

Comparison of Endometriosis Characteristics in Adolescents and Women of Advanced Reproductive Age

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Abstract

Objective: To compare the clinical and pathological characteristics of endometriosis between adolescents (10 – 19 years) and women of advanced reproductive age (35 – 45 years) to improve early diagnosis and personalized management.

Methods: A retrospective, cross-sectional study of 68 patients (31 adolescents; 37 older women) with laparoscopically and histopathologically confirmed endometriosis at Dr. Margono Soekarjo Regional General Hospital between January 2022 and December 2024. Statistical analyses included independent t-tests, chi-square tests, and multivariate logistic regression.

Results: Adolescents showed a higher prevalence of dysmenorrhea (80.6% vs. 43.2%; $p=0.003$), more early-stage disease (Stage I–II: 71% vs. 22%; $p<0.001$), and increased peritoneal lesions (29% vs. 8%; $p=0.030$). They also had a lower BMI (21.4 vs. 24.3 kg/m²; $p=0.007$) and earlier menarche (12.9 vs. 13.8 years; $p=0.016$). Women of advanced age mainly presented with late-stage disease (Stage III–IV: 78%) and showed significant associations with age (OR 1.15; 95% CI 1.02–1.30), primiparity (OR 5.67; 95% CI 1.23–26.12), multiparity (OR 6.23; 95% CI 1.34–28.98), and Stage III–IV disease (OR 4.89; 95% CI 1.25–19.16).

Conclusion: Endometriosis in adolescents appears as severe dysmenorrhea, milder stages, and peritoneal involvement, while older women show advanced disease related to age and parity. Age-specific diagnostic awareness and management are crucial.

Keywords: Adolescents, advanced reproductive age, dysmenorrhea, endometriosis

Perbandingan Karakteristik Endometriosis antara Remaja dan Wanita Usia Reproduksi Lanjut

Abstrak

Tujuan: Penelitian ini bertujuan membandingkan karakteristik endometriosis pada kedua kelompok untuk mendukung diagnosis dini dan tatalaksana tepat.

Metode: Metode yang digunakan dalam penelitian ini adalah studi observasional analitik retrospektif dengan desain potong lintang pada 68 pasien (31 remaja, 37 wanita usia reproduktif lanjut) endometriosis terkonfirmasi laparoskopik dan histopatologi di Rumah Sakit Umum Daerah Dr. Soekarjo Margono Purwokerto periode Januari 2022 – Desember 2024). Analisis statistik meliputi uji independent t-test, chi-square, dan regresi logistik multivariat.

Hasil: Hasil penelitian menunjukkan remaja memiliki prevalensi dismenore lebih tinggi (80,6% vs 43,2%; $p=0,003$), stadium awal (I-II) dominan (71% vs 22%; $p<0,001$), dan lesi peritoneum lebih sering (29% vs 8%; $p=0,030$). Wanita usia reproduksi lanjut cenderung stadium III-IV (78%), dengan faktor risiko signifikan: usia (OR 1,15; 95%CI 1,02–1,30), paritas primipara (OR 5,67; 95%CI 1,23–26,12), multipara (OR 6,23; 95%CI 1,34–28,98), dan stadium III-IV (OR 4,89; 95%CI 1,25–19,16). Perbedaan signifikan juga terlihat pada IMT lebih rendah (21,4 vs 24,3 kg/m²; $p=0,007$) dan usia menarche lebih dini (12,9 vs 13,8 tahun; $p=0,016$) pada remaja.

Kesimpulan: Karakteristik endometriosis pada remaja berbeda dengan wanita usia reproduksi lanjut. Diagnosis dini pada remaja dan pendekatan terapeutik berbasis usia diperlukan untuk kualitas hidup endometriosis yang optimal..

Kata Kunci: Dismenore; endometriosis; remaja; usia reproduksi lanjut.

Introduction

Endometriosis is a chronic neuro-inflammatory disorder characterized by the growth of endometrium-like tissue outside the uterine cavity. This condition affects approximately 10% of women of reproductive age worldwide, with an estimated prevalence reaching 190 million women.¹ Despite its high prevalence, endometriosis is often significantly underdiagnosed, with an average diagnostic delay of 6.6 years (range 1.5 to 11.3 years) from the onset of symptoms.² The impact of endometriosis goes beyond physical health, greatly affecting mental well-being and overall quality of life, leading to reduced physical, social, and emotional functioning.^{2,3}

Endometriosis in adolescents exhibits distinct clinical and pathological characteristics compared to adult women of advanced reproductive age. While it is often linked to adulthood, studies indicate a high prevalence of laparoscopically confirmed endometriosis in adolescents (62% among those undergoing laparoscopy for evaluation, 75% in those with chronic pelvic pain unresponsive to treatment, and 70% among those experiencing dysmenorrhea). Khashchenko et al. (2023) found that adolescents with endometriosis mostly present with early-stage disease (rASRM stages I–II), in contrast to adult women who more frequently present with advanced-stage disease (stages III–IV).⁴ Clinical characteristics also differ significantly between the two age groups. According to Janssen et al. (2013), dysmenorrhea is the main symptom in adolescents, with a prevalence of up to 80%, considerably higher than in adult women.³ Studies by Khashchenko et al. (2023) further show that adult women are more likely to have deep infiltrating lesions and ovarian endometriomas.⁴ Risk factors for endometriosis vary by age and include early menarche (before age 11), a history of

infertility, and specific menstrual bleeding patterns.⁵

Understanding the distinct characteristics of endometriosis in adolescent and adult populations is essential for enabling earlier diagnosis, customizing appropriate treatment options, and enhancing patient quality of life. Previous research has shown that early detection and proper management in adolescents can prevent disease progression and reduce long-term complications.⁴ However, there is limited comparative data specifically examining the clinical and demographic differences between these two age groups. This highlights the need for further studies to strengthen the scientific evidence and improve clinical approaches. This study aims to compare the clinical, demographic, and lesion distribution features of endometriosis between adolescents (10–19 years) and women of advanced reproductive age (35–45 years) at Dr. Margono Soekarjo Regional General Hospital, Purwokerto, Banyumas Regency, Central Java, Indonesia, thereby providing insights into age-specific disease presentations in the Indonesian population and aiding in the development of optimized diagnostic and treatment strategies.

Methods

This study used a retrospective, observational, cross-sectional design to explore the characteristics of endometriosis across different age groups. Adolescents were defined as those aged 10–19 years, according to the World Health Organization (WHO), while women of late reproductive age were categorized as those aged 35–45 years, based on the American Society for Reproductive Medicine (ASRM) criteria for the late reproductive phase. The research was conducted at Dr. Margono Soekarjo General Hospital in Purwokerto and included a representative sample of endometriosis cases diagnosed between January 2022 and

December 2024.

Inclusion criteria included women who had undergone laparoscopy with histopathologically confirmed endometriosis and presented with relevant symptoms such as chronic pelvic pain, dysmenorrhea, or dyspareunia. Exclusion criteria included women with unconfirmed endometriosis, those outside the specified age ranges, and patients with comorbid conditions that could potentially influence outcomes. These conditions encompassed other gynecologic disorders like uterine fibroids, adenomyosis, or ovarian cancer; pelvic inflammatory disease; autoimmune disorders affecting the reproductive system, such as systemic lupus erythematosus or antiphospholipid syndrome; endocrine issues, including polycystic ovary syndrome (PCOS) or thyroid problems; and a history of major gynecologic surgery other than laparoscopy for endometriosis. Other chronic illnesses affecting hormonal balance or immune function were also grounds for exclusion.

Sample size was estimated using the population proportion formula with absolute precision, resulting in a minimum required sample of 31 subjects per group. Data were collected from patients' medical records. Ethical approval for this study was granted by the Ethics Committee of RSUD Prof. Dr. Margono Soekarjo, Purwokerto, Central Java, Indonesia (Approval No. 420/03847, dated June 10, 2025).

Data analysis involved normality testing to evaluate data distribution, univariate analysis to describe baseline characteristics of the studied variables, and bivariate analysis to compare variables between groups. Multivariate analysis was performed using logistic regression to identify independent factors associated with endometriosis, which produced adjusted odds ratios (ORs) and corresponding 95% confidence intervals (CIs). All statistical analyses were conducted using SPSS software, with statistical

significance at $p < 0.05$.

Results

A total of 68 patients were included in this study, consisting of 31 adolescents and 37 women of advanced reproductive age. The final sample size was determined through a thorough selection process based on predefined inclusion and exclusion criteria. Detailed characteristics of the study participants are shown in Table 1.

An independent t-test was used to calculate mean differences between groups. Chi-square test was used for categorical variables. Statistical significance was set at $p < 0.05$.

Table 1 shows significant statistical differences ($p < 0.05$) in several characteristics between the adolescent group ($n = 31$) and women of advanced reproductive age ($n = 37$) with endometriosis. Adolescents had a mean age of 16.8 ± 2.3 years, while women of advanced reproductive age were older (47.5 ± 5.2 years). Body Mass Index (BMI) in adolescents (21.4 ± 3.1 kg/m²) was lower than that of older women (24.27 ± 5.03 kg/m²). Adolescents experienced menarche at a younger age (12.9 ± 1.3 years) compared to women of advanced reproductive age (13.8 ± 1.8 years).

Menstrual cycle patterns varied significantly between groups, with 77.4% of adolescents reporting regular cycles compared to only 51% of older women. Parity status also showed a clear difference: most adolescents (77.4%) were nulliparous, while the majority of women of advanced reproductive age were multiparous (59.4%). Interestingly, family history of endometriosis did not significantly differ between the groups (41.9% in adolescents vs. 45.9% in older women, $p = 0.931$), nor did the use of hormonal contraception ($p = 0.270$). However, more adolescents tended not to use contraception (64.5%) than women of

Table 1 Characteristics of Study Subjects

| Characteristic | Adolescents (n = 31) | Advanced Reproductive Age Women (n = 37) | p-value |
|----------------------------------------|-------------------------|------------------------------------------------|---------|
| Age (years), mean ± SD | 16.8 ± 2.3 | 47.5 ± 5.2 | 0.001* |
| BMI (kg/m ²), mean ± SD | 21.4 ± 3.1 | 24.27 ± 5.03 | 0.012* |
| Age at menarche (years), mean ± SD | 12.9 ± 1.3 | 13.8 ± 1.8 | 0.025* |
| Menstrual cycle, n (%) | | | 0.049* |
| -Regular | 24 (77.4%) | 19 (51%) | |
| - Irregular | 7 (22.6%) | 18 (48%) | |
| Parity, n (%) | | | <0.001* |
| - Nulliparous | 24 (77.4%) | 11 (29.7%) | |
| - Primiparous | 3 (9.7%) | 4 (10.8%) | |
| - Multiparous | 4 (12.9%) | 22 (59.4%) | |
| Family history of endometriosis, n (%) | 13 (41.9%) | 17 (45.9%) | 931 |
| Use of hormonal contraception, n (%) | | | 270 |
| - None | 20 (64.5%) | 15 (40.5%) | |
| - Oral pill | 6 (19.3%) | 5 (13.5%) | |
| - Injection | 3 (9.7%) | 4 (10.8%) | |
| - IUD | 0 (0%) | 3 (8.1%) | |
| - MOW | 1 (3.2%) | 4 (10.8%) | |
| - Combination | 1 (3.2%) | 6 (16.2%) | |

Table 2 Comparative Analysis of Endometriosis Characteristics

| Variable | Adolescents (n=31) | Women of Advanced Reproductive Age (n=37) | P-value |
|------------------------------------|-----------------------|----------------------------------------------|---------|
| Dysmenorrhea, n (%) | 25 (80.6%) | 16 (43.2%) | 0.003* |
| Chronic pelvic pain, n (%) | 5 (16.1%) | 3 (18.9%) | 454 |
| ASRM Endometriosis Stage, n (%) | | | <0.001* |
| -Stage I–II | 22 (71.0%) | 8 (21.6%) | |
| - Stage III–IV | 9 (29.0%) | 29 (78%) | |
| Lesion location, n (%) | | | |
| - Fallopian tube | 8 (25.8%) | 13 (35.1%) | 442 |
| - Ovary | 14 (45.2%) | 21 (56.7%) | 465 |
| - Peritoneum | 9 (29.0%) | 3 (8%) | 0.030* |

The independent t-test is used to estimate the mean difference between groups.

The chi-square test is used for categorical variables.

*Statistically significant if p<0.05

advanced reproductive age (40.5%).

Table 2 presents a comparative analysis of endometriosis characteristics, demonstrating statistically significant differences between adolescents (n=31) and women of advanced reproductive age (n=37). Adolescents exhibited a markedly higher rate of dysmenorrhea (80.6%) compared to older women (43.2%) (p=0.003). Chronic pelvic pain was not significantly different between groups (16.1% vs. 18.9%, p=0.454).

Endometriosis staging also showed apparent differences. Most adolescents had early-stage disease (ASRM I–II: 71.0%), whereas women of advanced reproductive age mostly had advanced-stage disease (ASRM III–IV: 78%, p<0.001). Regarding lesion distribution, no significant differences were found for fallopian tube (p=0.442) and ovarian involvement (p=0.465). However,

peritoneal lesions were significantly more common in adolescents (29.0%) than in older women (8%, p=0.030). These findings indicate that endometriosis in adolescents often presents with more prominent pain symptoms, especially dysmenorrhea, milder disease stages, and different lesion locations compared to older women.

Table 3 summarizes the multivariate analysis identifying factors independently associated with endometriosis in women of advanced reproductive age. Increasing age significantly increased the risk of endometriosis (Adjusted OR: 1.15, 95% CI: 1.05–1.26, p=0.003). Primiparous and multiparous statuses were also linked to higher risk compared to nulliparity (Primipara: Adjusted OR 5.67, 95% CI: 1.84–17.5, p=0.002; Multipara: Adjusted OR 8.23, 95% CI: 2.12–31.9, p=0.002).

Table 3 Multivariate Analysis of Factors Linked to Endometriosis in Women of Advanced Reproductive Age

| Variable | Adjusted OR | 95% CI | P-value |
|--------------------------|-------------|-----------|---------|
| Age (years) | 1.15 | 1.05–1.26 | 0.003* |
| BMI (kg/m ²) | 1.12 | 0.98–1.28 | 0.89 |
| Age at menarche (years) | 0.85 | 0.68–1.07 | 165 |
| Menstrual cycle | | | |
| -Regular | 1.00 | – | – |
| -Irregular | 2.34 | 0.89–6.15 | 85 |
| Parity | | | |
| - Nulliparous | 1.00 | – | – |
| - Primiparous | 5.67 | 1.84–17.5 | 0.002* |
| - Multiparous | 8.23 | 2.12–31.9 | 0.002* |
| Dysmenorrhea | 0.42 | 0.15–1.18 | 98 |
| ASRM Endometriosis Stage | | | |
| - Stage I–II | 1.00 | – | – |
| - Stage III–IV | 4.89 | 1.76–13.6 | 0.002* |
| Lesion location | | | |
| - Fallopian tube | 1.00 | – | – |
| -Ovary | 1.23 | 0.45–3.37 | 689 |
| - Peritoneum | 0.31 | 0.08–1.22 | 95 |

Adjusted OR: Odds ratio from multivariate analysis. CI: Confidence interval. P-value: Statistical significance (p<0.05).

Advanced-stage disease (ASRM III–IV) was associated with a greater risk (Adjusted OR: 4.89, 95% CI: 1.76–13.6, $p=0.002$). No significant associations were found for BMI, age at menarche, menstrual cycle pattern, presence of dysmenorrhea, or lesion location in the ovary or peritoneum.

Discussion

The findings of this study show significant differences in demographic and anthropometric characteristics between adolescents and women of advanced reproductive age with endometriosis. The average age of adolescents with endometriosis was 16.8 ± 2.3 years, while women of advanced reproductive age had an average age of 47.5 ± 5.2 years. Significant differences ($p<0.05$) were also found in Body Mass Index (BMI), with adolescents having a lower BMI (21.4 ± 3.1 kg/m²) compared to older women (24.27 ± 5.03 kg/m²). Additionally, age at menarche varied, with adolescents experiencing menarche earlier (12.9 ± 1.3 years) than women of advanced reproductive age (13.8 ± 1.8 years).

These findings are consistent with previous studies on endometriosis in adolescent populations. A study by Laufer et al. reported the average age of adolescent endometriosis patients as 17.95 ± 1.48 years, with symptoms starting at an average of 15.28 ± 3.03 years.⁶ The average time to diagnosis was 2.96 ± 2.93 years, indicating delays despite early symptom onset.⁶ Other research also shows that endometriosis affects not only adult women but adolescents as well, especially those with uterine anomalies.⁷ The BMI differences observed between groups in this study are in line with the literature, which suggests that BMI tends to increase with age in women with endometriosis.⁸

Earlier menarche in adolescents with endometriosis supports the hypothesis that early menarche could be a risk factor for the

disease. Several studies have linked early menarche to various health issues, including metabolic syndrome, type 2 diabetes, and certain gynecological problems.⁹ A meta-analysis by Lee et al. reported that early menarche significantly raises the risk of endometriosis, with an increased adjusted relative risk (aRR).⁹ The connection between early menarche and endometriosis may be due to earlier and longer exposure to estrogen, which is known to be important in the disease's pathogenesis. This could explain why adolescents in this study experienced menarche earlier than women of advanced reproductive age.

BMI differences between the two age groups are also significant. The relationship between BMI and endometriosis is complicated. Some studies suggest that women with a lower BMI have a higher risk of developing endometriosis, while others indicate that being overweight may increase estrogen production in fat tissue, potentially worsening the disease.¹⁰ In this study, the lower BMI in adolescents may reflect normal age-related body composition changes but could also point to different metabolic factors affecting disease development across age groups. A study by Vitonis et al. found no significant links between endometriosis and lifestyle factors such as alcohol, caffeine, or smoking, emphasizing the greater influence of intrinsic factors like BMI and menarche in shaping disease risk and symptoms.¹¹

This study also identified significant differences in menstrual cycle patterns, with 77.4% of adolescents showing regular cycles compared to only 51% of older women. These findings highlight important differences in how endometriosis presents across age groups. Prior studies have reported that the time between menarche and the onset of cycle regulation in adolescents varies widely and may be influenced by genetic, ethnic, intrauterine, social, geographic, lifestyle, and chronic disease factors.¹² The high proportion

of regular cycles in affected adolescents warrants further investigation, as irregular cycles are often seen as signs of reproductive disorders. This phenomenon may be due to early stages of endometriosis development in adolescents, during which cycle regulation remains largely intact.

A contrasting difference was also observed in parity status: most adolescents (77.4%) were nulliparous, while the majority of older women (59.4%) were multiparous. This reflects not only the demographic characteristics of adolescents, who typically have not yet entered active reproductive stages, but also the role of endometriosis as a secondary cause of infertility that may interfere with conception.¹³

This study further revealed significant differences in the prevalence of dysmenorrhea between groups, with adolescents showing notably higher rates (80.6%) compared to older women (43.2%) ($p=0.003$). Dysmenorrhea is the most common menstrual symptom among adolescent girls and young women, usually presenting as discomfort or cramping in the lower abdomen before or during menstruation without prior medical pathology.¹⁴ Recent studies indicate that ultrasound features of endometriosis are found in 13.3% of the general adolescent female population, increasing significantly to 35.3% in those with severe dysmenorrhea.¹⁵ These findings support the data in this study, confirming a higher prevalence of dysmenorrhea in adolescents.

Dysmenorrhea linked to endometriosis is classified as secondary dysmenorrhea, which is defined as pain caused by an underlying pelvic pathology.¹⁵ Endometriosis is the primary cause of secondary dysmenorrhea in adolescents, with a notably high prevalence. Systematic reviews show that, among adolescents undergoing laparoscopy for chronic pelvic pain that does not respond to treatment, 75% were diagnosed with endometriosis, while the prevalence was

70% in those with dysmenorrhea.³ The high rate of dysmenorrhea observed in this study (80.6%) supports these findings, indicating that endometriosis in adolescents has distinct clinical features compared to adult women.

Moreover, staging distribution revealed significant differences. Adolescents were more likely to present with early-stage disease (I–II) (71.0%), whereas older women were mainly diagnosed with advanced-stage disease (III–IV) (78%) ($p<0.001$). This distribution highlights the progressive nature of endometriosis, linked to longer exposure to menstrual cycles and hormonal fluctuations in older women. This is consistent with findings by Bai et al. in Korean adolescents, who reported that most adolescent patients (44%) were diagnosed with stage II disease according to the American Fertility Society (AFS) classification, with only 10% presenting with stage I, 28% with stage III, and 18% with stage IV.¹⁶ The chronic and progressive course of endometriosis is clear, as adolescents with shorter exposures to hormonal cycles and reproductive years tend to have early-stage lesions, while cumulative risk factors in adulthood drive progression to more advanced stages. Bai et al. also found a mean diagnostic interval of 5.9 years after menarche, indicating early disease onset during reproductive years.¹⁶

Differences in lesion distribution were also observed, especially in peritoneal lesions, which were notably more common in adolescents (29.0%) than in older women (8%) ($p=0.030$). In contrast, no significant differences were found for fallopian tube ($p=0.442$) or ovarian lesions ($p=0.465$). The high rate of peritoneal lesions in adolescents might relate to the early developmental stage of endometriosis. Martire et al. (2020) suggested that endometriosis may begin early in life but often remains undiagnosed.¹⁷ Superficial peritoneal lesions are believed to be the first sign of the disease and may develop into more complex forms, such as

ovarian endometriomas or deep infiltrating lesions, over time. This progression could also explain why there are no significant group differences for fallopian tube and ovarian lesions, as these types take longer to develop.

Immunological dysfunction has also been recognized as a key factor in endometriosis pathogenesis.⁷ Women with this condition show altered activity in peritoneal macrophages, lymphocytes, and natural killer cells, along with increased levels of inflammatory mediators and growth factors in the peritoneal fluid. Differences between adolescents and older women may reflect changes in immune response with age. Adolescents, with a more reactive immune system, might show different clinical signs and disease progression compared to older women, who may experience age-related immune alterations. This could account for the higher prevalence of peritoneal involvement in adolescents.⁶

The results also show that, in women of advanced reproductive age, increasing age raises endometriosis risk by 1.15 times per year, while parity significantly affects disease expression. Primiparous and multiparous women face risks that are 5.67 times and 6.23s times higher, respectively, than nulliparous women. Additionally, advanced-stage disease (III–IV) increased the risk 4.89 times compared to early stages (I–II). These findings align with a systematic review reporting that primiparous women with endometriosis have nearly double the risk of preeclampsia and other pregnancy complications compared to multiparous women.¹⁸ The link between parity and endometriosis can be explained through hormonal mechanisms, as pregnancy and higher parity may modulate disease severity and suppress symptoms by altering estrogen and progesterone levels. Moreover, nulliparity itself is considered a risk factor for endometriosis, along with early menarche and late menopause.¹⁸ The higher risk associated

with advanced-stage disease reflects the presence of more invasive and extensive lesions, which take longer to develop and are therefore more common in older women of reproductive age.

Conclusion

This study shows that endometriosis in adolescents has notably different characteristics compared to women of advanced reproductive age across demographic, clinical, and pathological dimensions. Adolescents with endometriosis mainly experience symptoms like dysmenorrhea, which affects up to 80.6% of cases, tend to have milder disease stages (stages I-II accounting for 71.0%), and are more likely to have peritoneal lesions (29.0%) compared to older women. In contrast, women of advanced reproductive age more often suffer from advanced-stage endometriosis (stages III-IV making up 78%), with a lower rate of dysmenorrhea (43.2%), indicating disease progression with age and longer hormonal exposure. Factors such as an earlier age at first period, mostly nulliparous status in adolescents, and differences in body mass index contribute to the variations in how endometriosis presents between the two groups. These findings highlight the need for diagnostic and treatment strategies tailored to specific age groups: early detection in adolescents can prevent disease from advancing, while managing older women requires addressing the complexity of more developed disease and its effects on fertility and long-term quality of life.

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