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How to Diagnose Endometriosis in Adolescents Early

Hartati[1*], Dannah Khalizha Nabila Pratiksa[2]

[1]Department of Obstetrics and Gynecology, Faculty of Medicine, Sriwijaya University, Palembang, Indonesia
[2]Faculty of Medicine, Sriwijaya University, Palembang, Indonesia
E-mail : drhartatispog@gmail.com

Abstract

Endometriosis is one of the reproductive disorders in women that has severe symptoms and affects activities. Globally, endometriosis is estimated to affect around 10% of women of reproductive age, or around 190 million women worldwide. However, the diagnosis of endometriosis is still very slow with an average delay of 4 to 12 years from the first symptoms. This study aims to provide information on how to detect endometriosis early in adolescents. When is the best time to do early detection, what are the factors for late diagnosis, and what are the disadvantages that can occur if the diagnosis is late. This writing method is a literature study with literature sources for the last 5 years through search sites such as google scholar, Pubmed, NCBI, Clinical Key, and Science Direct. The results obtained from these various literature sources are Early detection is very important since adolescence, especially if there is severe dysmenorrhea or chronic pelvic pain. Delay in diagnosis is caused by the normalization of dysmenorrhea, lack of accurate non-invasive diagnostic tools, and low public awareness. As a result, patients are at risk of experiencing impaired quality of life.

Keywords*:* Endometriosis, Early Detection, Adolescents

1. Introduction

Endometriosis is one of the reproductive disorders in women that has severe symptoms and affects activities. Endometriosis is a chronic condition, a gynecological condition in which endometrial tissue grows and settles outside the uterine cavity, especially in the pelvic area, such as the ovaries, peritoneum, and uterosacral ligaments.[1,2]

Globally, endometriosis is estimated to affect around 10% of women of reproductive age, or around 190 million women worldwide. Among adolescents, the prevalence is said to be high because it reaches 60–70% of those who experience chronic pelvic pain. This condition presents symptoms that interfere with life such as severe dysmenorrhea, chronic pelvic pain, infertility, gastrointestinal and urinary disorders, fatigue, and impaired quality of life of sufferers.[3]

Although endometriosis is not a malignant disease, endometriosis is often called a "silently crippling" disease because its symptoms are chronic, progressive, and play a major role or impact on the physical, mental and social health of sufferers.4 Even so, the diagnosis of endometriosis is still very slow with an average delay of 4 to 12 years from the first symptoms.[4]

The cause of the delay is due to the normalization of dysmenorrhea by patients or health workers. Then the lack of accurate non-invasive diagnostic tools, and there are variations in clinical presentation. For that, currently a way to detect endometriosis in adolescents is needed so that there is no delay in diagnosis. This paper is expected to provide information on how to detect

endometriosis early in adolescents. When is a good time to do early detection, what are the factors for delayed diagnosis, and what are the disadvantages that can occur if the diagnosis is late.

2. Methods

This study is a narrative literature review, which aims to summarize and synthesize recent findings related to early diagnosis of endometriosis in adolescents. The review is organized based on emerging themes identified across selected peer-reviewed studies, aiming to provide a comprehensive overview of current perspectives, analyzing facts from accurate and valid scientific sources. Scientific sources are obtained from Google Scholar, Pubmed, NCBI, Clinical Key, and Science Direct. in the form of scientific articles. The library data obtained is then selected according to the inclusion criteria and exclusion criteria. Library data is included if it is published in the last 5 years, Literature search was conducted in May 2025. Sources for conducting this literature review include a systematic search study of computerized databases with the keywords used, namely "Early Diagnostic", "Endometriosis" and "adolescent". The study selection process is illustrated in the PRISMA flow diagram.

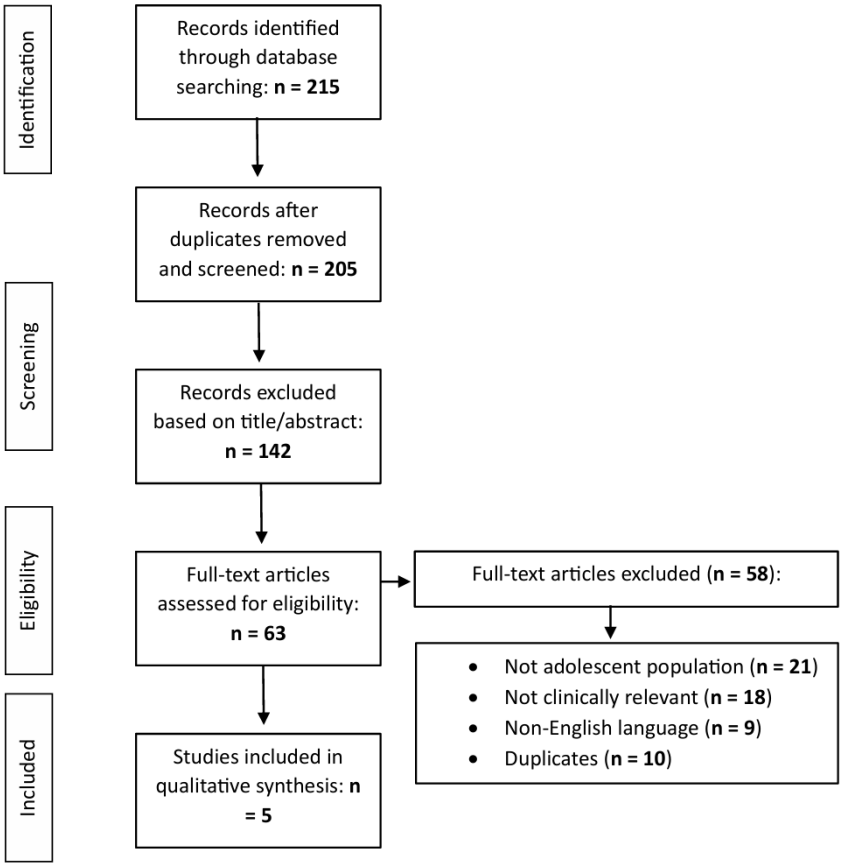

Figure 1. PRISMA Flow Diagram of Study Selection

3. Results

After searching for data and analysis, 5 articles were found that had covered the inclusion criteria suitable for this research review. The characteristics of these articles can be seen in Table 1 below.

Table 1. Research Results of Various Study References

Reference	Study Title	Study Design	Main Findings
Balogh et al., 2024.[5]	The use of machine learning for early diagnosis of endometriosis through a mobile health application	A prospective cohort study based on a mobile application. Involving 10,000 women (5,000 with endometriosis, 5,000 without) who used the health application "Lucy"	Collected data includes symptoms, lifestyle, nutrition, and physical/mental conditions. Machine learning algorithms are used to detect symptom patterns associated with endometriosis. Potential for early diagnosis and data-driven nutritional recommendations.
Al- Shukri et al., 2023.[6]	Are There Predictors of Early Diagnosis of Endometriosis Based on Clinical Profile?	Retrospective observational cohort study Retrospective study of 262 women in Oman with a diagnosis of endometriosis	Most diagnoses (75.6%) were surgically established. No specific symptom profile was found to significantly predict early diagnosis. There was a trend towards increasing diagnosis at a younger age over the study period (p = 0.047), indicating increased awareness. Infertility and pelvic pain were common but were not significantly associated with time to diagnosis.
Brandes et al., 2022.[7]	Cross-sectional study for derivation of a cut-off value for identification of an early versus delayed diagnosis of endometriosis based on analytical and descriptive research methods	Cross-sectional study based on data from the EndoCost study in Germany.	The average delay in diagnosis of endometriosis internationally is 6.7 years. This study determined that 5 years is a significant threshold for distinguishing early vs. late diagnosis. Early onset of symptoms at a young age is associated with a longer delay in diagnosis. Adolescents need special attention in education and early diagnosis.
El-Hadad et al., 2023.[8]	Dysmenorrhea in adolescents requires careful investigation of endometriosis—an analysis of early menstrual experiences in a large case-control study	A multicenter case-control study involving 563 women with endometriosis and 563 controls from Swiss, Germany, dan Austria.	Dysmenorrhea that begins at menarche or occurs several years later is highly correlated with the diagnosis of endometriosis. Negative memories of menarche are also predictive factors. Mother's experience and attitude toward menstruation do not have a significant effect. It is recommended that dysmenorrhea in adolescents should be seriously investigated as an indicator of possible endometriosis.

Reference	Study Title	Study Design	Main Findings
Martire et al., 2023.[9]	Early noninvasive diagnosis of endometriosis: dysmenorrhea and specific ultrasound findings are important indicators in young women	Retrospective observational study. Involved 371 female patients aged 12–25 years with severe dysmenorrhea (VAS ≥ 7) who underwent transvaginal or transrectal ultrasound examination at the University of Rome "Tor Vergata" between 2016–2021.	35.3% of patients had ultrasound findings consistent with endometriosis. Additional symptoms such as dyspareunia, dysuria, bowel disorders, and heavy menstrual bleeding were significantly more common in patients with ultrasound findings of endometriosis. Severe dysmenorrhea accompanied by additional symptoms increased the likelihood of endometriosis diagnosis by 60%+. The study emphasizes the importance of ultrasound evaluation by an expert sonographer in early detection of endometriosis in adolescents, to reduce delays in diagnosis and prevent disease progression.

4. Discussion

There are five articles found and have been studied. The existing research approximately examines and discusses about early detection of endometriosis in adolescents. The research methods used are diverse. Where there are retrospective observational, case control studies, and cross-sectional studies conducted.

4.1. Digital Technology and Machine Learning for Early Detection

Early detection of endometriosis cases can use data with existing registry-based information on endometriosis diagnosis such as quality of life evaluation, pain score assessment (VAS), symptomatic and emotional symptoms associated with pain sensation. The data is filled in by respondents in an application that contains a questionnaire menu that is clearly displayed on the main page of the application. In addition, this study further reveals that some dietary factors can intensify pain and adversely affect the quality of life in women suffering from endometriosis and can be used as nutritional recommendations in the future. In research conducted by Balogh[5] Researchers use applications to monitor symptoms, lifestyle, and psychological physical conditions, which technology is very well utilized for the continuity of monitoring in the early screening stage before invasive actions. Then with this technology, it can facilitate access to early diagnosis, especially in young age groups who are familiar with the use of technology.[5]

4.2. Clinical Profile and Diagnosis Through Surgical Methods

Most cases of endometriosis (75.6%) were found in Al-Shukri[6] study diagnosed by surgery or surgical methods. Then the rest (24.4%) were diagnosed clinically based on symptom profiles, clinical examinations, and imaging studies. This shows that surgery is still the dominant method even though it is invasive. Diagnosis through surgery is still the gold standard but is too invasive to be used as a screening tool, especially in adolescents. Data were also obtained regarding ovarian cysts present in (80.2%) patients, while there

were (63.4%) accompanied by symptoms such as (dysmenorrhea, dyspareunia, dyschezia, or chronic pelvic pain) at least one of them. And (45.4%) experienced infertility. In this study it was stated that ultrasonography makes it a potential early warning tool because there were (80.1%) identified ovarian endometrioma using ultrasonography. Then based on the symptoms, it was found that pain was the most common symptom (48.9%) experienced dysmenorrhea, (5.0%) experienced dyspareunia, (9.5%) chronic pelvic pain, and (1.5%) experienced dyschezia. Then the only factor that correlated significantly with age at diagnosis was time related to public awareness and health workers who played a role in reducing the risk of late diagnosis and contributing to increased early diagnosis.[6,10]

4.3. Determination of Time Limit for Endometriosis Diagnosis (Cut-off Analysis)

A timely diagnosis of endometriosis ideally within five years of initial symptoms is crucial to prevent further advancement of the condition. While there is no scientific standard that clearly states how many years are too late to diagnose, this study can establish a cut-off for diagnosis based on population statistics. It also highlights the importance of educating adolescent girls and young adult women and those in their communities about endometriosis as an important first step to improving early diagnosis of endometriosis. Because in the Brandes[7] study it was stated that young age at first symptom was highly correlated with delayed diagnosis. However, the lack of knowledge and awareness of the community regarding this case is a barrier to accessing this target group. For this reason, strategies were developed such as introducing normal and pathological menstrual symptoms. The aim of this campaign is for adolescent girls and young adult women to consult a doctor earlier and provide an authentic description of their symptoms, especially pelvic pain related to the menstrual cycle. Doctors who are directly involved in advice should recognize the likelihood of endometriosis in women younger than 30 years old, so that differential diagnoses can be considered at an early stage.[7,11]

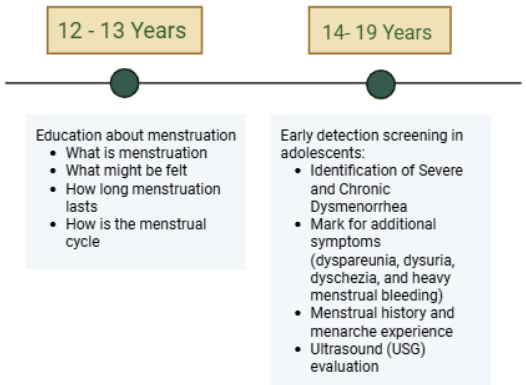

Figure 2. Timeline recommendation for early detection of endometriosis[7,12]

*Critical age for intervention < 20 years

*Educational intervention & clinical screening are carried out during puberty

4.4. Correlation of Dysmenorrhea and Endometriosis: Significance of Initial Symptoms

Dysmenorrhea is often considered a normal physiological phenomenon in adolescents, but in some cases, it is the main symptom of endometriosis. So that such a perception can cause many cases not to be investigated early. In the study of El-Hadad[8] revealed that the likelihood of developing endometriosis increases when dysmenorrhea appears more than three years after the onset of menstruation. Although some women experience menstrual pain early, about 33% did not identify endometriosis symptoms until more than ten years later. A possible reason for this delay could be that endometriosis often emerges at a later stage, and the pain associated with it may shift in character, making early recognition more difficult.[8]

Endometriosis-related dysmenorrhea is typically described as a distinct and severe form of pain, yet the exact onset of the disease remains unidentified. Due to the delayed timing of surgical assessment in most subjects, data regarding the initial presence and anatomical distribution of lesions at menarche or symptom onset are limited. Additionally, severe dysmenorrhea is often perceived as a normal aspect of menstruation by many women. Therefore, health care professionals and women themselves often do not evaluate the cause properly. adolescent girls and doctors may not be aware of the importance of dysmenorrhea as a major symptom of endometriosis in this age group. Fertility impairment is a common consequence of endometriosis, underscoring the importance of early diagnosis for reproductive planning. In advanced cases, conception may only be possible through assisted reproductive technologies, which continue to show limited success rates.[8,12]

The early identification of endometriosis is critical for initiating treatment that may preserve fertility, enable timely family planning, or facilitate egg freezing prior to surgical loss of ovarian tissue. Such interventions are essential to minimize the combined negative effects of endometriosis and age-related fertility decline. Our results indicate a significant correlation between early menarche and the development of endometriosis, with dysmenorrhea being the most prominent factor in evaluating disease risk.[8,12]

4.5. Ultrasound Examination and Associated Clinical Symptoms in Early Diagnosis of Endometriosis in Adolescents

The main indications by general practitioners to refer young women to our center for USG were pelvic pain (52.6%), followed by menstrual disorders (12.1%), ovarian cysts (11.9%), suspected uterine anomalies (3.0%), and heavy menstrual bleeding (2.4%).[9]

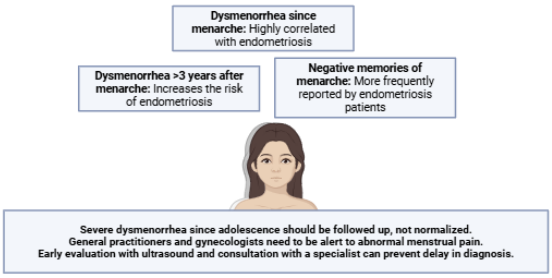

Figure 3. Correlation of dysmenorrhea incidence with early detection of endometriosis[12]

However, 18.1% were referred for routine examination. In the study by Martire[9] Severe dysmenorrhea was reported by all patients only after a focused pelvic pain examination. Similarly, heavy menstrual bleeding was often overlooked by general practitioners, with only 2.4% undergoing ultrasound due to this symptom, compared to 48.2% who reported it after detailed personal evaluation.[9]

Among the 371 patients experiencing intermittent dysmenorrhea, 131 (35.3%) exhibited one or more characteristic ultrasound (USG) findings indicative of pelvic endometriosis or adenomyosis. Since USG signs of endometriosis may present individually or in combination, 54 patients (14.5%) had ovarian endometriosis, 67 (18.1%) showed features consistent with adenomyosis, and 70 (18.9%) had posterior deep infiltrating endometriosis (DIE). Additionally, adhesions were observed in 15 cases (13.7%).[9]

However, these separate findings were excluded from being classified as ultrasound signs of endometriosis in this study. Anovarian cysts (not endometriomas) were present in 27 (7.3%), polycystic ovaries in 5.4%, and uterine anomalies in 4.0%, while 45.8% had normal USG examinations despite being referred for severe dysmenorrhea.[9]

The most frequently reported symptoms accompanying dysmenorrhea were heavy menstrual bleeding (48.2%) and dyspareunia (40.3%), with bowel symptoms (24.8%) and dysuria (6.2%) occurring less commonly. Patients who showed ultrasound (USG) evidence of endometriosis reported more intense pain-related symptoms compared to those with normal USG results. Among this group, heavy menstrual bleeding (61.1%) was the most prevalent symptom, followed by dyspareunia (59.2%), bowel symptoms (44.3%), and dysuria (9.9%). These symptoms were significantly more frequent in patients with USG-confirmed endometriosis than in those without such findings. Among the 120 patients who experienced dyspareunia, 59.2% had more than one ultrasound feature of endometriosis, including posterior deep infiltrating endometriosis (DIE) in 36.7%, adenomyosis in 26.7%, and endometrioma in 23.3%.[9]

Table 2. Comparison between normal menstruation and abnormal menstruation[14,15]

Parameter	Normal Menstruation	Abnormal Menstruation (AUB)
Cycle Interval	24–35 days (average ~28 days)	Less than 21 days (polymenorrhea) or more than 35–40 days (oligomenorrhea)
Duration of Bleeding	2–7 days	More than 7 days or prolonged bleeding episodes (menorrhagia or menometrorrhagia)
Blood Volume	Approximately 30–40 mL per cycle (maximum ~80 mL)	Exceeds 80 mL or includes large clots; may lead to anemia
Cycle Pattern	Regular and predictable	Irregular, unpredictable bleeding, including intermenstrual or continuous bleeding (metrorrhagia)
Onset Pattern	Gradual regulation post-menarche; cycles stabilize within 2–3 years	Persistently irregular beyond 3 years post-menarche or newly abnormal in adulthood
Dysmenorrhea (Pain)	Mild to moderate, manageable with simple analgesics	Severe pain, resistant to analgesics, interfering with daily activities
Associated Symptoms	Generally absent	May include fatigue, anemia, dyspareunia, gastrointestinal or urinary pain, or subfertility
Clinical Concern	No clinical concern if within normal limits and not affecting quality of life	Suspect pathology if bleeding is excessive, prolonged, irregular, or associated with systemic symptoms or anemia

Ultrasound examination in adolescents with severe dysmenorrhea, especially when accompanied by additional symptoms (dyspareunia, heavy bleeding, digestive disorders) is a strong indication, significantly increasing the early detection of endometriosis. Implementation of a complete evaluation protocol and training of primary care physicians can reduce delays in diagnosis.[13]

4.5 Limitations and Recommendation

This literature review has several limitations. First, the number of studies included was limited to five, which may not fully represent the global perspective of early endometriosis diagnosis in adolescents. Second, all selected studies originated from Europe and the Middle East, limiting the cultural and geographical generalizability of the findings. Cultural perceptions of menstruation, health-seeking behavior, and accessibility to healthcare services vary greatly between regions, which could influence the timeliness and method of diagnosis. Third, the studies had heterogeneous designs and diagnostic criteria, making direct comparisons difficult. Finally, since this is a literature-based study, primary data collection was not conducted, potentially limiting the depth of contextual analysis.

Based on this review, we recommend:

1. Mandatory screening for adolescents with severe dysmenorrhea or chronic pelvic pain using validated questionnaires and ultrasound by trained sonographers.
2. Integration of menstrual health education in school health programs to raise awareness among adolescents and parents
3. Training for general practitioners and school health personnel to identify potential early signs of endometriosis and refer appropriately.
4. Further research involving populations outside Europe and the Middle East to validate early detection tools across diverse cultural and healthcare settings.

4.6 Summary of Emerging Patterns

From the five reviewed studies, several consistent themes emerge: (1) Dysmenorrhea is a recurrent and early symptom significantly associated with endometriosis; (2) The average diagnostic delay is substantial across studies, often exceeding 5 years; (3) Non-invasive tools such as ultrasound and digital applications show potential in reducing this delay; (4) Surgical diagnosis, while definitive, is not ideal for adolescents; and (5) Awareness, both public and clinical, plays a critical role in accelerating diagnosis. These findings suggest the need for structured screening protocols in adolescents presenting with chronic pelvic pain, and investment in non-invasive diagnostic technologies and education.

5. Conclusion

Endometriosis is a chronic disease that is often diagnosed late, especially in adolescents, with an average delay of 4–12 years from the first symptoms appearing. Early detection is very important from adolescence, especially if there is severe dysmenorrhea or chronic pelvic pain. Delayed diagnosis is caused by the normalization of dysmenorrhea, the lack of accurate non-

invasive diagnostic tools, and low public awareness. As a result, patients are at risk of experiencing impaired quality of life, infertility, and the need for more complex medical interventions. Education, early detection, and increasing awareness among adolescents and health workers are essential to prevent the long-term impacts of endometriosis.

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