



**MAPPING GLOBAL RESEARCH TRENDS AND EMERGING GAPS IN
DYSMENORRHEA AND THERMOTHERAPY: A BIBLIOMETRIC ANALYSIS OF
WEARABLE COMFORT-BASED INTERVENTIONS**

Eka Muzyanti^{1*}, Mekar Dwi Anggraeni²

¹Magister Program in Nursing, Faculty of Health Sciences, Universitas Jenderal Soedirman, Jl. Dr. Soeparno, Karangwangkal, Karang Bawang, Grendeng, Purwokerto Utara, Purwokerto, Central Java 53122, Indonesia

²Department of Nursing, Faculty of Health Sciences, Universitas Jenderal Soedirman, Jl. Dr. Soeparno, Karangwangkal, Karang Bawang, Grendeng, Purwokerto Utara, Purwokerto, Central Java 53122, Indonesia

*eka.muzyanti@mhs.unsoed.ac.id

ABSTRACT

Dysmenorrhea is a common reproductive health problem that adversely affects women's quality of life, daily activities, and productivity. Although pharmacological treatment remains the dominant management approach, interest in non-pharmacological interventions, including thermotherapy, has increased. This study aimed to map global research trends, thematic development, and emerging gaps in dysmenorrhea and thermotherapy research using a bibliometric approach. Publications were retrieved from Scopus, PubMed, Semantic Scholar, and PoPCites Crossref using predefined search terms. English-language publications from 2005 to 2026 were screened using the PRISMA framework. Of 2,207 identified records, 127 articles met the eligibility criteria and were analysed using publication trend, citation, co-authorship, keyword co-occurrence, network, overlay, and density analyses in VOSviewer. The findings showed growing research attention, particularly in recent years. Dominant themes included pain, drug therapy, quality of life, women's health, and endometriosis, whereas comfort-based care, wearable thermotherapy, self-management, and nursing interventions remained underrepresented. This study contributes to the scientific literature by identifying an important research gap and highlighting wearable thermotherapy as a promising patient-centred, non-pharmacological intervention for menstrual pain management and future nursing research.

Keywords: bibliometric analysis; dysmenorrhea; thermotherapy; wearable technology; women's health

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INTRODUCTION

Dysmenorrhea is a prevalent reproductive health condition in adolescents and reproductive-age women (McKenna & Fogleman, 2021). Menstrual pain not only brings physical discomfort, but also influences everyday living, learning attentiveness, work productivity, psychological health and women's general quality of life (MacGregor et al., 2023; Situmorang et al., 2025). Dysmenorrhea may cause restrictions in activities, work, or school absences, sleep difficulties, and a major reduction in quality of life in some cases (Itani et al., 2022). This condition suggests that dysmenorrhea is a multifaceted health problem that should be managed with a holistic strategy (MacGregor et al., 2023).

Dysmenorrhea management has been dominated by pharmaceutical techniques such as the use of nonsteroidal anti-inflammatory medications and hormonal therapy (Kirsch et al., 2024a). These therapies are successful in lowering pain, but adverse effects can occur with long-term usage and may not entirely meet patients' goals for comfort and self-management (Mardon et al., 2024). Thus, different non-pharmacological techniques have been developed; one of these approaches is thermotherapy or heat therapy. Thermotherapy is known to enhance blood circulation, lessen muscle spasms and helps to minimize the experience of menstrual discomfort (Kirsch et al., 2024a). Meanwhile, the growth of health technology has also driven the development of wearable thermotherapy devices that are more practical, portable, and convenient to use in daily life

(Choonara et al., 2025). The potential of this method is significant, as it not only aims at reducing pain but also fosters comfort, patient self-management, and quality of life for women with dysmenorrhea (Li et al., 2024). However, the body of research for wearable thermotherapy on dysmenorrhea is still rather restricted and has not yet established a major subject in the global research (Choonara et al., 2025; Li et al., 2024).

Research on dysmenorrhea and endometriosis still centers around diagnostic, pharmacological treatment, pathophysiology, pelvic pain, and clinical care (Kirsch et al., 2024a; MacGregor et al., 2023). Keywords such as female, pain, pharmacological therapy, quality of life and endometriosis are among the most investigated themes. Also, research has begun to concentrate on patient-centered outcomes, biomarkers, and alternative medicines (Taylor et al., 2021; Becker et al., 2022). However, the themes of comfort-oriented non-pharmacological therapies, self-management, wearable technologies, and nursing interventions remain not dominating in the global research network.

This condition reveals a research gap between the high frequency of dysmenorrhea and the restricted development of effective, pleasant, technology-based non-pharmacological therapies that are patient-centered. In reality, comfort-based and patient-centered treatment approaches are essential paths in the development of modern healthcare, especially in the management of chronic pain and women’s reproductive health (Choonara et al., 2025; MacGregor et al., 2023). Under this scenario, we need to conduct study to explore the worldwide research trends of dysmenorrhea and thermotherapy, in order to find out the direction of scientific progress, the dominant research issues and prospects for future research. Hence, this bibliometric analysis was done to map the global research trend on dysmenorrhea and thermotherapy and to identify the existing research gaps. The novelty of this study is the focus on thermotherapy as a comfort-based non-pharmacological strategy in the management of dysmenorrhea, which has rarely been studied in the bibliometric research. Moreover, this study emphasizes the potential of wearable thermotherapy as a simple, technology-based innovation to enable patient-centered care, self-management, and improvement of the quality of life of women with dysmenorrhea (Kim et al., 2024; Li et al., 2024).

METHOD

Research Design

This study used a bibliometric design with a descriptive quantitative approach to map the development of global research related to dysmenorrhea, menstrual pain, and thermotherapy. Bibliometric analysis was used to evaluate publication trends, author collaboration patterns, citation analysis, thematic development, and relationships among keywords in scientific publications (Anggraeni & Saryono, 2025; Hukum & Awaludin, 2025). This approach enables the identification of scientific development directions, dominant research themes, and research gaps in the field of dysmenorrhea and thermotherapy.

Research Framework (PICO)

This study used the PICO approach (Population, Intervention, Comparison, Outcome) to help develop the literature search strategy systematically.

Table 1.

PICO Framework for the Bibliometric Analysis of Dysmenorrhea and Thermotherapy Research	
Component	Description
Population (P)	Women with dysmenorrhea, menstrual pain, and endometriosis
Intervention (I)	Thermotherapy, heat therapy, warm compress, and wearable thermotherapy
Comparison (C)	Not specifically limited because this study used a bibliometric design
Outcome (O)	Research trends, quality of life, pain management, non-pharmacological therapy, and patient-centered care

Data Sources and Databases

The literature search was conducted using four international databases: Scopus, PubMed, Semantic Scholar, and PoPCites Crossref. These databases were selected because they provide broad coverage of scientific publications and are commonly used in health-related bibliometric studies. All articles were obtained through metadata export from each database in a format compatible with bibliometric analysis.

Literature Search Strategy

The search strategy was conducted using a combination of Boolean operators, including AND and OR, to obtain relevant articles. The keywords used were as follows:

(dysmenorrhea OR "menstrual pain" OR "primary dysmenorrhea")

AND (thermotherapy OR "heat therapy" OR "warm compress" OR "wearable thermotherapy")

The search was performed in the title, abstract, and keywords of the articles. The publication year was limited to 2005–2026 to describe the development of research over the past two decades.

Inclusion and Exclusion Criteria

The inclusion criteria comprised articles addressing dysmenorrhea, menstrual pain, endometriosis, or thermotherapy; articles published in English between 2005 and 2026; research articles, reviews, conference papers, and book chapters; and publications with complete metadata suitable for bibliometric analysis. Articles were excluded if they were duplicates across databases, were not relevant to the research topic based on title and abstract screening, lacked complete bibliographic information, or were classified as editorials, notes, or letters to the editor.

Article Selection Process

The article selection process was conducted using the PRISMA approach. At the identification stage, a total of 2,207 records were obtained from all databases. The records were then screened based on title, abstract, topic relevance, and duplicate removal. After the selection process was completed, 127 articles met the inclusion criteria and were included in the bibliometric analysis.

Data Extraction

The extracted data included author names, year of publication, citation counts, journal or source titles, keywords, countries of origin, research themes, and other relevant bibliographic metadata. The data were subsequently organized in spreadsheet format to facilitate bibliometric analysis and research network visualization.

Bibliometric Analysis

Bibliometric analysis was conducted using VOSviewer and included annual publication trend analysis, citation analysis of articles and authors, co-authorship network analysis, keyword co-occurrence analysis, and network, overlay, and density visualizations. These analyses were used to identify dominant research themes, relationships among research topics, patterns of scientific development, and potential directions for future research on thermotherapy and dysmenorrhea (van Eck & Waltman, 2010).

Data Validity and Reliability

Data validity was ensured through a systematic article screening process based on predefined inclusion and exclusion criteria. In addition, data cleaning was performed to remove duplicates, correct inconsistencies in author names, and standardize keyword variations to improve the accuracy of the bibliometric visualization results.

Ethical Considerations

This study did not involve human participants directly; therefore, informed consent was not required. All data used in this study were obtained from openly available scientific publications and were used solely for academic and research purposes.

RESULT

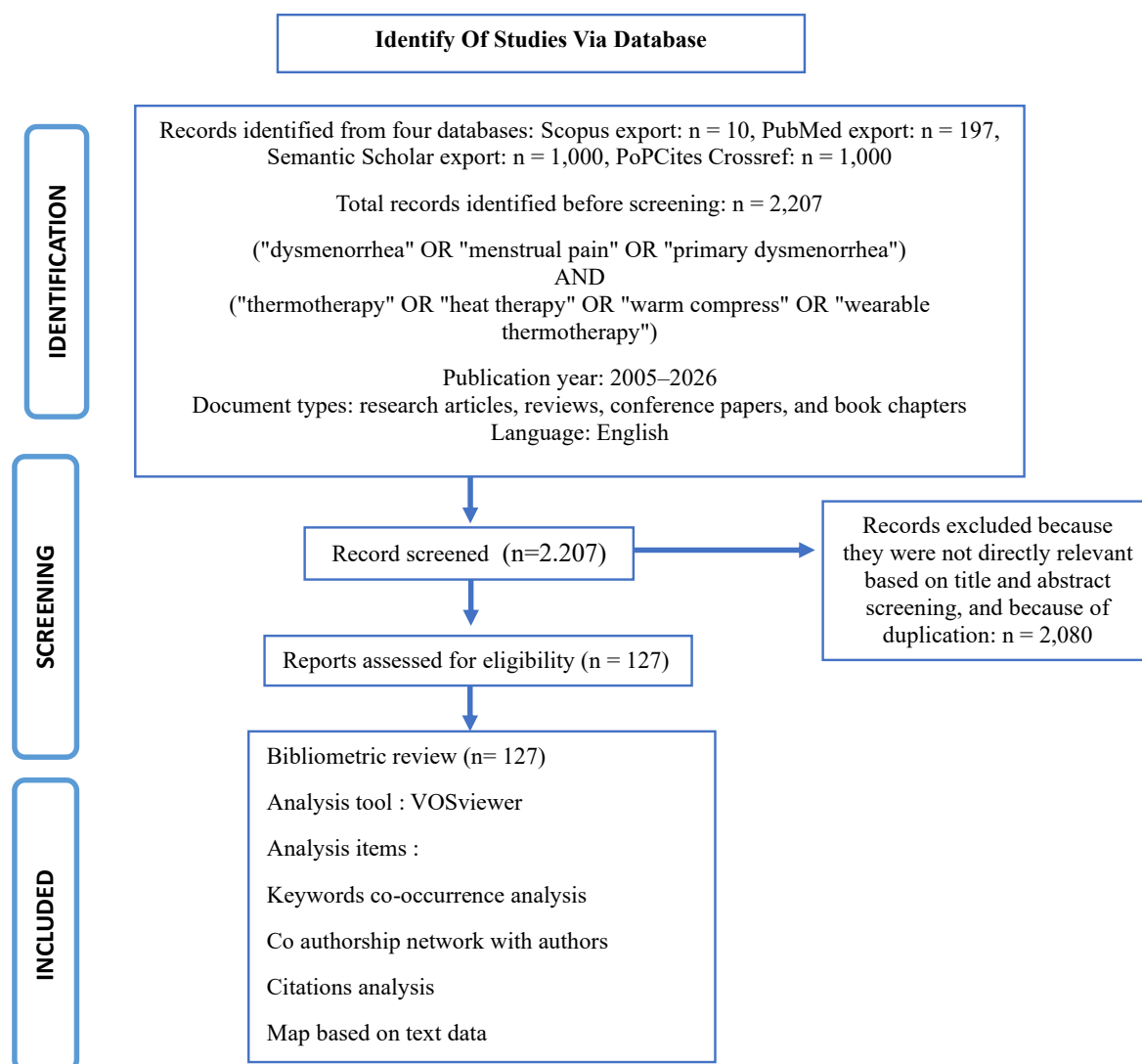


Figure 1 Prisma Diagram

Interpretation : presents the PRISMA flow diagram for study selection in this bibliometric review. A total of 2,207 records were identified from Scopus, PubMed, Semantic Scholar, and PoPCites Crossref using keywords related to dysmenorrhea and thermotherapy. After title and abstract screening, duplicate removal, and relevance assessment, 2,080 records were excluded. Finally, 127 studies met the eligibility criteria and were included in the bibliometric analysis using VOSviewer. The analysis included keyword co-occurrence, co-authorship network, citation analysis, and text-based mapping.

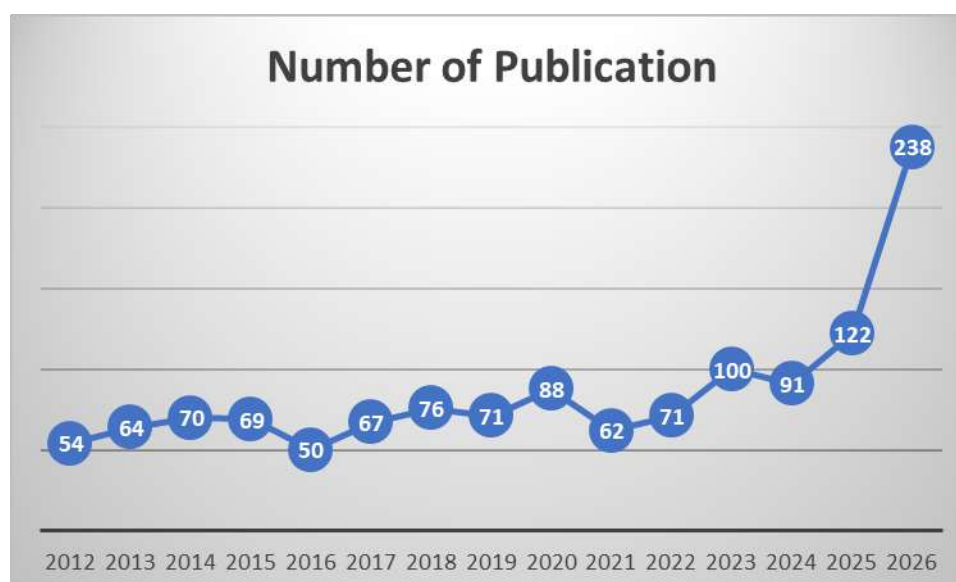


Figure 2. Number of Publications by Year

Interpretation: As shown in the graph, the number of articles about dysmenorrhea, menstrual pain, and thermotherapy gradually grew from 2012 to 2026. The number of publications remained largely consistent in the early period, with 54 articles in 2012 and an increase to 70 publications in 2014. However, the number of publications dropped to 50 in 2016, before rising in the subsequent years. Between 2017 and 2020 the increase was more steady with 88 publications in 2020.

The trend in publication climbed sharply from 2023 to 2026, but there was a drop in 2021. The year with the largest number of publications was 2026 with 238 publications, followed by 122 publications in 2025. This rapid increase suggests that dysmenorrhea, menstruation pain, and the use of thermotherapy as a nonpharmacological remedy are receiving increasing attention and study interest.

Overall, the graph demonstrates that research in this area has advanced significantly in recent years and has become increasingly relevant in women's reproductive health and comfort- and technology-based pain management.

Table 2.

Most Productive Authors Based on Number of Documents and Total Link Strength

Rank	Author	Number of Documents	% of Documents	Total Link Strength	% TLS
1	Vercellini, P.	24	8.48	36	7.83
2	Farquhar, C.	17	6.01	12	2.61
3	Croignani, P.	14	4.95	25	5.43
4	Armour, M.	11	3.89	35	7.61
5	Fedele, L.	11	3.89	18	3.91
6	Giudice, L.	10	3.53	14	3.04
7	Proctor, M.	10	3.53	8	1.74
8	Chapron, C.	10	3.53	2	0.43
9	Smith, C.	9	3.18	30	6.52
10	Kennedy, S.	9	3.18	11	2.39

Interpretation: As shown in the table, Paolo Vercellini was the most productive author with 24 publications (8.48%) and the greatest Total Link Strength (TLS) score of 36 (7.83%). This suggests a robust scientific contribution and collaboration network in endometriosis and pelvic pain research. Mike Armour likewise scored a high TLS value of 35, suggesting a wide-ranging collaborative network in the studies of dysmenorrhea and non-pharmacological pain therapy. Furthermore, some

other authors, like Linda Giudice, Charles Chapron, and Stephen Kennedy, were also recognized as key researchers in the area of endometriosis and women's reproductive health. Overall, these data imply that research on dysmenorrhea and endometriosis has progressed through a strong international scientific partnership.

Table 3.
Characteristics of the Top 10 Most Influential Publications in Endometriosis and Dysmenorrhea Research

Rank	First Author	Citations	Year	Journal Source	/ Article Title	DOI	Country	Research Focus / Theme	Official Article Link
1	Paolo Vercellini	1694	2014	Nature Reviews Endocrinology	Endometriosis: Pathogenesis and Treatment	10.1038/nrendo.2013.255	Italy	Pathogenesis, inflammation, and treatment of endometriosis	Nature Reviews Endocrinology
2	Linda Giudice	1649	2010	The New England Journal of Medicine	Clinical Practice. Endometriosis	10.1056/NEJMcpl000274	United States	Clinical diagnosis and management of endometriosis	NEJM
3	European Society of Human Reproduction and Embryology	1609	2005	Human Reproduction	ESHRE Guideline for the Diagnosis and Treatment of Endometriosis	10.1093/humrep/dei135	Europe / Multi-country	Guidelines for the diagnosis and treatment of endometriosis	Human Reproduction
4	Rudolf Moos	922	1968	Psychosomatic Medicine	The Development of a Menstrual Distress Questionnaire	10.1097/00006842-196811000-00006	United States	Development of a menstrual distress measurement instrument	Psychosomatic Medicine
5	Stella Iacovides	881	2015	Human Reproduction Update	What We Know About Primary Dysmenorrhea Today: A Critical Review	10.1093/humupd/dmv039	South Africa	Pathophysiology and treatment of primary dysmenorrhea	Human Reproduction Update
6	Hong Ju	726	2014	Epidemiologic Reviews	The Prevalence and Risk Factors of Dysmenorrhea	10.1093/epirev/mxt009	Australia	Epidemiology and risk factors of dysmenorrhea	Epidemiologic Reviews
7	Ryan Burney	697	2007	Endocrinology	Gene Expression Analysis of Endometrium Reveals Progesterone Resistance and Candidate Susceptibility Genes in Women with Endometriosis	10.1210/en.2006-1692	United States	Genetics and progesterone resistance in endometriosis	Endocrinology
8	Pinar Parasar	650	2017	Current Obstetrics and Gynecology Reports	Endometriosis: Epidemiology, Diagnosis and Clinical Management	10.1007/s13669-017-0187-1	United States	Epidemiology and clinical management of endometriosis	Springer Link
9	Paolo Vercellini	505	2007	Human Reproduction	Association Between Endometriosis Stage, Lesion Type, Patient Characteristics and Severity of Pelvic Pain Symptoms	10.1093/humrep/del339	Italy	Association between endometriosis stage and pelvic pain severity	Human Reproduction
10	Michelle Proctor	479	2006	BMJ	Diagnosis and Management of Dysmenorrhoea	10.1136/bmj.332.7550.1134	New Zealand	Diagnosis and management of dysmenorrhoea	BMJ

Interpretation: As shown in the table, the dominant themes of the most influential articles in the field of Endometriosis and dysmenorrhea were pathophysiology, diagnosis, treatment, and pain management. The most cited publications were authored by Paolo Vercellini and Linda Giudice showing that endometriosis is a major field of research worldwide. Articles on the prevalence, risk

factors, and treatment of dysmenorrhea were also highly cited, indicating the increased focus to menstrual pain and women’s quality of life. In general, these results indicate that research in this field has moved away from diagnosis and pathophysiology and toward pain management and patient outcomes.

Network Visualization

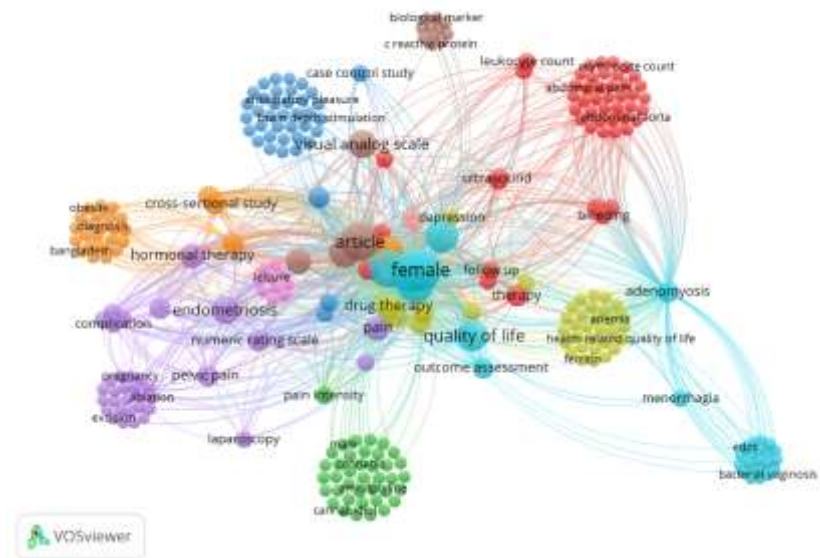


Figure 3. Network Visualization in Dysmenorrhea and Thermotherapy Research

Interpretation: The bibliometric visualization indicates that the research on dysmenorrhea and endometriosis is still dominated by diagnostic techniques, pharmaceutical therapy and medical interventions, with a main focus on pain, quality of life and clinical patient care. Research has begun to shift towards patient-centered outcomes and quality of life, however themes relating to comfort-based non-pharmacological therapies, self-management, wearable technologies and nursing interventions are still not dominating in the research network.

This condition provides an opportunity for the development of new research on wearable thermotherapy as a non-pharmacological intervention to help reduce menstrual pain, improve comfort and quality of life of women with dysmenorrhea. The novelty of the current study is the combination of wearable technology with comfort-based nursing approach and patient-centered care, which has been rarely investigated in prior studies.

Table 4.
Keyword Clusters in VOSviewer Network Visualization

Cluster	Color	Dominant Keywords	Research Theme Focus
Cluster 1	Purple	endometriosis, pelvic pain, laparoscopy, pregnancy, ablation, excision	Diagnosis, pelvic pain, and operative procedures in endometriosis
Cluster 2	Red	biological marker, c-reactive protein, leukocyte count, ultrasound, abdominal pain	Inflammatory biomarkers and non-invasive diagnosis
Cluster 3	Green-Yellow	quality of life, therapy, pain, outcome assessment, health-related quality of life	Quality of life, pain management, and patient outcomes
Cluster 4	Orange	hormonal therapy, cross-sectional study, diagnosis, obesity	Hormonal therapy and epidemiological studies
Cluster 5	Green	cannabis, cannabidiol, amitriptyline	Alternative therapy and chronic pain management
Cluster 6	Light Blue	adenomyosis, menorrhagia, anemia, ferritin	Adenomyosis, menstrual bleeding, and anemia
Cluster 7	Blue	visual analog scale, brain depth stimulation, anticipatory pleasure	Pain measurement and neuromodulation approaches

Overlay Visualization

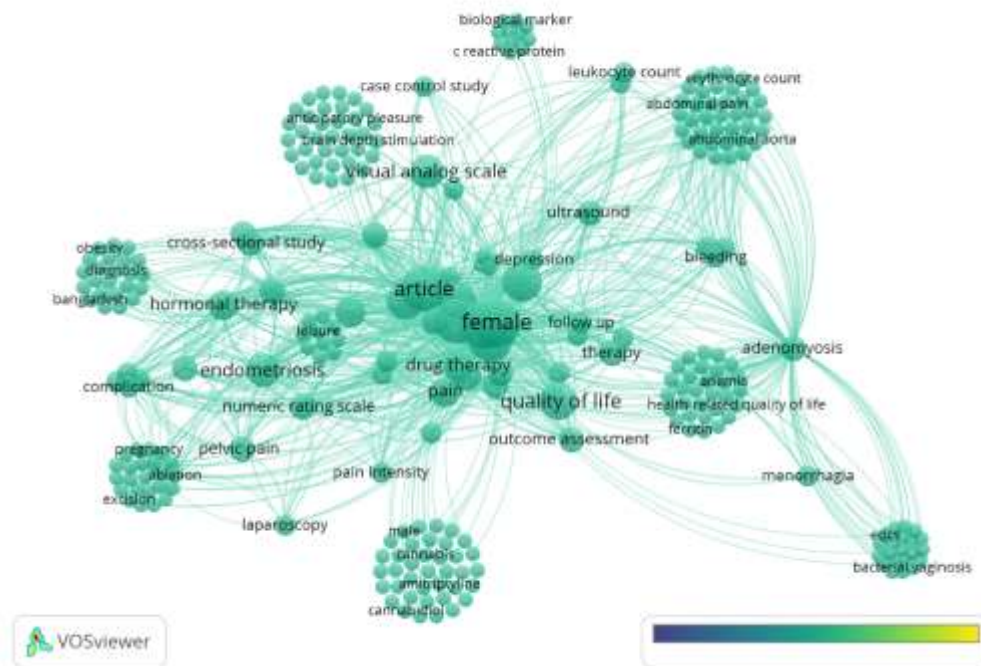


Figure 4. Overlay Visualization in Dysmenorrhea and Thermo-therapy Research

Interpretation: The bibliometric analysis demonstrates that studies on dysmenorrhea and endometriosis are still predominantly focused on diagnostic techniques, pharmaceutical therapy, and clinical care. On the other hand, there is very little research on comfort-based non-pharmacological therapies, self-management and wearable technology. Therefore, the originality of this study is the creation of wearable thermo-therapy as a comfort-based non-pharmacological intervention to assist reduce menstrual discomfort and improve the quality of life of women with dysmenorrhea. This technique is simple technology that can be applied practically in daily life for patient-centered care.

Table 5.
Interpretasi Tema pada Overlay Visualization VOSviewer

Theme / Keyword	Interpretation of Research Trend	Research Focus
Female	Becomes the central focus of the research network	Women's reproductive health research
Pain	The most dominant and consistent topic	Menstrual pain and pelvic pain
quality of life	Receives increasing research attention	Patient outcomes and quality of life
drug therapy	Remains the main therapeutic approach	Pharmacological therapy for dysmenorrhea and endometriosis
Endometriosis	A major and highly studied theme	Diagnosis, treatment, and pathogenesis
Adenomyosis	Emerging as a specific research topic	Menorrhagia, anemia, and quality of life
biological marker	Indicates a new research trend	Inflammatory biomarkers and non-invasive diagnosis
Ultrasound	Developing as a diagnostic approach	Non-invasive examination and imaging
health-related quality of life	Moving toward patient-centered outcomes	Impact of disease on patients' lives
cannabis, cannabidiol, amitriptyline	Still relatively limited but beginning to develop	Alternative therapy for chronic pain
outcome assessment	Becoming an increasingly important theme	Evaluation of treatment effectiveness
therapy	Related to various treatment approaches	Clinical management and patient therapy

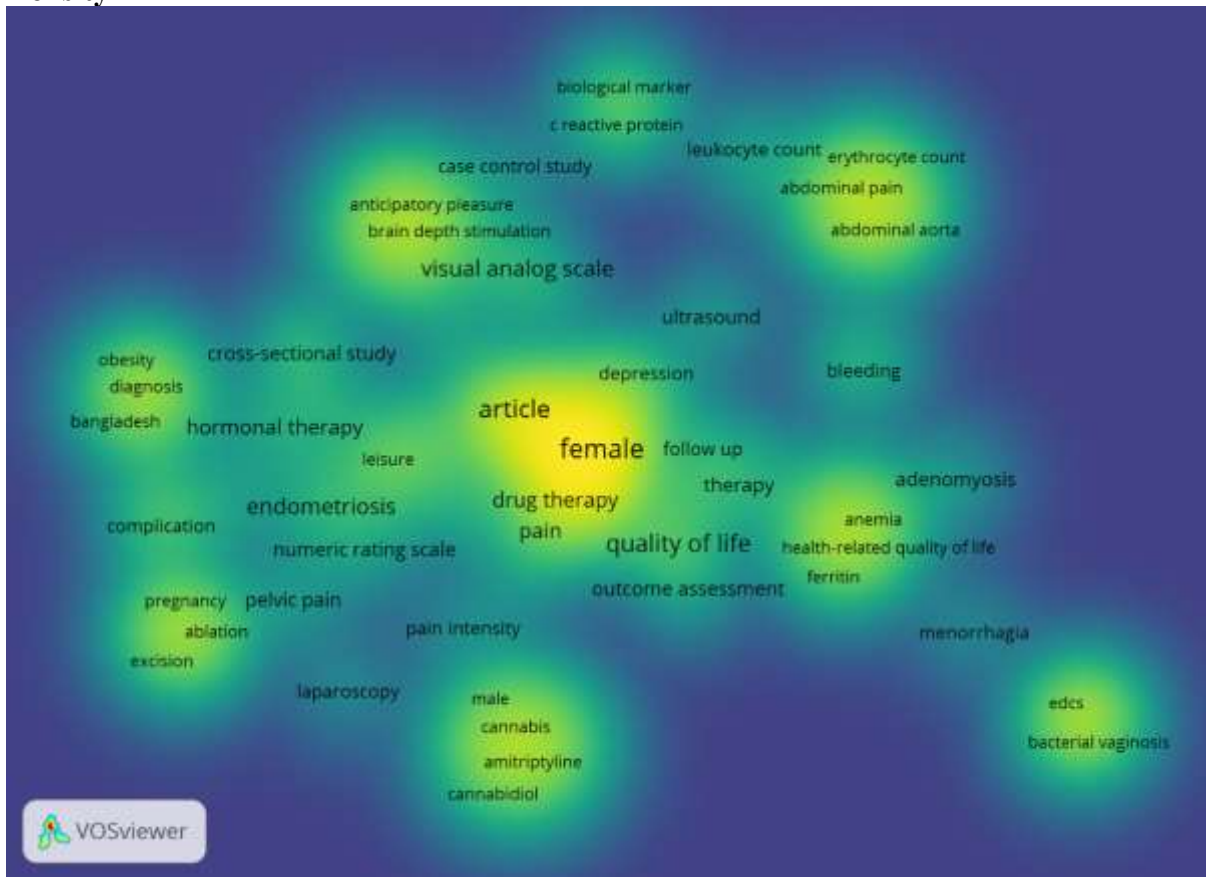


Table 6.

Dominant Area / Keywords	Density Level	Interpretation	Research Focus
female, article	Very high	Becomes the central focus of research	Women's reproductive health
pain, drug therapy	High	The most frequently studied topics	Pain management and pharmacological therapy
quality of life	High	Shows increasing attention to patient outcomes	Quality of life and patient-centered care
endometriosis	High	One of the main research themes	Diagnosis and treatment of endometriosis
hormonal therapy	Moderate to high	Strongly associated with medical therapy	Hormonal therapy and treatment
adenomyosis, anemia, ferritin	Moderate	Focuses on clinical impact and quality of life	Menorrhagia and anemia-related complications
biological marker, c-reactive protein	Moderate	Indicates the development of biomarker research	Non-invasive diagnosis and inflammation
visual analog scale	Moderate	Focuses on pain intensity measurement	Pain evaluation instrument
cannabis, cannabidiol, amitriptyline	Low to moderate	Emerging topics that are beginning to develop	Alternative therapy for chronic pain
laparoscopy, ablation, excision	Low	Represents operative intervention themes	Invasive diagnosis and treatment
bacterial vaginosis, EDCS	Low	Limited and specific research themes	Additional topics in reproductive health

Brief Interpretation

The density visualization demonstrates that the study on dysmenorrhea and endometriosis is mostly about women, pain, pharmacological therapy, quality of life, and endometriosis. High-density areas show the most explored themes, while low-density areas show the still limited themes and may be prospective prospects for future research (Donthu et al., 2021; Lim & Kumar, 2023). The picture shows that pharmacological therapy and medical techniques still dominate research. However, there is very little research on comfort-oriented non-pharmacological therapies, wearable thermotherapy and self-management. The uniqueness of this study is the creation of a wearable thermotherapy as an intervention of comfort for reducing menstrual discomfort and improving the quality of life of women with dysmenorrhea, based on a patient-centered care approach.

DISCUSSION

The bibliometric study indicated a significant growth in the research on dysmenorrhoea, menstrual discomfort, and thermotherapy in recent years. This development implies that the problem of menstruation pain is quickly becoming a major concern in women's reproductive health. Dysmenorrhea is no longer just a typical physiological complaint but a multifaceted health concern that impacts everyday activities, academic achievement, work productivity, psychological well-being, and quality of life (MacGregor et al., 2023; Situmorang et al., 2025). The increased number of articles also reflects the increasing international focus on more holistic, patient-centered approaches to managing menstrual discomfort (Choonara et al., 2025).

The data also demonstrated that endometriosis and pelvic pain, diagnosis, pharmacological therapy, and clinical care remain the dominating themes in the study landscape. High-productivity writers and high-citation papers mostly focused on endometriosis, pathophysiology, diagnosis and medical therapy. Such findings indicate that current research stays primarily within traditional gynecological and biological paradigms, especially with respect to inflammatory processes (Kirsch et al., 2024a), hormonal therapy, and drug-based pain control (Mardon et al., 2024).

Network, overlay and density visualizations revealed the main keywords as female, pain, pharmacological therapy, quality of life and endometriosis. The results suggest that most research still focus on women as the major demographic, pain as the main symptom and medication therapy as the main intervention. While there is a growing focus on quality of life and patient-reported outcomes, research is still largely medical and pharmacological in nature (Kirsch et al., 2024a; MacGregor et al., 2023).

One of the major gaps noted in this study is the lack of emphasis on comfort-based non-pharmacological therapies, wearable thermotherapy, self-management, and nursing-based approaches. These themes were not prominent in the bibliometric network, suggesting that they are still underexplored. This gap creates an opportunity for future research to evolve wearable thermotherapy into a practical, easy, and patient-centered intervention to alleviate menstrual pain, enhance comfort, and promote self-management in women with dysmenorrhea (Choonara et al., 2025; Li et al., 2024; Rodrigues et al., 2024).

The peculiarity of this study is that it was performed on thermotherapy as a non-pharmacological intervention focused on comfort. This work highlights the wearable thermotherapy and adds to the recognition of a novel research direction that merges basic wearable technology, patient-centered care, comfort theory, and nursing intervention. This technique has the potential to broaden the management of dysmenorrhea beyond pharmacological therapy and to encourage safer, practical and more acceptable pain management strategies for women (Li et al., 2024; Rodrigues et al., 2024).

The non-prominence of thermotherapy-related terms may possibly be due to inconsistent use of words among publications. Interventions involving heat may be referred to as heat therapy, local heat application, warm compress, heating pad, thermal therapy, or wearable heating device (Dar et al., 2025). This variation might lead to the fragmentation of conceptually comparable interventions within a term network, thus reducing their density. Hence, the low visibility of thermotherapy in the bibliometric maps should not be read as a lack of research but as a sign that this study subject is still conceptually fragmented and has not yet evolved a coherent research vocabulary. In future investigations, standardizing nomenclature may enhance the discovery, comparison and synthesis of evidence about heat-based therapies for dysmenorrhea (Kirsch et al., 2024b).

The prevalence of endometriosis, pelvic pain and pharmaceutical therapy are similarly high, suggesting that research on dysmenorrhea is often located within broader gynaecological and chronic-pain studies (Abubakar et al., 2020). Although research on endometriosis has provided us with vital insights into pain mechanisms and therapeutic management, primary dysmenorrhea is distinct from secondary dysmenorrhea in underlying causes, clinical features and treatment demands (Martire et al., 2023). Future bibliometric and systematic studies should therefore better differentiate primary dysmenorrhoea, secondary dysmenorrhoea and endometriosis-associated discomfort. This classification would allow a better comprehension of the current data and the identification of therapies specifically relevant for women with primary dysmenorrhea (Yuan et al., 2026).

The findings also need to be evaluated with the nature of bibliometric analysis in mind. High-frequency keywords, citation counts, and dense regions of the network may signal study visibility and intellectual influence but do not correspond directly to intervention effectiveness, methodological quality, or clinical applicability (Clemenza et al., 2021). Highly cited papers may be more noticed due to their historical significance, broader scope or publishing in renowned journals and not always because they give the strongest evidence for patient care. Thus, the research gaps established here should be followed up by systematic reviews, critical assessment and experimental investigations to determine effectiveness and safety of thermotherapy interventions (Chen et al., 2024).

From a nursing perspective, the underrepresentation of nursing-related

The underrepresentation of nursing-related keywords is particularly noteworthy from a nursing perspective, given the regular involvement of nurses in pain assessment, patient education, comfort promotion, and self-management assistance (Poncelas-Cabero et al., 2025). Management of dysmenorrhea may benefit from nurse-led therapies that incorporate thermotherapy with education on symptom monitoring, physical activity, relaxation, sleep, and appropriate referral when symptoms are suggestive of an underlying reproductive disease (Jo & Lee, 2018). Such techniques may expand the practice of nursing from symptom observation to systematic, evidence-based and patient-centred menstrual health care. This function may be further supported by the development of wearable thermotherapy, allowing women to self-manage pain while continuing to engage in regular activities (Lee et al., 2023; Sharghi et al., 2019).

Thus, future research should evaluate wearables thermotherapy not only for the alleviation of pain but also for comfort, usage, adherence, safety, mobility, school or work participation, and quality of life (Park et al., 2022; Umami, 2022). Randomized controlled trials are needed to evaluate wearable thermotherapy to conventional warm compress, pharmaceutical treatment, usual care, or combined therapies (Agustini et al., 2024; Oktaviani et al., 2025; Osuala et al., 2024). Likewise, qualitative and mixed-methods research can offer insights into women's choices, experiences, perceived hurdles, cultural considerations, and readiness to adopt wearable devices (Korekar et al., 2023). In addition, implementation research is needed to assess if such treatments can be integrated into school health services, community nursing, primary care and reproductive health programmes

(Zangga et al., 2023). The integrated research directions may reinforce the evidence base for practical, accessible and patient-centred thermotherapy therapies in managing dysmenorrhea (Alzghaibi, 2025; Kwiatkowska et al., 2024; Pérez-Domínguez et al., 2025).

CONCLUSION

This bibliometric investigation has shown that the research on dysmenorrhea, menstrual discomfort and thermotherapy has developed significantly in recent years. The main topics of research were diagnostic, pharmacological therapy, endometriosis, pelvic pain, clinical management and quality of life. However, there is insufficient research on comfort-oriented nonpharmacological therapies, wearable thermotherapy, self-management, and nursing interventions.

The results show a clear research gap and the possibility of the development of wearable thermotherapy as a unique comfort solution. Wearable thermotherapy may help in managing menstrual pain by reducing pain, increasing comfort, improving self-management and improving the quality of life of women suffering from dysmenorrhea.

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