

Effect of therapeutic strengthening versus stretching exercises on pain, pelvic floor function, and quality of life in women with endometriosis: Pilot study

Tamara Santamaría Galicia M.D.
Diana Espinoza Segovia M.D.
Marco Antonio Guzmán Aguilar M.D.
Víctor Josué Carrasco Urrutia M.D.
Jorge Rodríguez Ávalos M.D.
Aylin Saldívar Landeros M.D.
Valentín Tovar Galván M.D.
Juan Gustavo Vázquez Rodríguez M.D.

Mexico City, Mexico

Original Article

Gynecology and Obstetrics



Background: Endometriosis is associated with pelvic pain, functional limitations, and impaired quality of life. Physical therapy has emerged as a useful complementary alternative.

Objective: To compare the results of two therapeutic exercise modalities combined with transcutaneous electrical nerve stimulation (TENS) regarding pain, pelvic floor function, and quality of life in women with endometriosis.

Methods: Interventional study involving a prospective cohort of twelve patients with endometriosis. The intervention consisted of an eight-week program comprising two 55-minute sessions per week. In each session, all patients received 15 minutes of TENS followed by 40 minutes of specific therapeutic exercise: Group 1 (six patients) performed pelvic floor stretching exercises, and Group 2 (six patients) performed exercises to strengthen trunk stabilizing muscles.

Three variables were evaluated at the beginning and end of the intervention: (1) intensity of chronic pelvic pain, dysmenorrhea, and dyspareunia using the Visual Analog Scale (VAS); (2) lumbopelvic function using the Active Straight Leg Raise (ASLR) test; and (3) quality of life using the short version (18 items) of the Endometriosis Health Profile (EHP) questionnaire. The Wilcoxon and Mann-Whitney U tests were applied ($p < 0.05$).

Results: Group 1 showed a significant reduction in dysmenorrhea ($p=0.027$), while Group 2 showed significant improvement in lumbopelvic function ($p=0.041$). Both groups demonstrated a significant decrease in EHP scores ($p=0.028$), with no between-group differences.

Conclusions: Both therapeutic exercise modalities combined with TENS showed improvement in pain, lumbopelvic function, and quality of life.

Keywords: Endometriosis; Therapeutic exercise; Physiotherapy; Chronic pelvic pain; Dysmenorrhea; Pelvic floor.

Endometriosis is a chronic inflammatory disease characterized by the presence of endometrium-like tissue outside the uterine cavity. It affects approximately 190 million women of reproductive age worldwide, representing nearly 10% of this population.¹ Its clinical presentation is heterogeneous, and is characterized primarily by chronic pelvic pain, dysmenorrhea, dyspareunia, dyschezia, and dysuria. Symptoms may occur in isolation or in combination, and their severity does not always correlate with the anatomical extent of the disease. These manifestations significantly impact patients' quality of life, work productivity, and academic performance, as well as their physical and emotional health.

Chronic pelvic pain is defined as non-cyclic pain—not necessarily related to menstruation—lasting at least six months and of sufficient intensity to limit activities of daily living or require specialized medical care. In women with endometriosis, this symptom is a leading cause of functional impairment and healthcare service utilization.¹

Conventional management of endometriosis includes the use of non-steroidal anti-inflammatory drugs (NSAIDs), hormonal therapy, and laparoscopic surgery. However, these strategies have limitations regarding the persistence or recurrence of symptoms, the occurrence of adverse effects, and the need for prolonged treatment.² Consequently, in recent years,

physical therapy has played an increasingly important role in the multidisciplinary approach to this disease.

The aim of physiotherapy is to reduce pain and improve function through interventions targeting the musculoskeletal and neuromuscular abnormalities associated with endometriosis. Its objectives include pain modulation using manual techniques and electrotherapy modalities, normalization of pelvic floor muscle tone, release of myofascial trigger points, retraining of muscle coordination, strength, and endurance, and strengthening of the trunk-stabilizing muscles (the "core")—comprising the transversus abdominis, multifidus muscles, diaphragm, and pelvic floor. Once muscle hypertonia is controlled, these interventions also foster lumbopelvic stability and promote strategies for pain self-management, ergonomics, and physical activity.

Current evidence supports physical therapy as an effective component of the interdisciplinary management of endometriosis. Various studies have documented that manual therapy, therapeutic exercise, relaxation techniques, and other physical therapy interventions contribute to reducing pain intensity, improving quality of life, and enhancing sexual function in patients.^{3–5} Furthermore, pelvic floor physical therapy following a surgical procedure can facilitate functional recovery, reduce persistent pain associated with myofascial structures, and promote the restoration of normal movement patterns.⁶

Table 1. Baseline and final measurements of study variables by group.

Variables	Group 1		Group 2	
	Baseline	Final	Baseline	Final
Dysmenorrhea (VAS)	9.0	4.5*	8.0	5.5
Chronic pelvic pain (VAS)	3.5	3.0	6.0	2.5
Dyspareunia (VAS)	2.5	0.5	3.5	0.0
Lumbopelvic function (ASLR)	3.0	1.5	2.5	0.5*
Quality of life (EHP)	36.5	17.0*	38.0	15.5*

* $p < 0.05$ (within-group Wilcoxon test). VAS: Visual Analogue Scale. ASLR: Active Straight Leg Raise. EHP: Endometriosis Health Profile.

Therapeutic exercise and transcutaneous electrical nerve stimulation (TENS) are among the therapeutic modalities with the strongest evidence. Both interventions have demonstrated clinical benefits regarding pain and quality of life.³⁻⁵ However, the data derive primarily from multimodal programs; consequently, information regarding the comparative effects of different types of therapeutic exercise is limited.

Objective

We conducted a pilot study to compare the results of two therapeutic exercise modalities—core strengthening and pelvic floor stretching—on pain, pelvic floor function, and quality of life in women with endometriosis managed with TENS.

Methods

A longitudinal interventional study was conducted on a cohort of twelve patients with an established diagnosis of endometriosis treated at the Clinical Care and Simulation Center of the Institute of Biomedical Sciences at the Autonomous University of Ciudad Juárez (UACJ) in Chihuahua, Mexico, between February and March 2026.

Patients were included regardless of age, obstetric history, or history of surgical treatment. All participants had chronic pelvic pain (>6 months) or dysmenorrhea. Patients who were pregnant, had implanted electrical devices, engaged in regular physical activity exceeding 150 minutes per week, or had severe neuromuscular diseases were excluded.

Twelve patients meeting the selection criteria were chosen. They received the necessary information and provided written consent to participate in the study. Subsequently, they were randomly assigned to two groups: Group 1, consisting of six patients who performed pelvic floor stretching exercises and relaxation postures, and Group 2, comprising six women who followed a strengthening program targeting the trunk stabilizers (core) and lumbopelvic

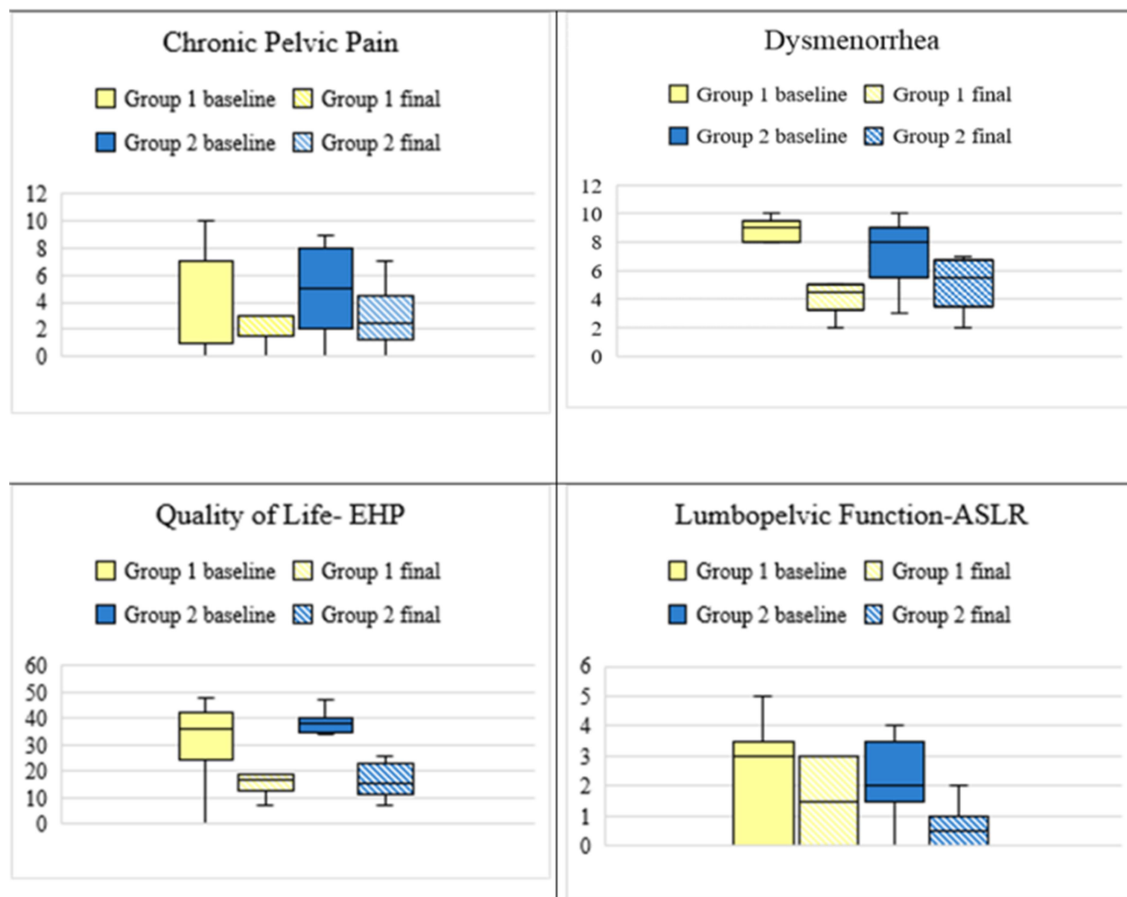


Figure 1. Distribution of baseline and final measurement values for the variables -chronic pelvic pain, dysmenorrhea, quality of life, and lumbopelvic function- by group.

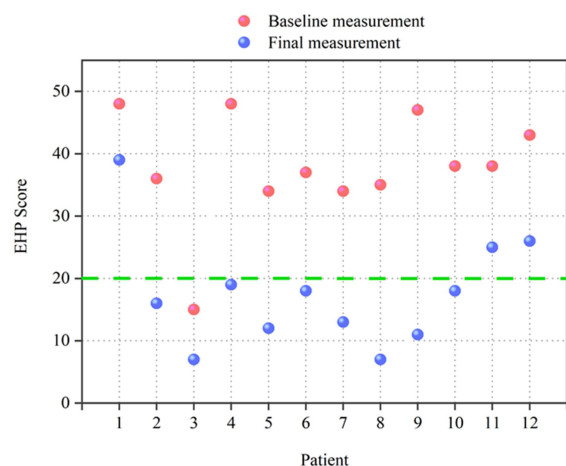


Figure 2. Quality of life of the 12 participants at the beginning and end of the intervention. EHP; Endometriosis Health Profile. Score: lower value = better quality of life. Green line: boundary between the “Good category” (6 to 20 points) and the “Regular category” (21 to 50 points).

stability.

The intervention lasted eight weeks consisting of two supervised 55-minute sessions per week. In each session, all patients from both groups initially received 15 minutes of TENS applied to the pelvic and lumbar regions using an asymmetric biphasic current (100 Hz, 80 μ s pulse width, and intensity adjusted to achieve comfortable paresthesia). Afterward, the participants performed 40 minutes of specific therapeutic exercises based on their assigned group.

Group 1 followed a protocol aimed at reducing pelvic floor hypertonia through diaphragmatic breathing, stretching of the adductor, piriformis, hamstring and iliopsoas muscles, yoga poses (Balasana, Ananda Balasana), and spinal mobility exercises. Group 2 followed a protocol for the progressive activation of the deep core (transversus abdominis and lumbar multifidi muscles, diaphragm, and pelvic floor), including “bird-dog” exercises, glute bridges, planks, torso and leg lifts, and squats with motor control.

Assessment instruments

The study variables were: (1) pain intensity, assessed using the Visual Analog Scale (VAS) -with a score of 0 to 10- to measure the intensity of chronic pelvic pain, dysmenorrhea, and dyspareunia; (2) lumbopelvic function, assessed using the Active Straight Leg Raise (ASLR) test -rated on a scale of 0 to 10- which has demonstrated adequate inter-rater reliability (ICC >0.87); ⁶ and (3) quality of life, assessed using the short version (18 items) of the Endometriosis Health Profile (EHP) questionnaire -utilizing a 0 to 4 Likert scale and a total score range of 0 to 72- which has been previously validated in Mexican women. ⁷ Assessments were conducted at the

start of the study (baseline measurement) and at the end of the intervention (final measurement).

The research project was previously approved by the Local Health Research Committee and the Local Health Research Ethics Committee of the host hospital. The patients' personal data and the research results are safeguarded by the medical team responsible for the project.

STATISTICAL ANALYSIS

Patient data and research results showed a non-normal distribution (Shapiro-Wilk test). Therefore, non-parametric tests were used for statistical analysis: the Wilcoxon test for within-group comparisons and the Mann-Whitney U test for between-group comparisons. Data are expressed as median and interquartile range (IQR). A p-value <0.05 was considered significant. SPSS[®] version 25 statistical software was used.

Results

The median age of the twelve patients was 25.8 years (range: 20–37 years), and the median time since the endometriosis diagnosis was 6.4 years. It was found that 92% of the patients regularly used NSAIDs, and 42% used oral contraceptives. The patients' personal characteristics were similar.

Chronic pelvic pain decreased in both groups (VAS) but did not reach statistical significance (Group 1: 14.3% reduction; Group 2: 58.3% reduction; $p > 0.05$). Likewise, the intensity of dyspareunia (VAS) decreased in both groups (Group 1: 80.0% reduction; Group 2: 100% reduction). No statistically significant differences between groups were identified for any of the study variables (Mann–Whitney U test, $p > 0.05$).

As can be observed, a decrease in dysmenorrhea scores was found in both groups. Likewise, Group 2 showed a greater reduction in lumbopelvic function scores whereas chronic pelvic pain showed considerable overlap between baseline and final measurement values in both groups, with no significant differences.

Discussion

This pilot study compared the results of two therapeutic exercise modalities combined with TENS in women with endometriosis. Patients in both groups showed improvement in the evaluated variables. However, the statistically significant changes differed between the groups. The stretching protocol demonstrated a significant reduction in dysmenorrhea, whereas the strengthening program showed significant improvement in lumbopelvic function. A significant

decrease in EHP questionnaire scores was observed in both groups, with no statistically significant difference between the groups.

The reduction in dysmenorrhea observed in the stretching group was consistent with physiological mechanisms linked to decreased hypertonicity in the pelvic floor and lumbopelvic musculature achieved through stretching and diaphragmatic breathing exercises.⁸ Furthermore, the improvement in lumbopelvic function observed in the strengthening group can be explained by the coordinated training of trunk stabilizing muscles -including the transversus abdominis and multifidi muscles, diaphragm, and pelvic floor- which are fundamental structures for motor control and lumbopelvic stability.⁹

The most significant finding of the study was the improvement in quality of life in both groups, reflected by a significant decrease in EHP questionnaire scores. These results align with previous studies documenting the benefits of physical therapy and TENS for quality of life in women with endometriosis.¹⁰ It is possible that applying TENS prior to therapeutic exercise facilitated more active patient participation by reducing pain perception through mechanisms proposed by the gate control theory.¹¹ Similarly, the study's findings are consistent with results from the Physio-EndEA program, as well as with observations from systematic reviews recommending physical therapy as part of the multidisciplinary management of patients with endometriosis.^{3,12,13}

The main strengths of this study were the direct comparison of two therapeutic exercise modalities using a standardized intervention protocol and the simultaneous assessment of pain, lumbopelvic function, and quality of life in the patients using validated instruments. Limitations include the small sample size, the short follow-up period, and the lack of systematic recording of analgesic use during the intervention. Studies with larger sample sizes, longer follow-up periods, and monitoring of NSAIDs use are needed to confirm the findings and issue a general recommendation.

Conclusion

In this pilot study, both supervised therapeutic exercise modalities combined with TENS demonstrated improvements in pain, lumbopelvic function, and quality of life in women with endometriosis. Both therapeutic strategies with TENS may be useful for the same patient.

Conflicts of interests

None declared by the authors

References

1. World Health Organization. Endometriosis [Internet]. Geneva: WHO; 15 October 2025 [cited 2026 August 19]. <https://www.who.int/news-room/fact-sheets/detail/endometriosis>
2. Maldonado Maldonado DA, Segovia Cañar LC, Fúel Quimbilco ED, Naranjo Zela AE, Zurita Cevallos GC, Melo Guerrero LO, et al. Efectos adversos de los fármacos antiinflamatorios no esteroideos. LATAM Revista Latinoamericana de Ciencias Sociales y Humanidades. 2024;5(1):1735-1749. <https://doi.org/10.56712/latam.v5i1.1706>
3. Abril-Coello R, Correyero-León M, Ceballos-Laita L, Jiménez-Barrio S. Benefits of physical therapy in improving quality of life and pain associated with endometriosis: A systematic review and meta-analysis. Int J Gynaecol Obst. 2023;162(1):233-243. <https://doi.org/10.1002/ijgo.14645>
4. Wójcik M, et al. Physiotherapy management in endometriosis. Int J Environ Res Public Health. 2022;19(23):16148. <https://doi.org/10.3390/ijerph192316148>
5. Arik MI, Kiloatar H, Aslan B, Icelli M. The effect of TENS for pain relief in women with primary dysmenorrhea: A systematic review and meta-analysis. Explore (NY). 2020;18(1):108-113. <https://doi.org/10.1016/j.explore.2020.08.005>
6. Kwong EH, Virani N, Robert M, Gerry K, Harding A, Rose MS, et al. Inter-rater reliability of the Active Straight-Leg Raise and One-Leg Standing tests in non-pregnant women. J Rehabil Med. 2013;45(10):1058-1064. <https://doi.org/10.2340/16501977-1213>
7. Ocampo Hernández DM, Gallardo Valencia LE, Guzmán-Valdivia Gómez G. Evaluación de la calidad de vida en pacientes con endometriosis mediante una escala original. Acta Med GA. 2023;21(4):349-355. <https://doi.org/10.35366/112645>
8. Awad E, Ahmed HAH, Yousef A, Abbas R. Efficacy of exercise on pelvic pain and posture associated with endometriosis: within subject design. J Phys Ther Sci. 2017;29(12):2112-2115. <https://doi.org/10.1589/jpts.29.2112>
9. Vikranth GR, Mathias L, Ghori MM. Effectiveness of core stabilization exercises and motor control exercises in patients with low back ache. Int J Physiother. 2015;2(3):544-551. <https://doi.org/10.15621/ijphy/2015/v2i3/67029>
10. Li L, Moyer R, Stetter C, Riley K. A pre-post prospective study on the use of Transcutaneous Electrical Nerve Stimulation (TENS) unit in the management of endometriosis pain. Eur J Obstet Gynecol Reprod Biol. 2026;321:115042. <https://doi.org/10.1016/j.ejogrb.2026.115042>
11. Marchand S. Mechanisms challenges of the pain phenomenon. Front Pain Res. 2021;1:574370. <https://doi.org/10.3389/fpain.2020.574370>
12. Artacho-Cordón F, Salinas-Asensio MM, Galiano-Castillo N, Arroyo-Morales M, Fernández-Lao C, Cantarero-Villanueva I, et al. Effect of a multimodal supervised therapeutic exercise program on quality of life, pain, and lumbopelvic impairments in women with endometriosis unresponsive to conventional therapy: A randomized controlled trial. Arch Phys Med Rehabil. 2023;104(11):1785-1795. <https://doi.org/10.1016/j.apmr.2023.06.020>
13. Salinas-Asensio MM, Ocón-Hernández O, Mundo-López A, Fernández-Lao C, Peinado FM, Padilla-

Vinuesa C, et al. 'Physio-EndEA' Study: A randomized, parallel-group controlled trial to evaluate the effect of a supervised and adapted therapeutic exercise program to improve quality of life in symptomatic women diagnosed with endometriosis. *Int J Environ Res Public Health*. 2022;19(3):1738.
<https://doi.org/10.3390/ijerph19031738>

Juan Gustavo Vázquez Rodríguez MD
Intensive Care Unit.
High Specialty Medical Unit
Gynecology and Obstetrics Hospital No. 3.
National Medical Center “La Raza”.
Mexican Institute of Social Security.
Mexico City, Mexico.