independent *t*-test or the Mann-Whitney *U* test, depending on the data's distribution normality.

This study received approval from the Health Research Ethics Committee of Rumah Sakit Umum Daerah Cibabat Kota Cimahi, with approval number 070 / 24 / Ethical Clearance / RSUD Cibabat / V / 2025, valid from May 6, 2025, to May 6, 2026. Permission for the research was also granted by the Director of RSUD Cibabat (No. KH.07.02.01/216/V/2025/RSUD Cibabat). The study complied with the seven WHO 2011 standards and CIOMS 2016 guidelines, as stated in the approval.

Results

Preliminary data collection obtained 708

Table 1 Characteristics Distribution of Adolescent and Adult Pregnancies in West Java, 2024

Variable	Category	Adolescent (n, %)	Adult (n, %)	Total (n, %)
Maternal Age	<18 years	33 (5%)	0 (0%)	33 (5%)
	≥18 years	0 (0%)	621 (95%)	621 (95%)
BMI	Normal (18.5–22.9)	17 (51.5%)	185 (29.8%)	202 (30.9%)
	Underweight (<18.5)	8 (24.2%)	57 (9.2%)	65 (9.9%)
	Overweight (23–24.9)	7 (21.2%)	98 (15.8%)	105 (16.1%)
	Obese (≥25)	-	273 (44%)	273 (41.7%)
Parity (P)	0	31 (93.9%)	237 (38.2%)	268 (40.9%)
	1	1 (3%)	161 (25.9%)	162 (24.7%)
	2	1 (3%)	143 (23%)	144 (22%)
	3	0	44 (7.1%)	44 (6.7%)
	4	0	23 (3.7%)	23 (3.5%)
	5+	0	13 (2.1%)	13 (1.9%)
Maternal Status	Antenatal	15 (45.5%)	309 (49.8%)	324 (49.5%)
	Postpartum	-	3 (0.5%)	3 (0.45%)
	Preterm	18 (54.5%)	309 (49.8%)	327 (50%)
Morbidity, childbirth	Unintended pregnancy	4 (12.12%)	4 (0.64%)	8 (1.2%)
	Premature rupture of the membrane	10 (30.30%)	87 (14%)	97 (14.84%)
	Premature contraction	1 (3.03%)	17 (2.7%)	18 (2.75%)
Placental Pathology	Fetal distress	1 (3%)	24 (3.9%)	7
	Low Birth Weight	3 (9.1%)	28 (4.5%)	31
	Very Low Birth Weight	1 (3%)	3 (0.5%)	4
	Small for Gestational Age	1 (3%)	51 (8.2%)	53
	Stillbirth	2 (6.1%)	34 (5.5%)	34
Mode of Delivery	Cesarean section	6 (18.2%)	334 (53.8%)	340 (52%)
	Spontaneous	17 (51.5%)	129 (20.8%)	146 (22.3%)
	Vacuum	1 (3%)	3 (0.5%)	4 (0.6%)
	Oxytocin drip augmentation	9 (27.3%)	44 (7.1%)	53 (8.1%)

Note. Antenatal refers to women who were still pregnant at the time of data collection; postpartum refers to women who had delivered within the same admission period; preterm refers to delivery at less than 37 completed weeks of gestation.

Table 2 Univariate Analysis of Binary Variables (*Yes/No*) using the *Chi-Square* Test

Variable	Category	Adolescent Pregnancy (n, %)	Adult Pregnancy (n, %)	p-value
Placental Abnormality	**Yes**	**0**	**304**	**0.004***
	No	**33**	**317**	
Premature Rupture of Membrane	**Yes**	**10**	**87**	**0.485**
	No	**23**	**534**	

Note. Placental abnormality data derived from the Placental Pathology category in Table 1.

Table 3 Univariate Analysis of Continuous Variables (Infant Weight/Length) Using the Mann–Whitney Test

Variable	Adolescent (Mean ± SD)	Adult (Mean ± SD)	p-value
Birth Weight (BB)	2321.03±603	2338.89±756	0.674
APGAR 1	6.3 ± 1.6	7.9 ±1.8	0.051
APGAR 5	5.5 ± 2.2	7.2 ± 2.4	0.137

medical records (634 RSHS and 74 RSUD Cibabat), with 54 records excluded due to incomplete data. The analyzed data totaled 654.

Data on maternal morbidity and placental pathology from Table 1 were further analyzed bivariately in Table 2 using the Chi-square test. Placental abnormality is defined as the presence of conditions under the Placental Pathology category (e.g., fetal distress, stillbirth); premature rupture of the membranes is directly listed in Table 1.

Discussion

This study involved 33 adolescents (5%) and 621 adults (95%), with most adolescent mothers having normal nutritional status (51.5%) compared to the adult group, which was mainly characterized by obesity (44%). In terms of parity, a significant proportion of adolescent mothers were primigravid (93.9%), compared with the adult group, which showed parity distribution ranging from 0 to 5+ (38.2%). The main finding is the significantly higher rate of preterm delivery in adolescent pregnancies (54.5%) compared to adult pregnancies (49.8%), with adolescent pregnancy prevalence not significantly different, 12.12% in adolescents versus 0.64% in adults. Complications such as premature rupture of membranes occurred more often in adolescent pregnancies (30.3% vs. 14.0%, p=0.485), though this difference was not statistically significant.

This research finding is consistent with previous studies, which showed that adolescent pregnancies are associated with higher risks of maternal and neonatal complications. Research from Zambia indicated that adolescent mothers under 20 years old have an increased risk of delivering low birth weight babies.[8] Studies on premature labor, preeclampsia, and neonatal conditions involve an analysis of 10,000 participants across 20 studies, highlighting issues in countries with high-burden deliveries and showing that adolescent mothers face significantly greater risks of low birth weight, maternal mortality, preterm labor, neonatal mortality, and perinatal mortality.[8] Research in Ethiopia found that 17.5% of adolescent pregnancies resulted in premature delivery, compared to only 6.8% among adult women. Meanwhile, global research shows that adolescents aged 10-14 are five times more likely than adult women to experience maternal and perinatal complications.[9-10]

High complication rates in adolescent pregnancy can be explained by several biological and social factors. Biologically, pregnancy occurs when reproductive organs have not yet reached full maturity, as the uterus needs time to prepare for pregnancy and childbirth.[11] Nutritional deficiency during adolescence, along with inadequate nutritional intake, increases the risk of maternal and placental complications such as anemia and placental dysfunction.[12] Moreover, social factors, including low socioeconomic status with perinatal risks, limited access to reproductive health services, and poor maternal health behaviors, contribute to adverse maternal outcomes.[12] The prevalence of adolescent pregnancy did not increase in this study (12.12%), indicating

insufficient access to comprehensive reproductive health information and services, which subsequently heightened complication risks.[13] Maternal mode of delivery by cesarean section in adolescent pregnancies (18.2%) compared to adults (53.8%) can be explained by economic and health service accessibility issues, especially considering medical professionals' tendency toward more intensive interventions for better neonatal outcomes.

This study shows that placental abnormalities occurred significantly more often in adult pregnancies with 304 cases compared to none in adolescent pregnancies (p=0.004). However, for neonatal parameters such as birth weight, body length, and APGAR score, no statistically significant difference was observed between the two groups, despite the adolescent pregnancies having a lower mean APGAR score. This result is consistent with research reporting higher rates of placental abnormalities in adult pregnancies.[14] Placental pathology in this study matches findings from other studies, indicating that maternal age is a risk factor for placental abnormalities. Research on placental issues suggests that conditions like diabetes, measles, and maternal obesity contribute to placental abnormalities. Additionally, some studies have found that placental abnormalities such as placenta previa have a lower incidence and severity compared to other causes.[15]

The findings of this study differ from those of previous research. Research in Romania involving 8 years of data showed that adolescent pregnancy was a risk factor for several complications, including preterm labor and low APGAR scores.[15] Studies in Jakarta, Indonesia, found that adolescent pregnancy carried a higher risk of complications such as prematurity, eclampsia, and low birth weight neonates.[16] Then, research in Sri Lanka also confirmed that adolescent pregnancy posed significant risks for obstetric complications, including low birth weight neonates and prematurity.[17] However, in this study, differences in neonatal parameters like birth weight and APGAR score were not statistically significant, indicating good quality antenatal care in West Java between the two groups.

Research findings show statistically non-significant results, mainly due to data limitations confined to a one-year collection period, with only two hospitals referring patients to both institutions. Cibabat General Hospital and Dr. Hasan Sadikin Hospital in Bandung accounted for a small number of referral patients, resulting in complex clinical conditions with placental involvement that required planned cesarean delivery.

Conclusion

Adolescent pregnancies in West Java showed higher maternal risks, such as preterm delivery and PROM, but showed fewer placental abnormalities compared to adult pregnancies, with similar neonatal outcomes. These results emphasize the importance of targeted obstetric care for adolescents and placental screening for adults. Policies should focus on improving access to reproductive health to lower complication rates.

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Research Article

The Association Between Obesity and Endometriosis: A Case-Control Study at Margono Soekarjo Hospital

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Received: January 29, 2026 | Accepted: March 12, 2026 | Published: March 13, 2026

Abstract
Objective: To investigate the association between obesity and the risk of endometriosis.
Methods: A retrospective case-control study was conducted at Prof. Dr. Margono Soekarjo General Hospital from January 2022 to May 2024. Cases were defined as patients with suspected endometriosis that was histopathologically confirmed, while controls were patients with suspected endometriosis who had negative histopathology results. Body mass index (BMI) was calculated using the Asia-Pacific classification. Data were analyzed using chi-square tests and multivariate logistic regression to estimate odds ratios (ORs) with 95% confidence intervals (CIs).
Results: A total of 100 participants were included, with 50 cases and 50 controls. Obesity was more prevalent among women with endometriosis (54%) compared to the control group (26%). Bivariate analysis revealed a significant association between obesity and endometriosis (OR = 3.34; 95% CI: 1.44–7.75; p = 0.004). Multivariate logistic regression confirmed that obesity remained significantly associated with endometriosis after adjusting for age and parity (adjusted OR = 1.66; 95% CI: 1.36–7.24; p = 0.042).
Conclusion: Obesity is strongly linked to a higher risk of endometriosis. These findings indicate that metabolic factors, especially obesity, could play a role in the development of the disease.

Keywords: Association; body mass index; case control; endometriosis; obesity

Asosiasi antara Obesitas dan Kejadian Endometriosis di RS Margono Soekarjo

Abstrak
Tujuan: Penelitian ini bertujuan menginvestigasi asosiasi antara obesitas dan kejadian endometriosis.
Metode: Penelitian ini menggunakan desain studi kasus-kontrol retrospektif yang dilakukan di RSUD Prof. Dr. Margono Soekarjo pada periode Januari 2022 hingga Mei 2024. Kelompok kasus didefinisikan sebagai pasien dengan dugaan endometriosis yang terkonfirmasi melalui pemeriksaan histopatologi, sedangkan kelompok kontrol merupakan pasien dengan dugaan endometriosis namun dengan hasil histopatologi negatif. Indeks massa tubuh (IMT) dihitung menggunakan klasifikasi Asia-Pasifik. Analisis data dilakukan menggunakan uji chi-square dan regresi logistik multivariat untuk menghitung odds ratio (OR) dengan interval kepercayaan 95%.
Hasil: Sebanyak 100 subjek dilibatkan dalam penelitian ini, terdiri atas 50 kasus dan 50 kontrol. Obesitas lebih banyak ditemukan pada wanita dengan endometriosis (54%) dibandingkan dengan kelompok kontrol (26%). Analisis bivariat menunjukkan adanya hubungan yang signifikan antara obesitas dan kejadian endometriosis (OR = 3,34; IK 95%: 1,44–7,75; p = 0.004). Analisis regresi logistik multivariat menunjukkan bahwa obesitas tetap berhubungan secara signifikan dengan endometriosis setelah dilakukan penyesuaian terhadap usia dan paritas (adjusted OR = 1,66; IK 95%: 1,36–7,24; p = 0.042).
Kesimpulan: Hasil penelitian ini menunjukkan bahwa terdapat hubungan yang signifikan antara obesitas dengan kejadian endometriosis. Temuan ini menunjukkan bahwa faktor metabolik seperti obesitas dapat berkontribusi terhadap perkembangan endometriosis.

Kata kunci: Asosiasi; endometriosis; indeks massa tubuh; kasus kontrol; obesitas

 DOI: 10.24198/obgynia.v9i1.1076

Introduction

Endometriosis is a chronic gynecological condition characterized by the ectopic presence of endometrium-like epithelium and/or stroma outside the normal uterine locations, specifically beyond the endometrium and myometrium, along with a persistent inflammatory process.[1] Typical symptoms include chronic pelvic pain, dysmenorrhea, dyspareunia, and infertility, as well as cyclical signs such as dyschezia, dysuria, hematuria, and rectal bleeding.[2] The prevalence of endometriosis is notably high among women of reproductive age, with global estimates ranging from 10-15%.[1]

Recent global epidemiological data have further refined these estimates. A 2025 systematic review and meta-analysis involving more than 198 million women from 127 studies reported that the pooled prevalence of endometriosis in the general female population is approximately 5%, while the prevalence increases dramatically among women with infertility or gynecological symptoms, reaching 38% and up to 42%, respectively.[3] These findings highlight the significant clinical burden of endometriosis and emphasize the need to better understand modifiable risk factors that may influence its development and progression.

One factor that has gained increasing attention in recent years is obesity, a global public health issue characterized by excessive fat accumulation and chronic low-grade inflammation. Obesity has been linked to many reproductive disorders due to its metabolic, endocrine, and inflammatory effects. Adipose tissue functions as an endocrine organ capable of producing estrogen through aromatization, secreting adipokines, and promoting systemic inflammatory responses, all of which may influence the development of endometriosis. However, the connection between obesity and endometriosis remains complex and debated.[4,5]

In epidemiological studies investigating metabolic risk factors, the classification of body mass index (BMI) should consider ethnic and population-specific characteristics. The conventional World Health Organization (WHO) global BMI classification defines overweight as BMI ≥25 kg/m² and obesity as BMI ≥30 kg/m². However, accumulating evidence has shown that Asian populations tend to have a higher body fat percentage and increased metabolic risk at lower BMI levels compared with Western populations. For this reason, the WHO Western Pacific Region and the International Association for the Study of Obesity recommended the Asia-Pacific BMI classification, which defines overweight as BMI ≥23 kg/m² and obesity as BMI ≥25 kg/m². This classification is considered more appropriate for Asian populations because it better reflects the relationship between adiposity and metabolic health risks.[6,7]

Several meta-analyses have yielded conflicting results regarding the association between body mass index (BMI) and the risk of endometriosis. Earlier pooled analyses suggested an inverse relationship, indicating that women with higher BMI may have a lower risk of developing endometriosis. One meta-analysis found that each 5 kg/m² increase in BMI was associated with a decreased relative risk of endometriosis.[8] Recent reviews and epidemiological studies continue to report similar findings, noting that endometriosis is often diagnosed more frequently in women with lower BMI, although the biological mechanism underlying this relationship remains unclear.[9,10]

In contrast, more recent evidence suggests that certain measures of adiposity may actually increase the risk of endometriosis. A 2025 population-based analysis evaluating visceral adiposity indices reported a significant association between markers of visceral fat accumulation and endometriosis, emphasizing the importance of metabolic health and fat distribution over BMI alone

in determining disease risk.[11] Furthermore, a recent meta-analysis assessing reproductive outcomes in women with endometriosis found that obesity may influence disease expression and reproductive performance, leading to reduced oocyte yield and lower live birth rates during assisted reproductive technologies.[12]

Although many studies have examined this association worldwide, evidence from Indonesia remains limited. Previous research in Indonesia has primarily focused on clinical presentation and infertility outcomes rather than metabolic risk factors. As a result, the connection between obesity and endometriosis in the Indonesian population is still unclear and possibly controversial. Thus, more research is necessary to better understand the potential link between obesity and endometriosis. Clarifying this relationship could improve knowledge of the metabolic and reproductive factors involved in endometriosis and help identify modifiable risks for prevention and treatment.

Method

This study used a retrospective, observational, case-control design to examine the association between obesity and the occurrence of endometriosis. The research was conducted from January 2022 to May 2024 at Prof. Dr. Margono Soekarjo General Hospital, a tertiary referral hospital in Purwokerto, Central Java, Indonesia.

The study population included all patients attending the gynecology clinic with suspected endometriosis whose medical records were documented between January 2022 and May 2024. A total of 215 patients were identified during this period. To minimize selection bias, a total sampling approach was used by including all eligible medical records meeting the inclusion criteria during the study timeframe. The minimum sample size was calculated using the formula for comparing two proportions in a case-control study. Based on this calculation, the minimum required sample size was 44 subjects per group.

Inclusion criteria for this study were women over 20 years old who attended the gynecology clinic at Prof. Dr. Margono Soekarjo Hospital with suspected endometriosis. Exclusion criteria included incomplete medical records, such as missing histopathological results or incomplete anthropometric measurements like height or weight.

Data collection was performed by reviewing patients' medical records. Initially, patients suspected of having endometriosis based on clinical symptoms were identified. These symptoms included abdominopelvic pain, dysmenorrhea, heavy menstrual bleeding, infertility, and dyspareunia. Physical examination findings such as tenderness suggesting endometriotic lesions were noted. Subsequently, ultrasonography results were examined to identify suspected pelvic masses or structural abnormalities indicative of endometriosis. Histopathological examination results obtained after laparoscopic procedures were used to confirm the diagnosis. Based on these histopathological results, subjects were categorized into two groups. The case group consisted of patients aged over 20 years with suspected endometriosis and histopathological confirmation. The control group included patients over 20 years old with suspected endometriosis but whose histopathological results did not confirm the condition. After classifying participants into case and control groups, the body mass index (BMI) of each patient was obtained from medical records. BMI was calculated as body weight in kilograms divided by height in meters squared (kg/m^2). It was categorized according to the Asian-Pacific classification, with obese defined as BMI >25 kg/m^2 and non-obese as BMI ≤ 25 kg/m^2. After applying

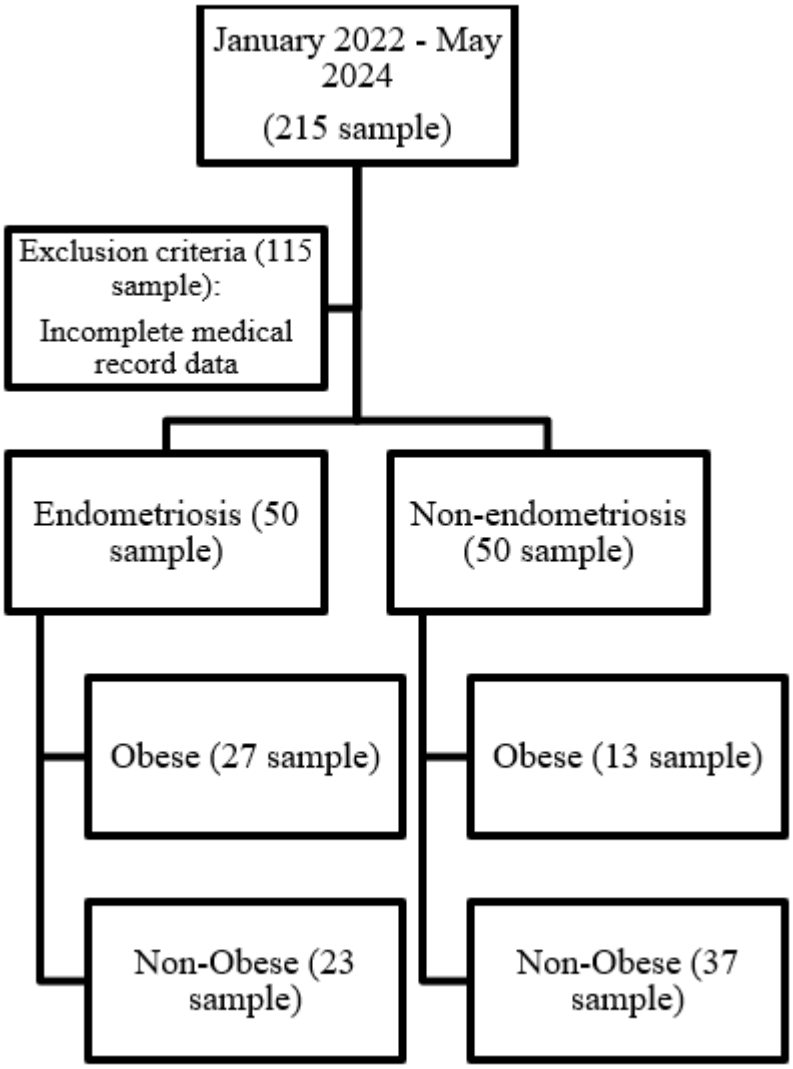

Figure 1 Flowchart Illustrating Patient Selection Process

the inclusion and exclusion criteria, 100 subjects were included in the final analysis, consisting of 50 cases and 50 controls.

Ethical approval for this study was granted by the Ethics Committee of RSUD Prof. Dr. Margono Soekarjo in Purwokerto, Central Java, Indonesia, under Approval No. 420/05601, dated August 21, 2025.

Data were processed and analyzed using SPSS version 27.0. Univariate analysis was conducted to describe the characteristics of the study variables. Bivariate analysis was performed to compare variables between case and control groups using the Chi-square test. Multivariate analysis was conducted with logistic regression to identify factors independently associated with endometriosis. Odds ratios (OR) with 95% confidence intervals (CI) were calculated to estimate the strength of the association between obesity and the occurrence of endometriosis. A P-value <0.05 was considered statistically significant.

Result

A total of 100 patients were recruited for this study, with 50 diagnosed with endometriosis included in the study group and 50 without endometriosis serving as the control group.

Table 1 shows the distribution of participant characteristics based on age, parity, and body mass index (BMI) among women with and without endometriosis. Regarding age, most women diagnosed with endometriosis were in the 36-45 years age group (42%), followed by the 46-55 years group (26%), and the 26-35 years group (20%). In the non-endometriosis group, the largest percentage was in the 46-55 years age group (38%), followed by 36-45 years (32%). The percentages of women under 25 years and over 56 years were relatively small in both groups, each representing 6%.

Regarding parity, most women with endometriosis had parity less than 1 (64%), while 36% had parity greater than 1. In comparison, the non-endometriosis group had a higher percentage of women with parity greater than 1 (66%) and 34% with parity less than 1.

Regarding body mass index, more than half of the women with endometriosis were classified as obese (BMI $\geq$ 25 kg/m^2), at 54%, while 46% were considered non-obese. Conversely, in the group without endometriosis, the majority of participants were non-obese (74%), with only 26% classified as obese.

Overall, these findings indicate that lower parity and obesity were more common among women with endometriosis, while age distribution appeared relatively similar between the two groups.

Table 2 shows the relationship between body mass index (BMI) and the occurrence of endometriosis. Statistical analysis indicated a significant link between obesity and endometriosis ($p = 0.004$). The odds ratio (OR) was 3.34 (95% CI 1.440-7.753), meaning women with obesity had about 3.3 times higher odds of developing endometriosis compared to non-obese women.

Table 3 presents multivariate logistic regression analysis to identify factors independently associated with endometriosis. After adjusting for age and parity, obesity

Table 1 Characteristics of Research Subjects

Patient Characteristics	Endometriosis (n=50)		Non-Endometriosis (n=50)	
	n	%	n	%
Age				
≤ 25	3	6.00	3	6.00
26-35	10	20.00	3	6.00
36-45	21	42.00	16	32.00
46-55	13	26.00	19	38.00
> 56	3	6.00	3	6.00
Parity				
≤ 1	32	64.00	17	34.00
> 1	18	36.00	33	66.00
Body Mass Index				
Obese (≥ 25 kg/m^2)	27	54.00	13	26.00
Non-obese (< 25 kg/m^2)	23	46.00	37	74.00

Table 2 Association between Obesity and Endometriosis

Body Mass Index	Endometriosis (n=50)		Non-Endometriosis (n=50)		p-value	Odds Ratio	Confidence Interval 95%
	n	%	n	%			
Obese (≥ 25 kg/m^2)	27	54.00	13	26.00	0.004	3.34	1.440-7.753
Non-obese (< 25 kg/m^2)	23	46.00	37	74.00			

Table 3 Multivariate Analysis of Factors Associated with Endometriosis

Variable	Adjusted OR	95% CI	p-value
Age			
≤ 25	1.00	-	-
26-35	3,33	0.42-26.03	0.251
36-45	1,31	0.23-7.38	0.758
46-55	0.68	0.11-3.93	0.671
>56	0.33	0.04-2.63	0.297
Parity			
<1	2,29	0.55-9.62	0.257
≥1	1.00	-	-
Body Mass Index			
Obese (≥ 25 kg/m^2)	1,66	1.36-7.24	0.042
Non-obese (<25 kg/m^2)	1.00	-	-

still shows a significant connection to endometriosis. Women classified as obese (BMI ≥ 25 kg/m^2) have 1,66 times higher odds of developing endometriosis compared to non-obese women (adjusted OR = 1.66; 95% CI: 1.36-7.24; p=0.042).

Discussion

The study examined the association between obesity and the occurrence of endometriosis among patients attending Prof. Dr. Margono Soekarjo General Hospital. The findings demonstrated that obesity was significantly associated with endometriosis. In the bivariate analysis, obese women had 3.34 times higher odds of developing endometriosis compared with non-obese women. Furthermore, after adjusting for potential confounding variables, including age and parity, in the multivariate logistic regression model, obesity remained significantly associated with endometriosis (adjusted OR = 1.66). These findings suggest that obesity may play a role in the occurrence of endometriosis in this study population.

The association between body mass index (BMI) and endometriosis remains debated. Several epidemiological studies have shown an inverse association between BMI and the risk of endometriosis. A meta-analysis found that every 5 kg/m^2 increase in BMI was associated with approximately a 33% decrease in endometriosis risk, indicating that women with lower BMI might be diagnosed more often with the condition.[13] Likewise, some studies have noted that lean women have a higher prevalence of endometriosis compared to overweight or obese women.[14]

The discrepancy between these findings and the results of this study may be due to several factors. First, differences in study

populations could influence the observed link between obesity and endometriosis. Many previous studies were conducted in Western populations, whereas this one was conducted in an Indonesian population, where genetic background, lifestyle, and metabolic characteristics may differ. Second, this study used the Asian-Pacific BMI classification, which defines obesity as BMI $\geq$ 25 kg/m^2. This classification is more suitable for Asian populations because metabolic complications tend to occur at lower BMI levels compared to Western populations. As a result, individuals categorized as obese in Asian populations might have different metabolic profiles than those in Western studies. Additionally, in this study, endometriosis was confirmed through histopathological examination after laparoscopic procedures, which is considered the gold standard for diagnosis. Conversely, some epidemiological studies relied on clinical diagnosis or self-reported endometriosis, which could lead to misclassification bias.[15,16]

In this study, parity showed a higher proportion of women with endometriosis among those with lower parity, although the association was not statistically significant after adjustment. This finding aligns with previous studies that report nulliparity is associated with a higher risk of endometriosis.[17] Pregnancy suppresses ovulation and menstruation, thereby reducing retrograde menstruation and limiting the opportunity for endometrial cells to implant in the peritoneal cavity.[18]

Age was not significantly associated with endometriosis in the multivariate analysis. Although endometriosis mainly affects women of reproductive age, it can occur across a broad age range. Additionally, diagnostic delay is common, with many women experiencing symptoms for years before receiving a confirmed diagnosis.[19]

The findings of this study have several clinical implications. It is important for clinicians to improve risk identification and prevention strategies. Clinicians should consider metabolic factors, including obesity, as part of the clinical assessment of women presenting with symptoms suggestive of endometriosis. Furthermore, addressing modifiable metabolic risk factors such as obesity may contribute to improved reproductive health outcomes and better management of gynecological disorders.

Nevertheless, several limitations should be acknowledged. First, this study needs larger sample sizes, and prospective study designs are recommended to better clarify the relationship between obesity and endometriosis. Second, other potential confounding factors, such as hormonal therapy, dietary patterns, and genetic predisposition, were not evaluated in this study.

Conclusion

This study showed that obesity was significantly associated with endometriosis. These findings imply that metabolic factors like obesity might play a role in developing endometriosis. Additional research with larger populations and prospective study designs is necessary to better understand the connection between obesity and endometriosis and to find potential preventive measures.

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