Sport Sciences and Health Research

University of Tehran
Faculty of
Physical Education and Sport Science

Impact of Corrective Exercises on Back Pain During Pregnancy and Postpartum

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Article Info

Article type:

Original Article

Article history:

Received: 06 August 2024

Revised: 31 May 2025

Accepted: 04 Jun 2025

Published online: 01 July 2025

Abstract

Background: Pregnancy is a crucial period marked by significant physiological, hormonal, and anatomical changes. One common issue is low back pain (LBP), affecting 47-80% of women globally. This condition can persist post-pregnancy, with 50-90% of women experiencing it during pregnancy and a notable percentage continuing to suffer after childbirth. Managing and mitigating this pain is essential, as it can significantly impact daily life and lead to movement disabilities.

Aim: This study aims to evaluate the changes in back pain during pregnancy and assess the impact of eight weeks of corrective exercises on alleviating back pain in women after childbirth.

Materials and Methods: The study involved 30 pregnant women from specialized gynecology and maternity clinics in Shahin Shahr and its suburbs. The participants were between 6 and 10 weeks pregnant, healthy, with no history of back pain or sports. They were divided into an experimental group (12 participants) who underwent an eight-week exercise program post-delivery and a control group (13 participants). Data was collected using the Quebec Back Pain Assessment Questionnaire. The exercise program, supervised by midwives and obstetricians, included three weekly sessions of gradually increasing duration from 30 to 45 minutes over eight weeks. Statistical analysis involved descriptive statistics, repeated measures ANOVA, and independent t-tests to evaluate the effect of the exercises.

Results: Back pain increased significantly during pregnancy, peaking at an average score of 93.53 in the 40th week. The exercise program significantly reduced back pain in the experimental group compared to the control group. Lumbar lordosis also showed a notable decrease during pregnancy, but improved with the corrective exercises postpartum.

Conclusion: Corrective exercises conducted postpartum were effective in reducing back pain associated with pregnancy. The study underscores the importance of such exercise programs to alleviate back pain and recommends that women engage in supervised corrective exercises post-delivery to recover muscle strength and manage residual pain

Keywords: Pregnancy, back pain, corrective exercises

Cite this article: Pirani, H., Khosravi, P., Saeidi, S., & Khoramipour, K. (2025). Impact of Corrective Exercises on Back Pain During

Pregnancy and Postpartum. *Sport Sciences and Health Research*, 17(2), 1-8.

1. Introduction

Pregnancy is considered one of the most fundamental stages of life for a mother, and from a medical perspective, the health of the mother is crucial (1). During pregnancy, significant physiological, hormonal, metabolic, anatomical, mechanical, and psychological changes occur, which are all influenced by the process of pregnancy (5). These changes include the increase in the fetus's weight, the shift in the center of gravity, and the rotation of the pelvis. The weakening of the abdominal muscles results in increased lumbar lordosis (L), thereby putting additional pressure on the muscles and ligaments of the back and pelvis, especially the lower back (8,13). As a consequence, back pain often becomes inevitable (8,13).

Globally, 47% to 80% of women experience musculoskeletal complications during pregnancy, with low back pain being the most common. This condition often persists for years after pregnancy (11). In fact, back pain during and after pregnancy remains one of the most prevalent complaints among women, with 50% to 90% of women experiencing it during pregnancy (6)(18). Several studies, including those by William et al. (1991), Mogren et al. (2005), and Albert et al. (2001), have confirmed these findings (9,2,16).

Additionally, some studies have suggested that women who experience back pain during pregnancy are at an increased risk of persistent back pain postpartum (14,11). Research indicates that the prevalence of back and pelvic pain can range from 5% to 43% six months after childbirth, and these conditions are often associated with movement disabilities (10,11,2). Padova et al. (2005) showed that about half of women still suffer from back pain one year after giving birth, although some report significant improvement (12).

Despite some studies showing limited effectiveness of exercise in relieving back pain during pregnancy (7), and the fact that some women may be unable to exercise in the final months due to physical conditions, pain, or fear of exercise, it remains essential to address and manage the back pain that persists after delivery. Therefore, in this study, we aim to evaluate changes in back pain during pregnancy and also investigate the effect of eight weeks of corrective exercises on postpartum back pain.

2. Methods and Materials

The statistical population of the present study consisted of 34 pregnant women referring to specialized gynecology and maternity clinics in Shahin Shahr and its suburbs. Four participants were excluded due to pregnancy-related complications. The inclusion criteria for participants were as follows:

1. Women between 6 and 10 weeks of pregnancy;

2. Willingness to participate as evidenced by a signed consent form;
3. Full awareness of the study's objectives;
4. No previous history of back pain;
5. No prior engagement in organized sports activities;
6. Age between 22 and 30 years.

Two weeks after pregnancy, 15 women voluntarily participated in the exercise program, while 15 were assigned to the control group. Due to difficulties in maintaining contact with some subjects after delivery, 12 participants remained in the experimental group and 13 in the control group.

2.1. Sample Size and Recruitment:

The initial selection of 34 participants was based on available resources and feasibility within the study context. Although a formal power analysis was not performed, it is acknowledged that a larger sample size would enhance the generalizability and robustness of the results. Participants were recruited through advertisements at local clinics and word-of-mouth, which may have introduced self-selection bias favoring individuals with a pre-existing interest in physical activity.

2.2. Control Group:

Participants in the control group were instructed to refrain from engaging in any structured physical exercise during the study period. This ensured a clear comparison between the intervention provided to the experimental group and the natural course observed in the control group.

2.3. Ethical Considerations:

Prior to the commencement of the study, ethical approval was obtained from the Ethics Committee of [insert institution name]. All participants provided informed consent, ensuring that the study was conducted in accordance with ethical guidelines.

2.4. Instrumentation:

The study utilized the Quebec Back Pain Assessment Questionnaire, which consists of 25 five-choice questions. This tool has been validated in countries such as England, France, Germany, the Netherlands, and Iran, with a reported test-retest reliability (Pearson correlation coefficient) of 90% (44). Participants selected from five options ranging from 0 (indicating no pain) to 100 (indicating very severe pain), corresponding to different intensities of back pain.

2.5. Procedure:

Two weeks after giving birth, the experimental group commenced an exercise program supervised by midwives and obstetricians. The program lasted eight weeks, with three sessions per week. Each session started at 30 minutes in the first week and was gradually increased to 45 minutes by the final week. Before the exercise program began, an audiovisual session was provided to familiarize participants with basic

spinal anatomy and function. Detailed exercise sheets outlining the order and duration of each activity were also distributed. The exercise regimen included:

1. A general warm-up (e.g., slow walking and stretching for 10 minutes).
2. Main exercises (remedial exercises aimed at increasing flexibility and muscle strength; duration increased from 15 minutes in the first week to 30 minutes in the last week).
3. A cool-down period of 5 minutes.

2.6. Statistical Analysis:

Data analysis was performed using SPSS software (version 17) (17). Descriptive statistics were used to summarize the data, while inferential statistical tests—namely repeated measures ANOVA and independent t-tests—were conducted to compare back pain outcomes between the groups post-delivery. The significance level was set at 0.05. In addition, confidence intervals and effect sizes were calculated to enhance the interpretability of the findings. Any typographical errors, such as "repeated measure0," have been corrected to "repeated measures."

2.7. Consideration of Underlying Mechanisms:

While the primary focus of the study was to assess changes in back pain, it is important to recognize that corrective exercises may enhance posture, muscle strength, and flexibility, which in turn could reduce pain. Future studies are encouraged to further investigate these biological and biomechanical mechanisms

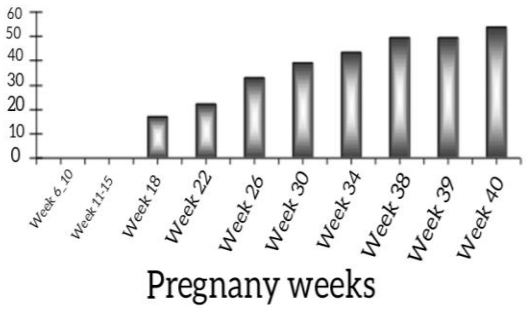
3. **Results**

The results regarding back pain during pregnancy are presented in Diagram 1 and Diagram 2.

Diagram 1 – Back Pain During Pregnancy:

- Axes Description:
    - Horizontal Axis: Represents gestational weeks, ranging from week 18 to week 40.
    - Vertical Axis: Represents back pain intensity measured on a scale from 0 (no pain) to 100 (very severe pain).

The diagram shows a statistically significant increase ($P < 0.05$) in back pain as pregnancy progresses. Specifically, back pain starts at an average intensity of 13.17 at the 18th week and reaches an average of 93.53 by the 40th week. Additionally, between weeks 22 and 26, there is a significant increase of approximately 10.63 units in back pain intensity, with values stabilizing during the 38th and 39th weeks



Diargram 1. the average difference of back pain after childbirth in two groups is displayed.

Diagram 2 – Changes in Lumbar Lordosis:

- Axes Description:
    - Horizontal Axis: Represents gestational weeks, spanning from week 18 to week 40.
    - Vertical Axis: Indicates the angle of lumbar lordosis (measured in degrees).

The results indicate that lumbar lordosis, initially averaging 21.46° at week 18, shows a significant decrease reaching an average angle of 16.51° by week 40.

Table 1 displays the mean values, standard deviations, and significance levels of back pain at various stages after childbirth for both the experimental group and the control group

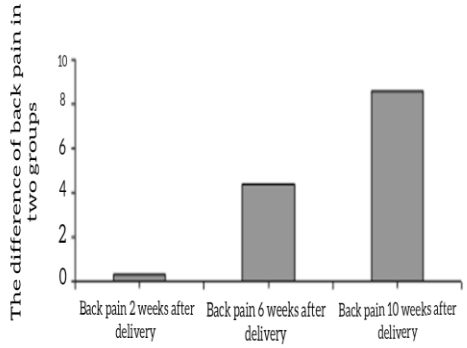


Diagram 2. The average difference of postpartum back pain in two groups.

Back pain decreased significantly in both groups post-delivery. However, the reduction in back pain was consistently and significantly greater in the experimental group (those who participated in the corrective exercise program) compared to the control group (those who did not engage in any structured exercise) at every measured stage ($P < 0.05$).

Statistical significance was determined using independent t-tests to compare the means between the experimental and control groups at each stage. Additionally, repeated measures ANOVA was applied to evaluate changes over time within each group. Confidence intervals and effect sizes were calculated to better illustrate the magnitude of changes, which contributed to the robust interpretation of the results

In Table No 1, the data related to the difference in average back pain after childbirth in each stage in the two experimental and control groups are displayed . As can be seen from the obtained results, back pain during pregnancy, After delivery in the experimental and control groups, it has decreased significantly in each stage . However, back pain in the experimental group has decreased significantly more than the control group in each stage ($P<0.05$) .

Table 1. The results of pairwise comparison of average back pain after childbirth in different stages

group	Measurement time		Average difference)1-2(	Standard deviation error	The significance level
experimental	2 weeks after delivery	6 weeks after delivery	22/33	0.22	0.000
	2 weeks after delivery	10 weeks after giving birth	16/30	0.79	0.000
	6 weeks after delivery	10 weeks after giving birth	83/7	0.70	0.000
Control	2 weeks after delivery	6 weeks after delivery	18/30	0.23	0.04

	2 weeks after delivery	10 weeks after giving birth	92/21	0.88	0.031
	6 weeks after delivery	10 weeks after giving birth	6/3	0.78	0.04

4. Discussion

The present study demonstrated a significant increase in back pain during pregnancy. This finding is consistent with previous research by William et al. (2009), Mogren et al. (2005), and Albert et al. (2001) (16,9,2), and contrasts with the results reported by Ball and K et al. (1987) (4). These discrepancies could be attributed to differences in the frequency and timing of measurements, the evaluation tools used, sample sizes, parity, and the age range of the subjects (20,21).

Physiological changes during pregnancy—such as hormonal fluctuations, metabolic adjustments, and mechanical alterations—can disturb the balanced distribution of forces along the vertebral column. This leads to abnormal loading on certain segments, potentially resulting in tissue lesions and pain (1). Additionally, increased lumbar lordosis can further contribute to mechanical stress on the lower back, emphasizing the importance of understanding these changes in both clinical and biomechanical contexts(19,21).

Our findings indicate that corrective exercises administered after delivery significantly reduced back pain compared to the control group. This is in line with the study by Stah and co-workers (2004) (15), which reported that postnatal exercise training significantly decreased pelvic girdle pain while strengthening muscles. Moreover, the experimental group's greater reduction in back pain suggests that such interventions may play an essential role in both pain management and the prevention of chronic discomfort after childbirth. Considering that over 80% of pregnant women report back pain as a factor affecting daily activities (16,9), the clinical implications of these results are considerable(17).

Based on our results, healthcare professionals are encouraged to integrate corrective exercise programs into postnatal care. These exercises, focusing on improving posture, core muscle strength, and flexibility, may help mitigate the adverse effects of pregnancy-related back pain. Future research should focus on:

- Conducting longitudinal studies to evaluate the long-term benefits of these interventions.
- Examining the specific biological and biomechanical mechanisms underlying the observed effects.
- Expanding sample diversity in terms of age, health status, and baseline physical activity to enhance the generalizability of the findings.

Educating pregnant women about the high likelihood of experiencing back pain during and after pregnancy is crucial. Awareness programs that include practical strategies and guided exercise routines can empower women to manage their pain effectively and maintain their

daily activities with minimal discomfort. Recommendations for maintaining proper posture and engaging in structured corrective exercises (15,1) should be emphasized by both clinicians and fitness professionals(23).

5. Conclusions

In conclusion, the performance of corrective exercises can significantly reduce the increased back pain caused by pregnancy. It is recommended that postpartum women engage in structured corrective exercise programs under the supervision of qualified trainers and gynecologists to alleviate pregnancy-induced back pain and restore muscle strength. This approach not only assists in immediate pain management but may also have lasting benefits in preventing chronic back discomfort.

Conflict of interest

The authors declared no conflicts of interest.

Authors' contributions

Conceptualization, H.P, Methodology, H.P, Software, H.P P.K, Validation, H.P K.K, P.K, Formal Analysis, P.K S.S; Investigation, H.P, Resources, KK, Data Curation, H.P, Writing Original Draft Preparation, P.K, Writing—Review & Editing, H.P, S.S Supervision, H.P, Project Administration, H.P, Funding Acquisition, H.P.

Acknowledgment

Hereby the authors of the current paper acknowledge the help of all those who have cooperated in conducting the present research.

Ethical considerations

This study was a part of a National Scientific Project supported by the “Chabahar University of Maritime and Marine Sciences” under the code number: 35/03/184 in 2021. All aspects of the study were approved by the scientific research committee of the Federation.

Data availability

The dataset generated and analyzed during the current study is available from the corresponding author on reasonable request.

Funding

This research did not receive any specific grant from funding agencies in the public, commercial, or not-for-profit sectors.

References

1-Mir al-Hassani , Narges " Investigation of the dorsal and lumbar vertebrae of pregnant women before and after childbirth and also comparing these two conditions with each other and finally providing a suitable corrective movement program ", 2006 . Medical doctor thesis , Kerma N. University of Medical Sciences .

2- Albert, H. Godskesen, M. Westergaard, J. 2001. "Prognosis in four syndromes of pregnancy-related pelvic

pain". Acta Obstet Gynecol Scand. 80:505-510.3- Artal R, O'Toole M. 2003. Guidelines of the American College of Obstetricians and Gynecologists for exercise during pregnancy and the postpartum period. Br J Sports Med. 37(10): 6-12.4- Bullock, JE Jull, GA Bullock, MI 1987. "The relationship of the low back pain to postural changes during pregnancy". The Australain Journal of Physiolotherapy. Vol: 33.5- Calzolari, A. Dalgleish, DJ 2008. "Anatomical and physiological changes in pregnancy relevant to anesthesia ". Anesthesia JK. PP: 1-7.6- Chan, YL Lam, WWM Lau, TK Metreweli, C. Chan, DPN 2002. "Back pain in pregnancy. Magnetic resonance imaging correlation". J Clinical radiology. 57:1109-1112.7- Dumas, GA Reid, JG Wolf, LA Griffin, MP McGrath, Mj 1995. "Exercise, posture, and back pain during pregnancy". Clin Biomec. 10(2): 98-103.8-

Lieberman, D. Shapiro, L. Whitcome, K. 2007. "Female lower back has evolved to accommodate the weight of pregnancy". Occupation Health and Safety. 55(6):33.

9- Mogren, IM 2006. "BMI, pain and hyper-mobility are determinants of long-term outcome for women with back pain and pelvic pain during pregnancy". Eur Spine J. 15: 1093-1102.

10 - Mogren, IM Pohjanen, AI 2005. "Low back pain and pelvic pain during pregnancy: prevalence and risk factors". Spine. 33(8): 91-983.

11 - Ostgaard, HC Zetherstrom, G. Roos-Hansson, E. 1996. "Regression of back and posterior pelvic pain after

pregnancy". Spine. 23:2777-804.12- Padua, L. Caliandro, P. Aprile, I. Pazzaglia, C. Padua, R. Calistri, A. Tonali, P. 2005. "Back pain in pregnancy: 1-year follow-up of untreated cases" ". Eur Spine J. 14: 151-154.

13 - Perkins, J. Hammer, A. Roger, L. Loubert, V. 1998. “Identification & management of pregnancy. related low back pain". J of Nurse-Midwifery. 43:331-340.

14 - Shim, MJ Lee, YS Oh, HE Kim, JS 2007. "Effect of a back-pain-reducing program during pregnancy for Korean women: A non-equivalent control-group pretest-posttest study". International J of Nursing Studies.44:19-28.15- Stuge B, Laerum E, Kirkesola G, Vollestad N. 2004. The efficacy of a treatment program focusing on specific stabilizing exercise for pelvic girdle pain after pregnancy. A randomized controlled trial. Spine. 29(10):197-203.

16 - William WK, Wong MWN. Back Pain Symptoms and Bone Mineral Density Changes in Pregnancy as Measured by Quantitative Ultrasound. Gynecol Obstet Invest, 2009; 67(1):36-41.

17- Gaccioli F, Lager S, Sovio U, Charnock-Jones DS, Smith GC. The pregnancy outcome prediction (POP) study: Investigating the relationship between serial prenatal ultrasonography, biomarkers, placental phenotype and adverse pregnancy outcomes. Placenta. 2017 Nov 1;59:S17-25.

18- Santos FF, Lourenço BM, Souza MB, Maia LB, Oliveira VC, Oliveira MX. Prevention of low back and pelvic girdle pain during pregnancy: a systematic review and meta-analysis of randomised controlled trials with GRADE recommendations. Physiotherapy. 2023 Mar 1;118:1-1.

19- Conder R, Zamani R, Akrami M. The biomechanics of pregnancy: A systematic review. Journal of functional morphology and kinesiology. 2019 Dec 2;4(4):72.

20- Salari N, Mohammadi A, Hemmati M, Hasheminezhad R, Kani S, Shohaimi S, Mohammadi M. The global prevalence of low back pain in pregnancy: a comprehensive systematic review and meta-analysis. BMC pregnancy and childbirth. 2023 Dec 2;23(1):830.

21- Shanshan H, Liying C, Huihong Z, Yanting W, Tiantian L, Tong J, Jiawei Q. Prevalence of lumbopelvic pain during pregnancy: A systematic review and meta-analysis of cross-sectional studies. Acta obstetricia et gynecologica Scandinavica. 2024 Feb;103(2):225-40

22- Somathilake E, Delay UH, Senanayaka JB, Gunarathne SL, Godaliyadda RI, Ekanayake MP, Wijayakulasooriya J, Rathnayake C. Assessment of fetal and maternal well-being during pregnancy using passive wearable inertial sensor. IEEE Transactions on Instrumentation and Measurement. 2022 May 13;71:1-1.

23-Sufriyana H, Husnayain A, Chen YL, Kuo CY, Singh O, Yeh TY, Wu YW, Su EC. Comparison of multivariable logistic regression and other machine learning algorithms for prognostic prediction studies in pregnancy care: systematic review and meta-analysis. JMIR medical informatics. 2020 Nov 17;8(11):e16503.