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Continuing Education

Influence of the Practice of the Pilates Method on Pain Perception During Pregnancy: A Quasiexperimental Study

Carmen Feria-Ramirez[1], CNM, PhD, Juan D. Gonzalez-Sanz[2], CNM, PhD, Rafael Molina-Luque[3], PhD, Guillermo Molina-Recio[3], PhD

Introduction: The physiologic changes associated with pregnancy often result in pain, impacting the quality of life. Therefore, it is crucial to prevent and manage this pain through appropriate health care, including guidance on physical exercise. One of the currently recommended interventions is the Pilates method. However, health care professionals caring for pregnant women must have the necessary knowledge, tools, and resources to advise their patients. This study aimed to examine the impact of Pilates method practice on pregnancy-related pain.

Methods: A quasiexperimental study was conducted in multiple primary care centers between November 2018 and December 2019. Participants (n = 107) self-selected to receive a Pilates program (experimental group; n = 38) or their usual care (control group; n = 69). The presence or absence of pelvic, dorsal, and abdominal pain was evaluated as an outcome measure. The results were compared after the intervention, using descriptive, bivariate, and multivariate statistics. The study was registered at ClinicalTrials.gov (NTC04431102).

Results: Pilates method practice was associated with decreased presence of pelvic pain (odds ratio [OR], 2.73; 95% CI, 1.18-4.51; $P = .02$) and abdominal pain (OR, 5.24; 95% CI, 2.23-12.35; $P < .001$). No statistically significant difference was found for the presence of dorsal pain.

Discussion: Pilates appears to be a promising tool for enhancing well-being during pregnancy by reducing pelvic and abdominal pain. It would be beneficial to involve other professionals trained in the Pilates method or, in the future, to train midwives to implement this intervention in birth and parenting programs within primary care.
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Keywords: abdominal pain, and back pain, pelvic pain, Pilates method, pregnancy

INTRODUCTION

Pregnancy provokes a series of physiologic changes in a person's body, which can affect her quality of life.[1] One of the main changes is the increase in uterine size that leads to the displacement of the center of gravity, favoring hyperlordosis and rotation of the hip over the femur.[2] On the other hand, the increase in joint laxity due to the action of relaxin causes the pregnant woman to adopt a waddling gait. All these changes at the musculoskeletal level[3] can lead to problems of mobility, leading to a reduction in daily activity,[4] and the appearance of dorsal, lumbar, and pelvic pain[5] and sciatica.[6]

Between 50% and 90% of pregnant women have lumbar pain[7] with prevalence varying geographically.[8] Additionally, 20% suffer from pelvic pain,[9] and 10% of these women experience pain in the postpartum period.[7] This demonstrates that pain is one of the most common problems during pregnancy, with the lumbar region being the most frequently affected area, ranging from mild discomfort to severe or disabling pain.[10] Although the etiology of such pain is not known with certainty, multiparity, increased body weight, sedentary lifestyle,[11] and a history of lumbar pain are contributory risk factors.[12]

For this reason, it has long been recognized that interventions during the perinatal period are necessary to prevent pain during pregnancy, with a focus on health promotion[13] through physical activity[14,15] and the use of nonpharmacologic measures. Nonpharmacologic measures for managing pregnancy-related pain include osteopathy,[16] physiotherapy,[17] acupuncture,[18] yoga,[19] resistance exercises,[20] pelvic strengthening exercises,[21] transcutaneous nerve stimulation,[22] and the Pilates method.[23]

The use of the Pilates method in women's health is currently on the rise, playing a role in the treatment and rehabilitation of breast cancer, postmenopausal osteoporosis, sexual dysfunctions, and pelvic floor rehabilitation.[24,25] Additionally, it has become one of the most common interventions for preventing and treating lumbar pain and pelvic pain,[26,27] as it

[1]Department of Nursing, University of Huelva, Huelva, Spain
[2]Department of Nursing, COIDESO Research Center, University of Huelva, Huelva, Spain
[3]Nursing Faculty, Lifestyles, Innovation and Health (GA-16), Maimonides Biomedical Research Institute of Cordoba (IMIBIC), Córdoba, Spain

Correspondence
Juan D. Gonzalez-Sanz
Email: juan.gonzalez@denf.uhu.es

ORCID
Carmen Feria-Ramirez https://orcid.org/0000-0001-7940-7740
Juan D. Gonzalez-Sanz https://orcid.org/0000-0002-4344-8353
Rafael Molina-Luque https://orcid.org/0000-0002-5223-7400
Guillermo Molina-Recio https://orcid.org/0000-0002-0005-4901

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Quick Points

- The most common discomfort during pregnancy is pain, which can lead to a lower quality of life and disability.
- The practice of Pilates exercises can have a significant impact on improving these symptoms and promoting well-being during pregnancy.
- The Pilates method should be recommended as part of prenatal care as it appears to be an effective, safe, and inexpensive intervention.

strengthens the trunk and abdominal muscles, while also improving muscular endurance and spinal stability.[28]

Pilates practice has also increased significantly among the pregnant population in recent years. As a result, several studies have evaluated its impact on perinatal outcomes, both in combination with childbirth and parenting preparation programs and independently. Among the observed benefits during pregnancy related to Pilates practice, a reduction in gestational weight gain or pain relief is noted, with literature primarily focusing on the lumbopelvic area.[27,29] Other studies focus on assessing the perception of benefits during pregnancy, labor, and postpartum as experienced by pregnant women while engaging in this activity.[30]

Although Pilates is commonly practiced by pregnant women, most studies to date have focused primarily on evaluating lumbopelvic pain as a combined outcome. It is essential to explore the effects of Pilates on other areas of the body that may also be impacted during pregnancy, such as the abdominal and dorsal regions. Additionally, further research is needed to distinguish the effect of Pilates on lumbar and pelvic pain independently. Therefore, the objective of this study was to explore how Pilates practice affects pelvic, dorsal, and abdominal pain during pregnancy.

METHODS

Study Design

The present study was a secondary analysis of a multicenter quasiexperimental trial (NTC04431102) conducted between November 2018 and December 2019. The primary study aimed to evaluate the effect of an intervention based on Pilates practice (from the second trimester to birth) on the occurrence of intrapartum perineal injuries.[31] Participants received routine prenatal care in several primary care health centers in Huelva and Seville, Spain, and the intervention duration was 4 weeks.

Sample and Participants

Women who attended prenatal classes were informed about the study by their midwives if they met the eligibility criteria. Inclusion criteria were (1) enrollment in prenatal care; (2) having a singleton and low-risk pregnancy; and (3) being at least 18 years of age. Exclusion criteria were (1) not having attended 2 or more prenatal visits with the midwife up to the time of recruitment; (2) difficulty speaking or understanding Spanish; and (3) contraindications to physical activity.

Participant Recruitment and Intervention

During the first phase of the study, in November 2018, 2 Pilates instructors were selected to provide the planned Pilates sessions in the experimental group. To avoid bias resulting from differences in the instructors' training and practice of Pilates, both completed their training in the same center using the same technique. In the second phase, from December 2018 to December 2019, participants were enrolled and participated in the experimental or control interventions, and data were collected. Participants were recruited from existing prenatal groups offered in health centers. To eliminate potential bias from prenatal classes being provided by different types of health professionals, the study included only those health centers where prenatal classes was exclusively provided by a midwife. Randomly selected prenatal class groups in 13 health centers were approached to recruit participants during the first prenatal class session, at approximately 26 weeks' gestation. After being informed by the midwife, eligible pregnant women who agreed to participate signed the informed consent document. Later, participants self-selected to be in the intervention group (prenatal classes plus Pilates) or the control group (only prenatal classes). Subsequently, each participant individually completed questionnaires according to the schedule for their treatment group (Table 1).

Intervention Group

In addition to prenatal classes in their respective health centers,[1] participants in the experimental group were scheduled to receive 2 weekly Pilates sessions for 4 weeks. Each session included 50 minutes of floor Pilates, with a 5-minute warm-up beforehand and 10 minutes of stretching afterward. During the sessions, half of the exercises focused on resistance training, and the other half targeted flexibility improvement.

Control Group

The participants in this group received only the prenatal class sessions at their corresponding health centers (Table 2).

Sample Size

Participants included 107 pregnant women who had been informed about the study by their midwife during prenatal visits. Thirty-eight pregnant women were part of the intervention group, and 69 were part of the control group. A power analysis was conducted using G*Power (version 3.1.9.7; Heinrich-Heine-Universität Düsseldorf, Germany, 2020) to determine the statistical power of logistic regression analysis with a sample size of 107. The analysis assumed a binomial distribution, a 2-tailed test, and an α level of.05, resulting in a statistical power of.645.

Table 1. Follow-Up of Study Participants

Time Point	Variables	Method of Data Collection	Timing
1	Sociodemographics Lifestyle Pregnancy history	Self-administered questionnaire (including IPAQ and Duke-UNC)	1st prenatal class session
2	Variables related to the pregnancy process	Self-administered questionnaire	4th Pilates session (intervention group) 3rd prenatal class session (control group)
3	Variables related to the pregnancy process	Self-administered questionnaire	8th Pilates session (intervention group) The week following the 5th prenatal class session of (control group)
4	Variables related to the birth process and weight of the newborn	Health records and telephone interview	Between the 8th and 10th day after birth

Abbreviations: Duke-UNC, Questionnaire on Perceived Social Support; IPAQ, International Physical Activity Questionnaire.

Table 2. Birth and Parenting Program Sessions Offered to Pregnant Women by the Health Service

Class Number	Theme of the Session
Session 1 (Initial measurement)	Physiologic changes during pregnancy
Session 2	Childbirth
Session 3 (Intermediate measurement)	Care of the newborn
Session 4	The postpartum period
Session 5 (Final measurement)	Breastfeeding

Measures

The main outcome variable was pain (dorsal, pelvic, and abdominal), defined as the presence or absence of pain experienced by the pregnant woman at each evaluation location. To assess pain, the pregnant woman was asked to rate the intensity of pain perceived at the time of evaluation, using a Visual Analogue Scale (VAS) with numerical gradation, where 0 indicated no pain and 10 represented severe pain. The participant then identified the pain's location on a body diagram and provided ratings for the degree of pain, specifically in the dorsal, pelvic, and abdominal regions, using the same VAS scale. If no pain was reported, the participant continued with regular program sessions. However, if pain was present in multiple locations and/or with varying intensities, each pain-related variable and its corresponding location were recorded separately. The variable was then categorized based on the presence (scores 1-10) or absence (score 0) of pain. This categorization was chosen to emphasize the clinical significance of pain presence over its intensity, allowing the researchers to focus on whether pain was experienced rather than its specific degree.

The main independent variable was Pilates practice (attendance of Pilates sessions from the 26th week of pregnancy). Variables related to pregnancy included weeks' gestation and parity (nulliparous or multiparous). Sociodemographic and lifestyle variables included age (years), blood pressure (millimeters of mercury), weight (kilograms), body mass index (BMI), level of physical activity, smoking, perceived social support, and education level (primary, secondary, and tertiary). Birth-related variables included type of birth (spontaneous or instrumental) and gestational age at birth. Information on Pilates practice, as well as on variables related to pregnancy, sociodemographics, and lifestyle, was collected through a participant-completed questionnaire.

During routine prenatal visits in the health centers, blood pressure was measured with a digital sphygmomanometer (accuracy of 1 mm Hg), along with weight, by means of calibrated and approved scales (accuracy of 0.1 kg), and height (centimeters), using wall-mounted stadiometers (accuracy of 0.1 cm). The BMI at the start of the intervention (BMI-1) was classified as normal (BMI $\geq$18.5 and $\leq$24.9), overweight (BMI $\geq$25 and $\leq$29.9), and obese (BMI $\geq$30). Physical activity level was measured using the short version of the International Physical Activity Questionnaire,[32,33] which consists of 7 items, presenting a reliability coefficient above 0.65 (r = 0.76; 95 % CI, 0.73-0.77). The level of perceived social support was measured by means of the Duke-UNC questionnaire,[34] which consists of 11 items and has a test-retest reliability of 0.66, with the relationship of each item with the total score of the questionnaire also being adequate. The self-administered version shows good reliability indices (0.80) and acceptable internal consistency, both for the scale and for the 2 subscales (Cronbach's α of 0.90, 0.88, and 0.79, respectively). The Spanish validation of the Duke-UNC Questionnaire sets the 15th percentile as the cutoff distinguishing between regular support ($\geq$32) and low support ($<$32). Both instruments were completed individually and autonomously by the participant. These variables were measured 3 times (at the first prenatal class or Pilates session, the third session, and the last session). Finally, birth data were collected via structured telephone interviews by trained interviewers and confirmed with the participant's health records.

Statistical Analysis

Continuous variables were reported as means and SD, and nominal and ordinal variables were presented as absolute and percentage frequency. Bivariate analysis was conducted

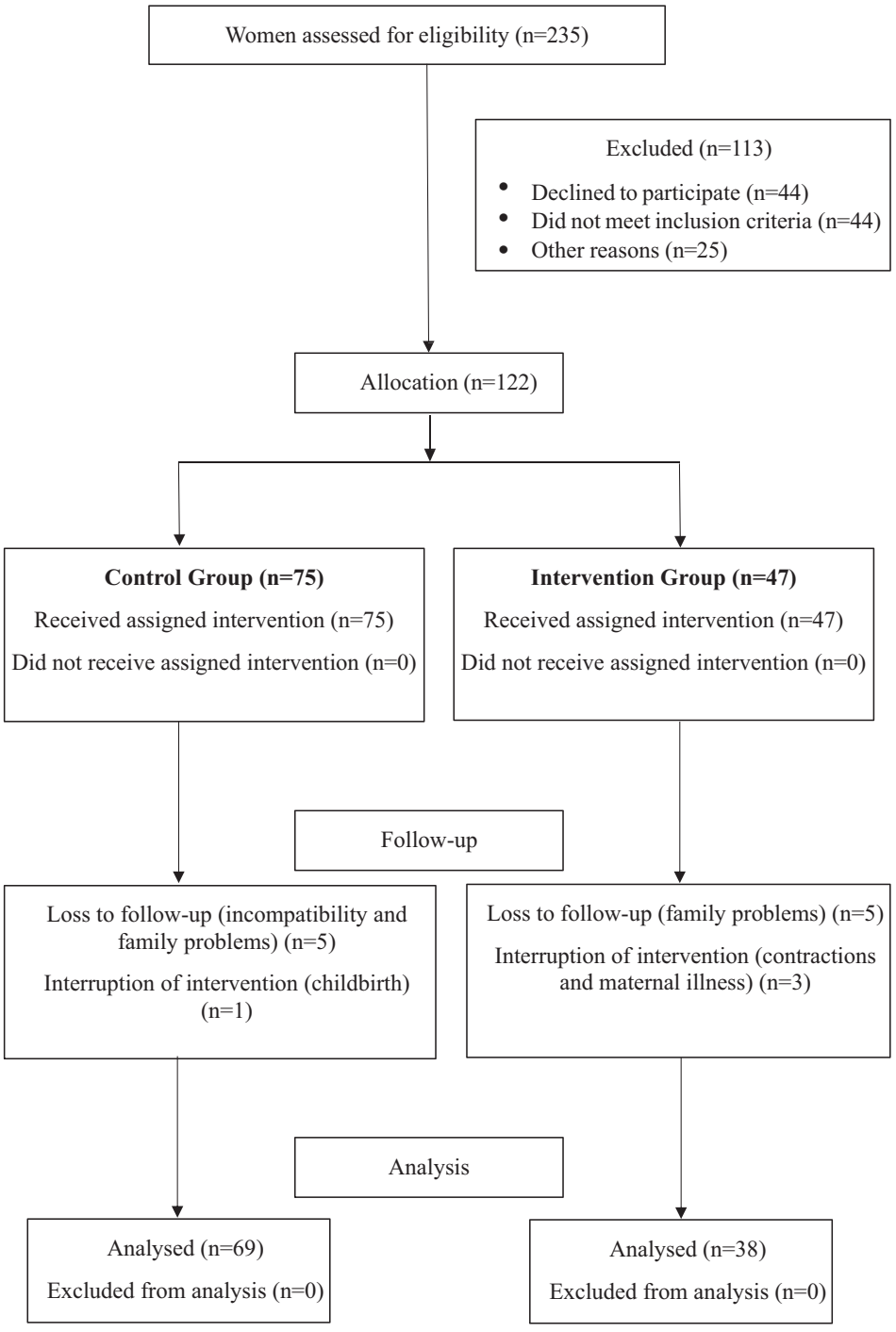

Figure 1. Consolidated Standards of Reporting Trials Flow Diagram.
A total of 113 women were excluded because they did not meet the eligibility criteria. In this case, for not attending prenatal visits or for having difficulties in speaking or understanding the language.

using Student's *t* test to compare means between 2 groups. For categorical data, the χ^2 test was used, with Fisher's exact test applied when appropriate. Binary logistic regression models were tested and adjusted for categorical and quantitative variables (weeks' gestation at birth, maternal age, Pilates attendance, and parity) to determine their association with pain locations (in the final prenatal or Pilates session). The raw and adjusted odds ratios (ORs) were determined with a 95% CI. The model's goodness-of-fit was calculated using −2 log plausibility, goodness-of-fit statistic, Cox and Snell R^2, Nagelkerke R^2, and Hosmer-Lemeshow parameters. For all statistical analyses, a significance level of $\alpha < .05$ was used. All

Table 3. Baseline Characteristics of 107 Pregnant Women Before the Intervention

Variable	Total (N = 107)	Regular BPP Attendance (n = 69)	PM Attendance (n = 38)	*P* value
Age, mean (SD), y	32.9 (4.8)	32.5 (5.0)	33.4 (4.5)	.35
Height, mean (SD), m	1.8 (1.6)	1.6 (0.1)	1.6 (0.1)	.29
Weight, mean (SD), kg	67.9 (10.0)	68.8 (10.0)	66.3 (9.9)	.21
BMI, mean (SD)	25.6 (3.7)	25.8 (3.8)	25.3 (3.5)	.45
SBP, mean (SD), mm Hg	111.9 (11.3)	111.8 (11.7)	112.2 (10.6)	.84
DBP, mean (SD), mm Hg	67.9 (8.5)	67.7 (8.9)	68.2 (7.8)	.79
Weeks' gestation, mean (SD)	27.4 (3.5)	27.4 (3.9)	27.5 (2.4)	.84
Physical activity, n (%)				
Low	49 (45.8)	31 (44.9)	18 (47.4)	.81
Moderate-Intense	58 (54.2)	38 (55.1)	20 (52.6)	.81
Smoking, n (%)				
No	101 (94.4)	64 (92.8)	37 (97.4)	.32
Yes	6 (5.6)	5 (7.29)	1 (2.6)	.32
Perceived social support, n (%)				
Normal	106 (99.1)	68 (98.6)	38 (100.0)	.46
Low	1 (0.9)	1 (1.4)	0 (0.0)	.46
Education level, n (%)				
Primary-secondary	37 (34.6)	24 (34.8)	13 (34.2)	.95
Higher-university	70 (65.4)	45 (65.2)	25 (65.8)	.95
Parity, n (%)				
Primiparous	75 (70.1)	46 (66.7)	29 (76.3)	.30
Multiparous	32 (29.9)	23 (33.3)	9 (23.7)	.30

Abbreviations: BMI, body mass index; BPP, birth and parenting programme; DBP, diastolic blood pressure; SBP, systolic blood pressure; PM, pilates method.

statistical analyses were performed with IBM SPSS Statistics version 27.0.

Ethical Considerations

The study was conducted in accordance with the fundamental principles outlined in the Helsinki Declaration (1964), the Council of Europe Convention on Human Rights and Biomedicine (1997), and UNESCO's Universal Declaration on the Human Genome and Human Rights (1997). The study complied with the requirements outlined in Spanish legislation on biomedical research, as well as regulations on personal data protection and bioethics, as updated by the Organic Law 3/2018 of December 5. The study was approved by the bioethics committee of the Andalusian Health Service (PI 021/14 of 21/08/2014). Data were collected only from participants who provided signed informed consent. The study was registered with ClinicalTrials.gov (NTC04431102). The design and development of this research adhered to the recommendations outlined in the Transparent Reporting of Evaluations with Nonrandomized Designs checklist (Supporting Information: Appendix S1).[35]

This research was led by a midwife as the principal investigator, with extensive experience caring for pregnant women alongside other individuals whose primary training is in nursing. Based on their professional practice, there was a strong belief in the potential benefits of Pilates to reduce pain during pregnancy. To minimize any possible influence from the researchers on the subject of the study and to ensure objectivity in the results, specific strategies were implemented, such as masked review of the results, the use of control groups (which allowed for comparison of outcomes between participants and nonparticipants, thereby controlling for potential confounding factors), and the balanced presentation of results (which was thoroughly reported, including both positive effects and those that showed no significant differences between groups).

RESULTS

A total of 122 women met the selection criteria and consented to participate. Of these, 47 joined the intervention group, and 75 joined the control group. Nine women from the intervention group and 6 from the control group withdrew for various reasons. The final number of participants was 107 (38 in the Pilates group and 69 in the control group), as shown in the Consolidated Standards of Reporting Trials flow diagram (Figure 1). Participants attended 100% of prenatal class sessions in both groups, and participants in the intervention group attended 95% of Pilates sessions.

Sample Characteristics

Table 3 presents participants' baseline characteristics. Participants had a mean (SD) age of 32.9 (4.8) years, a mean (SD)

Table 4. Characteristics of 107 Pregnant Women After the Intervention

Variable	Total (N = 107)	Prenatal Class Group (n = 69)	Pilates and Prenatal Class Group (n = 38)	*P* value
Weight, mean (SD), kg	71.7 (10.8)	71.9 (10.9)	71.2 (10.5)	.75
BMI, mean (SD)	27.0 (4.0)	27 (4.2)	27.1 (3.7)	.85
SBP, mean (SD), mm Hg	112.8 (12.1)	112.4 (11.3)	113.4 (13.7)	.69
DBP, mean (SD), mm Hg	68.3 (7.9)	67.6 (7.0)	69.4 (9.3)	.26
Weeks' gestation, mean (SD)	32.5 (4.1)	31.3 (4.3)	34.7 (2.6)	<.001
Smoking, n (%)				
No	104 (97.2)	67 (97.1)	37 (97.4)	.94
Yes	3 (2.8)	2 (2.9)	1 (2.6)	.94
Weeks' gestation at birth, mean (SD)	39.1 (1.5)	39.0 (1.5)	39.2 (1.5)	.35
Type of birth, n (%)				
Spontaneous	51 (47.7)	36 (52.2)	15 (39.5)	.21
Instrumented	56 (52.3)	33 (47.8)	23 (60.5)	.21

Abbreviations: BMI, body mass index; DBP, diastolic blood pressure; SBP, systolic blood pressure.

Table 5. Pain Characteristics of the 107 Pregnant Women Before and After the Intervention

	Before Intervention				After Intervention			
Variable	Total (N = 107)	Regular BPP (n = 69)	PM (n = 38)	*P* value	Total (N = 107)	Regular BPP (n = 69)	PM (n = 38)	*P* value[a]
Pain, n (%)								
No	9 (8.4)	5 (7.2)	4 (10.5)	.56	11 (10.3)	5 (7.2)	6 (15.8)	.16
Yes	98 (91.6)	64 (92.8)	34 (89.5)	.56	96 (89.7)	64 (92.8)	32 (84.2)	.16
Dorsal pain, n (%)								
No	18 (16.8)	11 (15.9)	7 (18.4)	.74	20 (18.7)	13 (18.8)	7 (18.4)	.96
Yes	89 (83.2)	58 (84.1)	31 (81.6)	.74	87 (81.3)	56 (81.2)	31 (81.6)	.96
Lumbar pain, n (%)								
No	20 (18.7)	13 (18.8)	7 (18.4)	.96	28 (26.2)	13 (18.8)	15 (39.5)	.02
Yes	89 (83.2)	56 (81.2)	31 (81.6)	.96	79 (73.8)	56 (81.2)	23 (60.5)	.02
Pelvic pain, n (%)								
No	32 (29.9)	20 (29.0)	12 (31.6)	.78	37 (34.6)	18 (26.1)	19 (50.0)	.01
Yes	75 (70.1)	49 (71.0)	26 (68.4)	.78	70 (65.4)	51 (73.9)	19 (50.0)	.01
Abdominal pain, n (%)								
No	39 (36.4)	23 (33.3)	16 (42.1)	.37	41 (38.3)	17 (24.6)	24 (63.2)	<.001
Yes	68 (63.6)	46 (66.7)	22 (57.9)	.37	66 (61.7)	52 (75.4)	14 (36.8)	<.001

Abbreviations: BPP, birth and parenting program; PM, pilates method.
[a]The χ^2 test was used for *P* value determination.

BMI-1 of 25.6 (3.7), and a mean (SD) systolic blood pressure and diastolic blood pressure of 111.9 (11.3) mm Hg and 68.0 (8.5) mm Hg, respectively. Nearly half of the participants were sedentary (45.8%), and almost all were nonsmokers (94.4%) and reported a normal level of social support (99.1%). The mean (SD) gestational age at the time of recruitment was 27.4 (3.5) weeks. At the end of the intervention, there was a slight increase in the number of nonsmoking participants (97.9%). Notably, just above half of the participants had an instrumental birth (52.3%) (Table 4). None of these variables showed statistically significant differences between the 2 groups before or after the intervention, except for weeks' gestation at the end of the intervention.

Pain During Pregnancy

Initially, 91.6% of the pregnant women reported pain in at least one of the assessed locations. By the end of the intervention, this figure had decreased slightly (89.7%). The most common locations at baseline were the dorsal area (83.2%), lumbar area (83.2%), pelvic area (70.1%), and abdominal area (63.6%), with no significant differences observed between the intervention and control groups (Table 5).

At the start of the study, participants' average pain level was 5 points, which decreased to 4.5 points by the end. In the intervention group, pain was initially concentrated in the lumbar and abdominal regions, but by the end of the intervention,

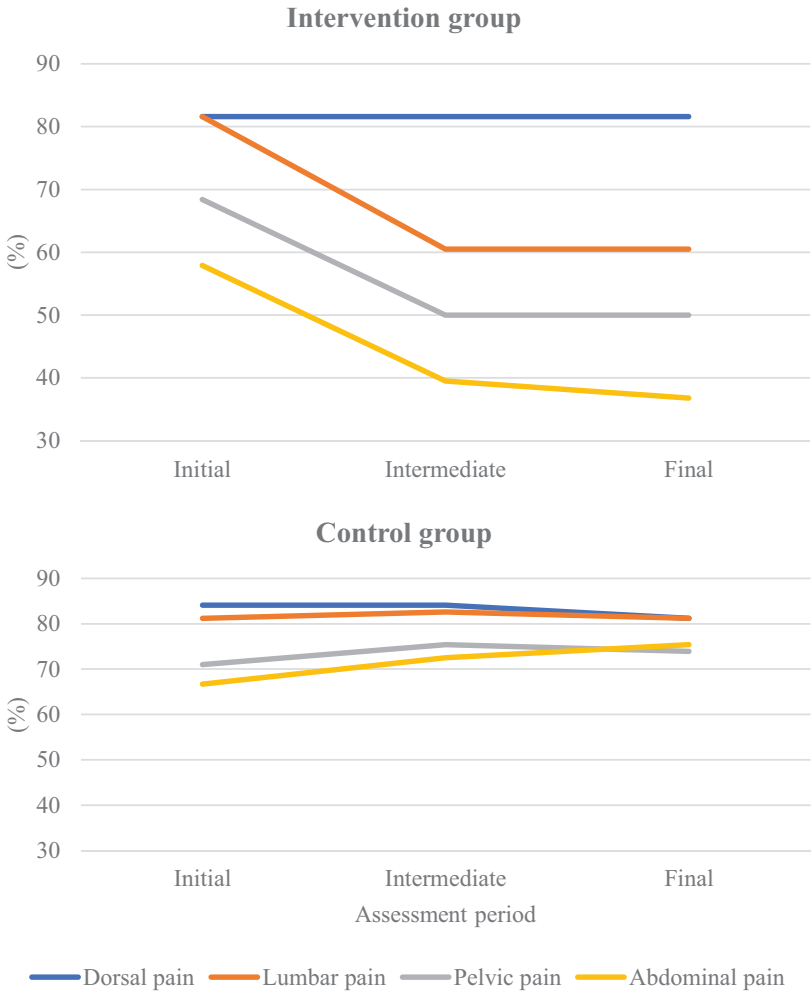

Figure 2. Evolution of Pain in the Intervention and Control Group

it was primarily localized to the lumbar region. In the control group, however, the pain location was maintained jointly in the lumbar and abdominal areas from the beginning. In the intervention group, the modal (most common) pain scores were 2 points for dorsal pain, 6 points for lumbar pain, 2 points for pelvic pain, and 5 points for abdominal pain. In contrast, the control group showed the same modal values for pelvic (2 points) and abdominal pain (5 points), whereas dorsal pain had a modal value of 3 points, and lumbar pain remained at 6 points. Throughout the study, the number of participants experiencing dorsal pain in the intervention group remained constant, whereas there was a significant reduction in the prevalence of lumbar ($P = .02$), pelvic ($P = .01$), and abdominal ($P < .001$) pain (Figure 2). In contrast, the control group showed a relatively stable number of participants affected by all types of pain, except for abdominal pain, which exhibited a slightly upward trend ($P < .001$) (Figure 2).

At the end of the intervention phase, participants in the control group had a greater risk of pain in the pelvic region (OR, 2.73; 95% CI, 1.18-4.51) and in the abdominal region (OR, 5.24; 95% CI, 2.23-12.35) compared with participants in the Pilates group. The other variables analyzed were not significant predictors of pain.

DISCUSSION

Pain associated with physiologic changes in pregnancy is common and negatively affects the quality of life.[36] Considering the growing adoption of Pilates due to its numerous benefits,[12,37] this study aimed to evaluate the effects of this method on pain during pregnancy.

The results indicated that slightly more than half of the participants (in both the control and intervention groups) performed adequate physical activity before the study began, based on established recommendations. These figures were lower than those reported in other studies, in which approximately 61% of women participated in moderate physical activity during the second trimester of pregnancy,[38] and are consistent with other studies, which report that approximately 57.1% of pregnant women lead a sedentary lifestyle,[39] with only 54% meeting the recommended levels of physical activity during the second trimester.[40]

Similar to other studies, we found decreased activity as pregnancy progressed.[41,42] This could be related to beliefs about the pregnant woman's need for rest and decreased physical activity.[43] Our finding of a high prevalence of pain (91.6%) during the second trimester of pregnancy was comparable to other studies, although there is some variation in the reported prevalence.[44,45] We found that the most frequent locations of pain were dorsal (83.2%) and lumbar (83.2%), followed by pelvic (70.1%) and abdominal (63.6%), somewhat higher than other studies reporting a prevalence of dorsal pain between 30% and 78%[36] and of lumbar and/or pelvic pain between 50% and 85%.[36,46] Our results align with other studies on low back and pelvic pain but show a much higher prevalence of dorsal pain compared with the 42% reported in those.[45]

Our study aligns with other research regarding the association between pelvic pain and Pilates practice during pregnancy.[47] We observed that women who did not attend Pilates sessions had a higher risk of experiencing pelvic pain compared with those who participated in the sessions ($P = .02$). Similarly, we found a significant relationship between Pilates practice and a lower risk of abdominal pain ($P < .001$). However, we were unable to find any studies that specifically analyze the impact of Pilates on abdominal pain throughout pregnancy to compare our findings, and similarly, no significant relationships were found in the present study regarding the influence of Pilates on dorsal pain, with no available studies for comparison.

Strengths and Limitations

This study has several limitations that should be acknowledged. First, it is important to note the potential for selection bias, as participants chose their group assignment. The individuals who chose the Pilates group may have had different characteristics from those who did not, such as greater interest in personal care, more awareness of the importance of physical activity, or increased access to resources to facilitate participation. This limitation should be considered when interpreting the results and applying the findings to broader contexts. Second, because data collection began at 26 weeks' gestation, it was not possible to determine whether other conditions predating the pregnancy contributed to their pain.

A strength of this study was that the intervention group followed a novel exercise practice supervised by a Pilates instructor and a midwife. The intervention group continued to receive the same physical training and the usual prenatal follow-up (attendance at the follow-up visits and prenatal classes) as the control; this combination seems to be more effective in improving pain during this stage of pregnancy.

CONCLUSION

It is essential that midwives, as the primary caregivers for pregnant women, have the knowledge and skills necessary for the prevention and management of pregnancy-related pain.

Pilates has been shown to be associated with reducing pain in different anatomical locations (pelvic and abdominal area) during the third trimester. Pilates, therefore, has the potential to treat and prevent pain associated with pregnancy and promote increased quality of life. Before incorporating Pilates into routine prenatal practice, there is a need for larger, randomized controlled trials that account for potentially confounding variables such as lifestyles, nutritional status, and quality of life. Pilates could be provided in prenatal classes by other professionals or by midwives additionally trained in Pilates. Additionally, it would be advisable to explore the results of interventions related to the prevention and/or treatment of pain during prenatal care visits.

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CONFLICT OF INTEREST

The authors have no conflicts of interest to disclose.

SUPPORTING INFORMATION

Additional supporting information may be found online in the Supporting Information section at the end of the article.

Appendix S1. Transparent Reporting of Evaluations with Nonrandomized Designs (TRENDS) Checklist

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