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Posture correction, pain & functional disability

Effect of Posture Correction and Stretching Movements on Functional Disability due to Back Pain in Pregnancy

Tahereh Khalegi[1], Roghaiyeh Nourizadeh[2*], Niloufar Sattarzadeh-Jahdi[3], Zahra Salahzadeh[4], Roghaiyeh Saadi[5], Rasoul Khalegi[6]

1Student Research Committee, Tabriz University of Medical sciences, Tabriz, Iran
t.khaleghi@yahoo.com. 0000-0002-6367-8615
2Integrative Medicine in Aging, Aging Research Institute, Clinical Research Development Unit of Taleghani hospital, Tabriz University of Medical Sciences, Tabriz, Iran
rnourizadeh@gmail.com. 0000-0002-7808-7906
3Department of Midwifery, Faculty of Nursing & Midwifery, Tabriz University of Medical sciences, Tabriz, Iran sattarzadehn@gmail.com. 0000-0003-3135-2909
4Department Physiotherapy, Faculty of Rehabiliation Sciences, Tabriz University of Medical sciences, Tabriz, Iran
salahzadeh@tbzmed.ac.ir. 0000-0003-1769-7986
5Treatment Deputy, Tabriz University of Medical sciences, Tabriz, Iran
r.sadi65@gmail.com. 0000-0001-5804-3511
6 Islamic Azad University of Jolfa, Jolfa, Iran
khalegi_rasoul@yahoo.com. 0000-0003-2635-626X
***Corresponding author**: Roghaiyeh Nourizadeh, **Email**: rnourizadeh@gmail.com. http://orcid.org/0000-0002-7808-7906

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Tahereh Khalegi[1], Roghaiyeh Nourizadeh[2*], Niloufar Sattarzadeh-Jahdi[3], Zahra Salahzadeh[4], Roghaiyeh Saadi[5], Rasoul Khalegi[6]. Effect of Posture Correction and Stretching Movements on Functional Disability due to Back Pain in Pregnancy. JCS

Abstract

Introduction: Increased curvature of the lumbar vertebrae during pregnancy leads to back pain and functional disability. This study aimed to assess the effect of posture correction and stretching movements on low back pain in various situations and on functional disability during pregnancy.
Methods: This quasi-experimental study involved 66 pregnant women attending health centers in Tabriz, Iran. Participants were randomly allocated to intervention (n= 33) and control (n= 33) groups. The intervention group received posture correction and stretching exercises during five sessions conducted between the 16th–18th and 32nd–34th weeks of pregnancy. Data collection tools included the Visual Analog Scale and the Oswestry Low Back Disability Index. Data were analyzed using ANCOVA, Mann–Whitney U, and Wilcoxon tests.
Results: The average (SD) pain score while standing in the intervention group was 3.23 (1.19), compared to 4.58 (1.70) in the control group during weeks 35–37 of pregnancy (P= 0.001). For pain experienced while bending, the average scores were 2.20 (1.32) in the intervention group

and 3.29 (2.01) in the control group (P= 0.03). No significant differences were observed regarding pain during sitting, twisting, or lifting objects. The average functional disability score was 39.20 (10.78) for the intervention group, while it was 42.64 (11.62) for the control group (P= 0.01).
Conclusion: Implementing posture correction and stretching exercises can significantly reduce low back pain while standing and bending during pregnancy and improve functional ability.

Keywords: Pregnancy, Backache, Health status, Musculoskeletal equilibrium, Exercise

Introduction

Pregnant women undergo physiological and anatomical changes throughout pregnancy, including hormonal, structural, and postural alterations.[1] Rapid weight gain and abdominal enlargement shift the body's center of gravity forward and downward, increasing pressure on pelvic and dorsal muscles and ligaments. Lumbar curvature intensifies due to weakened abdominal muscles, leading to increased lumbar lordosis and back pain.[2,3] Nearly half of pregnant women experience back pain, often exacerbated by improper postures and movements.[4] Lifting or pushing heavy objects, prolonged improper postures such as sitting or standing for extended periods, and excessive bending and twisting movements of the back may contribute to the onset of back pain.[5,6]

Lumbar lordosis increases during pregnancy.[7] Increased lumbar curvature not only affects appearance but, when chronic, is one of the most common causes of back pain and significantly influences the individual's functional disability.[8] Nearly all pregnant women experience musculoskeletal discomfort, with at least 25% experiencing some degree of functional disability.[9]

The Canadian Society for Physiology recommends physical activity for pregnant women to maintain a healthy lifestyle.[10] Posture correction movements can improve muscle strength, flexibility, and overall body coordination. One of the goals of posture correction during pregnancy is to restore the body’s biomechanical alignment.[11]

The results of a systematic review involving 5,121 women aged 16–45 during 12–38 weeks of pregnancy indicated that performing various exercises during pregnancy, compared to routine prenatal care, reduces the intensity of back pain. However, it is not effective in preventing the onset of pregnancy-related back pain. Due to the low quality of studies conducted in this area, further research was recommended.[12] In another systematic review and meta-analysis conducted in 2021 which included 693 pregnant women, the effects of various interventions, including exercise, auricular acupuncture, TENS (Transcutaneous Electrical Nerve Stimulation), kinesio taping, and neurosensory techniques, on back pain were evaluated. The findings showed that TENS had a positive impact on pregnancy-related back pain compared to other interventions. Given the high heterogeneity of the studies, further interventions were recommended.[13]

Weak muscle function in the lumbar and pelvic region is associated with pain and disability in pregnancy.[2] Low back pain can limit a person’s physical activity. Performing daily exercises related to the back and lumbar can strengthen the the elasticity of abdominal muscles while standing, bending, and quickly rotating to the right and left.[10] To date, numerous studies have examined the role of exercise and stability of the pelvic in preventing or relieving pregnancy-related low back pain.[14-16] However, according to the researcher's review, no study specifically assessed the impact of interventions on preventing or reducing low back pain in different situations.

Back pain during pregnancy can result in functional disability,[8] limiting daily activities and affecting quality of life.[17] Conservative interventions like posture correction and stretching movements offer low-risk solutions, but their effectiveness in pregnant populations is unclear,[18] and needs further investigation. Existing studies often lack rigorous methodology or control for confounding factors, limiting the generalizability and applicability of findings. Furthermore, variations in intervention protocols, outcome measures, and participant characteristics contribute to heterogeneity in the evidence base.[18]

It is crucial to quantify the impact of the interventions to develop care plans that enhance maternal comfort, mobility, and overall well-being.[19] Additionally, investigating the specific effects of posture correction and stretching exercises in pregnant women is necessary to tailor interventions that address the unique biomechanical challenges of pregnancy, potentially reducing pain and preventing future disability.[20] These therapeutic strategies could assist in clinical decision-making and improve prenatal care protocols by incorporating evidence-based, non-invasive treatments to manage back pain effectively.[21] Therefore, this study aimed to assess the effect of posture correction and stretching movements on low back pain in various situations and on functional disability during pregnancy. This research is one of the few studies specifically focusing on disability caused by back pain in pregnancy.

Materials and Methods

This quasi-experimental study was conducted among pregnant women attending selected health centers in Tabriz, Iran. As the intervention was conducted outside the clinical setting and self-administered by participants at home, the researchers were unable to fully control the intervention conditions; therefore, the study employed a quasi-experimental design. The study was approved by the Ethics Committee of Tabriz University of Medical Sciences (Approval ID: IR.TBZMED.REC.1399.009). Participants were enrolled in the study between November 2020 and September 2021, with follow-up continuing until February 2022. Inclusion criteria were primigravid women with singleton pregnancies who did not intend to participate in childbirth preparation classes, women aged 20–35 years, a gestational age of 16–18 weeks, a body mass index (BMI) between 18.5 and 29.9, and a height range of 155–170 cm.

Exclusion criteria included high-risk pregnancies such as a history of recurrent miscarriages (three or more), threatened miscarriage in the current pregnancy, incompetent cervix or cervical cerclage, placenta previa, history of bleeding during the current pregnancy, history of preterm labor or premature rupture of membranes, conditions arising or worsening during pregnancy, or chronic diseases such as gestational or chronic hypertension, severe anemia, cardiovascular, pulmonary diseases, diabetes, seizure disorders, or thyroid disorders. Other exclusion criteria included history of back pain before pregnancy, musculoskeletal diseases such as spinal disorders (e.g., disc herniation, spinal canal stenosis), joint problems, skeletal abnormalities, a history of spinal disc surgery, physical disabilities.

In this study, the sample size was determined using the GPOWER software. Based on the variable of lumbar pain and the findings from the survey by Güngör and Karakuzu Güngör [22] the mean of group 1 (MD) was 5.87, with a presumed 20% decrease after intervention, leading to a mean of group 2 (MD) of 4.7. The standard deviations for both groups (SD1 and SD2) were 1.45. The significance level (α) was set at 0.05, with a power of 80%. Using these parameters, the estimated sample size was 27 participants per group. To account for a 20% attrition rate, the final sample size was increased to 33 participants per group.

The researcher visited the high-population health centers in various areas of Tabriz and extracted a list of primigravid pregnant women aged 20–35 years with a gestational age of 16–18 weeks. Intervening at this age allows for prophylaxis against progressive postural decompensation, maximization of neuromuscular plasticity, and establishment of motor habits before the third trimester or late-stage morphological changes.[23]

Individuals interested in participating in the research were evaluated via phone for specific inclusion and exclusion criteria. Eligible participants were invited to attend an informational session. During the session, the objectives and methodology of the study were explained, and if they met the criteria and were willing to participate, written informed consent was obtained.

Participants completed a demographic form and the Oswestry Disability Index (ODI). The first author measured participants' body mass index (BMI) using their height and weight. Participants were then randomly allocated to the intervention and control groups using stratified block randomization based on normal and overweight BMI. Blocks of six with a 1:1 ratio were used, and allocation was concealed by writing the allocation type on paper and placing it in opaque envelopes, which were sequentially numbered. The envelopes were opened in order by someone not involved in the sampling process.

In this study, the intervention program was conducted over five sessions from weeks 16–18 to 32–34 of pregnancy in small groups of three participants. This group-based, phased approach allowed for social learning, peer support, and iterative skill acquisition. In the first session, during weeks 16–18 of pregnancy, after the introduction, pregnant women were taught proper skeletal habits during daily activities, including correct sleeping positions, correct sitting on the floor and chair, proper standing and walking techniques, correct methods of lifting and carrying objects, as well as the proper way to get out of bed for pregnant women. They were also instructed to avoid standing for long periods, use wedge shoes, and avoid high-heeled shoes (greater than 3 cm). Standardized and approved stretching exercises during pregnancy were also introduced, such as waist twisting to strengthen and increase the flexibility of the back and rib muscles, side stretching to maintain the natural curve of the spine, and exercises in a hands-and-knees position (cat-cow stretch and prayer pose), all known to support spinal alignment and muscular flexibility.[24] Posture correction training was done through expert practice and educational mediasuch as PowerPoint presentations and instructional films. These exercises were taught at the nearest health center to the participants' residences.

At weeks 20–22 of pregnancy, stretching exercises related to the back and pelvis, along with animation displays and face-to-face training, were conducted for 30 minutes. Respiratory techniques, along with practical stretching exercises and educational audio materials, were demonstrated during weeks 24 to 26, 28 to 30, and 32 to 34 for 30 to 45 minutes. All sessions were conducted in a calm room with proper ventilation in health centers by the first author under the supervision of the fifth author, who holds a certified coaching qualification for pregnancy from the Ministry of Health of Iran. It was recommended that the aforementioned exercises be performed at home twice a week for 20-30 minutes. Wearing suitable cotton clothing to reduce sweating, drinking fluids during and after the exercise to replenish lost body fluids, and using the educational CD at home were also recommended. The methodology was thus characterized by a holistic, pragmatic approach, integrating behavioral, environmental, and physiological considerations.[25]

The intervention group was also given a checklist to track the number of days they exercised per week. During the follow-up visits, this checklist was reviewed to ensure the continuation of the exercises. Furthermore, scenarios were presented during the training sessions to monitor proper skeletal habits during daily activities. The intervention's design included home-based practice and self-monitoring, with checklists reviewed at follow-up visits to ensure adherence and adapt instruction as needed. The methodology was thus characterized by a dynamic, participant-centered approach, which values individual agency, feedback, and adaptation qualities essential for effective behavioral change and functional improvement. The inclusion of bending, sitting, and lifting object scenarios to monitor skeletal habits in daily activities underscored a commitment to contextual transfer of learning, reflecting pragmatism's emphasis on experiential, real-world application.

The control group received routine prenatal care. After the intervention, at weeks 35–37 of pregnancy, the participants completed the visual pain scale and the Oswestry Disability Index (ODI) to assess back pain in different positions and functional disability, respectively. By weeks 35-37, the cumulative effects of weight gain and abdominal expansion reach their zenith. At this juncture, the musculoskeletal system is under maximal stress, and any deficits in postural control or muscular strength are most likely to manifest clinically. Measuring outcomes at the point of greatest anatomical challenge provides a stringent test of the intervention's effectiveness.[26]

Respect for autonomy was central to the ethical provision of exercise guidance during pregnancy. Only low-risk pregnant women without contraindications for exercise were invited to participate, ensuring their safety and eligibility. Participants were informed about their right to make voluntary and independent decisions regarding their participation in the study. Written informed consent was obtained from all participants after they were provided with clear and comprehensive information about the study's objectives, procedures, potential benefits, possible risks, and any uncertainties related to exercise during pregnancy. Participants were assured that

their participation was voluntary and that they could withdraw from the study at any stage without any consequences for their ongoing care.
Due to the nature of the study, blinding participants and the researcher was impossible. However, the data collector was blinded. The data collection tools in this study included a demographic form, the Oswestry Low Back Disability Index (ODI) to determine functional disability due to back pain, and the Visual Analogue Scale.
The demographic form included questions about age, weight, height, education level, employment status, household income adequacy, and other related factors. These forms were designed to gather basic information about the participants' personal and socioeconomic backgrounds. The face and qualitative content validity were assessed by 15 academic members of Tabriz University of Medical Sciences.
This study measured the intensity of back pain in various positions using the Visual Analogue Scale (VAS), which consists of a horizontal line graded from 0 to 10. Zero indicates no pain, and 10 represents unbearable pain.[27] Its validity and reliability have been previously confirmed.[28, 29] In this study, ten pregnant women were reassessed one week later, and their pain was evaluated in exactly the same positions as during the initial assessment. The test–retest reliability coefficient was 0.94.
Oswestry Disability Index consists of 10 six-option items that rate the level of function, with scores ranging from zero (indicating optimal ability) to 10 (indicating severe disability). Each item is scored from 0 to 10, and the overall disability index is between 0 and 100. A score of 0 indicates that the individual is healthy and able to perform daily activities without pain. In contrast, a score of 100 represents complete disability due to severe pain in which the individual cannot move.[30] In the Iranian version of the tool, a test-retest involving 22 patients with back pain showed a reliability coefficient of 0.99 after 24 hours, 0.91 after 4 days, and 0.83 after 21 days. The Cronbach's alpha coefficient ranged from 0.71 to 0.87.[31] Another study in Iran revealed that the Oswestry Disability Index questionnaire has adequate responsiveness to detect improvements in the functional status, and can help to identify important changes in the clinical status of an individual patient and treatment efficacy.[32] In this study, Cronbach's α for the tool was 0.81, and the intraclass correlation coefficient was 0.78.
Out of the 82 pregnant women who visited the selected health centers, 16 did not participate in the study. Among these 16, 12 did not meet the inclusion criteria, and four declined to participate. Finally, 66 pregnant women were randomly assigned to two groups of 33 participants each. After accounting for attrition, 30 participants from the control group and 31 from the intervention group were included in the final analysis (Figure 1). The collected data were analyzed using $SPSS_{25}$ software. The Kolmogrov smoinov test was employed to assess the normality of the data. To compare lumbar pain at weeks 16-18 and 35-37 of pregnancy, due to the non-normal distribution of the data, the Mann-Whitney U test and the Wilcoxon signed-rank test were used. For comparing disability scores before the intervention, the independent t-test was used. Additionally,at weeks 35-37 of pregnancy, ANCOVA was applied after controlling for baseline effects.

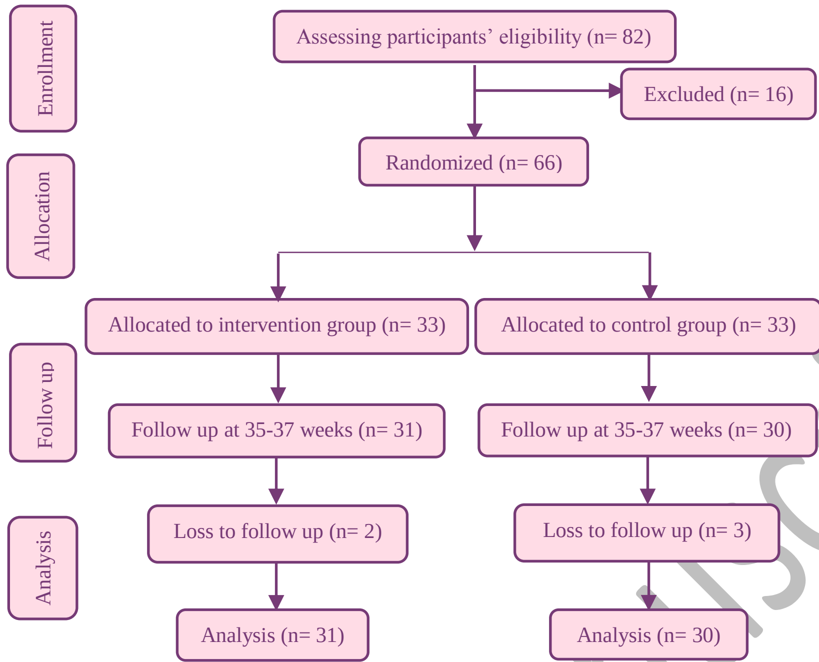

Figure 1. The flowchart of participants in the intervention and control groups

Results

There were no statistically significant demographic differences between the two groups (Table 1).

Table 1. Demographic characteristics of participants in the intervention and control groups

Variable	Frequency (%)		P
	Intervention (n= 33)	Control (n=33)	
Age (years)†	25.73 (3.08)	25.15 (3.40)	0.73*
Height (cm)†	162.26 (4.64)	161.83 (3.60)	0.68*
Spouse's age (years)†	30.26 (3.90)	30.80 (3.64)	0.57*
Body Mass Index (BMI)†			
Weeks 16–18	24.74 (4.10)	22.76 (3.25)	0.05*
Weight†			
Weight gain (weeks 28–30)	6.45 (3.02)	6.32 (2.44)	0.85*
Weight gain (weeks 35–37)	11.35 (2.87)	11.25 (2.69)	0.89*
Education level			0.98**
Elementary & Middle School	3 (9.09)	3 (9.09)	
High School	6 (18.18)	7(21.21)	
Diploma	11 (33.33)	11 (33.33)	
University	13 (39.39)	12 (36.36)	
Employment			0.67**
Homemaker	25 (75.75)	24 (72.72)	
Employed	8 (24.24)	9 (27.27)	
Spouse's Education Level			0.53**
Elementary & Middle School	1 (3.03)	1 (3.03)	
High School	10 (30.30)	5 (15.15)	
Diploma	9 (27.27)	10 (30.30)	
University	13 (39.39)	17 (51.51)	
Spouse's Occupation			0.38**
Employee	13 (39.39)	12 (36.36)	
Worker	3 (9.09)	9 (27.27)	
Self Employed	17 (51.51)	12 (36.36)	
Household Income			0.32**
Not Sufficient	-	-	
Somewhat sufficient	20 (60.60)	22 (66.66)	
Sufficient	13 (39.39)	11 (33.33)	
Fetal Gender			0.54**
Female	15 (45.45)	14 (42.42)	
Male	18 (54.54)	19 (57.57)	

†Mean (Standard Deviation), *Independent t-test, **Chi-square test.

During weeks 35–37 of pregnancy, the mean (SD) pain score while standing was 3.23 (1.19) in the intervention group and 4.58 (1.70) in the control group (P= 0.001). Similarly, the mean (SD) pain score while bending was 2.20 (1.32) in the intervention group, compared with 3.29 (2.01) in the control group (P= 0.03). However, no significant differences were observed between the groups in pain experienced during sitting, twisting, or lifting objects (Table 2).

Table 2. Comparison of back pain in different situations between the two groups during weeks 35-37 of pregnancy

Variable	Mean (SD)				P value*
	Intervention group (n= 31)	**Median (Q25-Q75)**	**Control group (n= 30)**	**Median (Q25-Q75)**	
Pain While Standing					0.39
Before Intervention (Weeks 16–18)	0.73 (1.08)	0 (0-0)	0.90 (1.04)	0 (0-0)	0.001
After Intervention (Weeks 35–37)	3.23 (1.19)	3(2.75-4)	4.58 (1.70)	5(3-5)	
P value**	<0.001		<0.001		
Pain While Sitting					0.89
Before Intervention (Weeks 16–18)	0.70 (1.08)	0 (0-0)	1.09 (1.04)	0 (0-0)	0.68
After Intervention (Weeks 35–37)	2.76 (1.86)	2(2-4)	2.93 (2.03)	3 (1-5)	
P value**	<0.001		<0.001		
Pain While Lifting Objects					0.30
Before Intervention (Weeks 16–18)	0.60 (1.03)	0 (0-0)	0.80 (1.04)	0 (0-0)	0.23
After Intervention (Weeks 35–37)	2.43 (1.45)	2 (2-3)	3.06 (1.84)	3(2-5)	
P value**	<0.001		<0.001		
Pain While Bending					0.60
Before Intervention (Weeks 16–18)	0.80 (1.15)	0 (0-0)	0.90(1.10)	0 (0-0)	0.03
After Intervention (Weeks 35–37)	2.20 (1.32)	2 (1-3)	3.29 (2.01)	3 (2-5)	
P value**	<0.001		<0.001		
Pain While Turning in Sleep				0 (0-0)	0.62
Before Intervention (Weeks 16–18)	0.30 (0.70)	0 (0-0)	0.35 (0.70)	0 (0-2)	0.12
After Intervention (Weeks 35–37)	0.53 (1.13)	0 (0-0)	1.03 (1.42)		
P value**	0.002		0.02		

*Mann Whitney U, **Wilcoxon.

In this study, the mean (SD) of functional disability scores in the intervention group increased from 29.80 (9.97) before the intervention to 39.20 (10.78) during weeks 35-37. In the control group, it increased from 27.67 (12.19) before the intervention to 42.64 (11.62) during weeks 35-37. This indicates that time led to an increase in functional disability in both groups. After adjusting for the baseline score, the functional disability score in the intervention group was significantly lower compared to the control group [adjusted mean difference with 95% confidence interval: -5.57 (-3.96 to -7.40), P= 0.01].

In the intervention group, one participant reported the onset of uterine contractions, which resolved with rest, and recovery was achieved. No cases of amniotic fluid leakage, bleeding, preterm labor, or other complications were observed in the intervention group.

Discussion

The present study aimed to determine the effect of postural correction and stretching movements during pregnancy on low back pain and functional disability. Interestingly, we found significant improvements in standing and bending pain, but no substantial differences were observed during sitting, twisting, or lifting activities. This nuanced finding suggests that posture correction and stretching may have specific biomechanical benefits that do not apply uniformly across all movement types. The complexity of pregnancy-related musculoskeletal adaptations suggests that additional targeted interventions may be necessary to address pain experienced in other positions. Consistent with our findings, previous studies also observed significant differences in low back pain scores in the intervention group compared to the control group following preparation and relaxation exercises,[33] and stretching-strengthening exercises.[16,34,35] Additionally, a systematic review and meta-analysis conducted in 2021 on 693 pregnant women, which assessed the effects of various interventions, found positive effects of exercise on pregnancy-related low back pain compared to other interventions.[14]

In contrast to the present study, in the survey by Stafne et al[36] after 12 weeks of exercise, including aerobic and stretching exercise from weeks 20-36 of pregnancy, twice a week with a group session led by a physiotherapist, no significant difference was observed in low back pain scores between the intervention and control groups. The difference in results between the present study and the study above may be attributed to the non-participation of many women in the intervention group due to concerns about the impact of the protocol and program on pregnancy outcomes in the latter study.

In this study, postural correction and stretching movements significantly improved functional disability in the intervention group compared to the control group. Our results complement research by Cilar Budler et al[37] which demonstrated the potential of structured physical interventions in mitigating pregnancy-related physical limitations. Potential mechanisms underlying these improvements likely involve enhanced muscular support, improved spinal alignment, and increased flexibility. The stretching components may help counteract the postural changes and ligamental laxity characteristic of pregnancy, reducing mechanical stress on the lower back.[38] Since functional disability in pregnant women is associated with the intensity of low back pain,[39] lower functional disability in the intervention group seems logical and reasonable due to lower back pain in this group compared to the control group.

In line with the present study, Sonmezer et al[40] studied 20 pregnant women who received Pilates exercises twice a week for eight weeks and showed a significant reduction in low back pain scores and functional disability in the intervention group compared to the control group. Consistently, the study by Nourani et al[41] which investigated the effects of taping and exercise therapy on functional disability in 90 pregnant women, showed that in the exercise and the taping groups, functional disability significantly decreased after six weeks compared to the control group. In the study by Ozdemir et al[42] which evaluated the impact of an exercise program on pregnant women's functional disability due to low back and pelvic pain, the participants in the intervention group (48 participants) received a four-week program. The findings showed that functional disability was significantly lower in the intervention group compared to the control group. The results of another study indicate that the addition of core stability exercises was more effective than usual care alone in pain relief and improving disability of pregnant women.[43] These results are also consistent with the current study. It is worth noting that no contradictory studies were found in this area.

The current study benefits from several strengths, including the random allocation and allocation concealment of samples to the intervention and control groups, which helps to mitigate selection bias. Additionally, incorporating checklists for monitoring home exercises and using standardized questionnaires further enhances the rigor of the research design. Nonetheless, the study has limitations, such as relying on self-reported information, the lack of blinding of participants due to the study's nature, uncertainties about the consistent execution of exercises at home, and the absence of long-term follow-up for mothers post-childbirth. Moreover, the study was conducted in a single geographical region, and the small sample size was another limitation. Additionally, this study focused on primigravida women, so the results cannot be generalized to multiparous women.

Potential implications of this study for future research include several important areas of investigation. First, the findings suggest a need for longitudinal studies to examine whether the benefits of posture correction and stretching during pregnancy persist into the postpartum period, including their effects on chronic low back pain, recovery after childbirth, and long-term maternal functional health. Future research could also explore the optimal type, frequency, intensity, and duration of posture correction and stretching exercises to determine the most effective intervention protocols for pregnant women at different stages of pregnancy. Comparative studies assessing these interventions against other non-pharmacological approaches, such as yoga, physiotherapy, or aquatic exercise, may further clarify the most beneficial strategies for managing pregnancy-related low back pain. Finally, larger and more diverse populations should be included in future studies to improve the generalizability of the findings.

Conclusion

This study provides evidence that posture correction and stretching movements can reduce low back pain while standing and bending, and improve functional disability during pregnancy. The reduction in functional disability scores in the intervention group suggests that posture correction and stretching not only alleviate pain but also empower women to engage more fully in their daily activities. Consequently, it is advisable to provide all pregnant women who do not have contraindications for pregnancy exercises with information on postural correction and stretching movements throughout the pregnancy. The findings support the integration of such interventions into prenatal care programs to promote better health outcomes for expectant mothers. Investigating the potential long-term benefits of these interventions is recommended.

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Authors' Contributions

Conceptualization: Tahereh Khalegi, Roghaiyeh Nourizadeh
Data curation: Tahereh Khalegi
Formal analysis: Roghaiyeh Nourizadeh, Niloufar Sattarzadeh-Jahdi
Funding acquisition: Roghaiyeh Nourizadeh
Methodology: Roghaiyeh Nourizadeh, Zahra Salahzadeh, Niloufar Sattarzadeh-Jahdi
Project administration: Tahereh Khalegi, Rasoul Khalegi, Roghaiyeh Saadi
Software: Tahereh Khalegi, Rasoul Khalegi
Supervision: Roghaiyeh Nourizadeh
Writing – original draft: Tahereh Khalegi, Roghaiyeh Saadi
Writing – review & editing: Roghaiyeh Nourizadeh, Zahra Salahzadeh, Niloufar Sattarzadeh-Jahdi

Conflict of Interest

None to be declared.

Data Accessibility

The data are available from the corresponding author on reasonable request.

Ethical Issues

The study followed ethical guidelines, including the Helsinki Declaration and received approval from the ethics committee of Tabriz University of Medical sciences (ID: IR.TBZMED.REC.1399.009). Informed written consent will be obtained from subjects.

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Research Highlights

What is the current knowledge?

- Weak muscle function in the pelvic region along with increased lumbar lordosis are associated with pain and disability in pregnancy.

What is new here?

- Posture correction and stretching movements can effectively reduce low back pain while standing and bending in pregnancy.
- This study provides evidence for potential health benefits of training posture correction and stretching movements on improving functional disability during pregnancy.

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