

Prevalence of Quadratus Lumborum Muscle Tightness-Induced Low Back Pain and Its Association in the Second Trimester of Pregnancy: A Comprehensive Survey Study

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ABSTRACT

Background: Pregnancy is associated with various physiological and biomechanical changes that increase the risk of low back pain (LBP), often attributed to compensatory muscle tightness. Quadratus lumborum muscle tightness is a common yet under-recognized cause of LBP during pregnancy.

Objective: To determine the prevalence of quadratus lumborum muscle tightness-induced LBP and its association with low back pain in the second trimester of pregnancy.

Methods: A cross-sectional survey was conducted on 78 pregnant females in their second trimester, recruited from Madina Teaching Hospital, Allied Hospital, and Chinniot General Hospital, Faisalabad. Quadratus lumborum tightness was assessed through goniometric measurements and clinical tests. Pain intensity was evaluated using the Visual Analog Scale (VAS). Chi-square test was used to establish associations, and data were analyzed using SPSS version 25.

Results: Out of 78 participants, 75 (96.2%) reported LBP, with 61.5% experiencing pain during walking and 56.4% during stair climbing. A significant association was found between quadratus lumborum muscle tightness and LBP ($p=0.02$).

Conclusion: The prevalence of quadratus lumborum muscle tightness-induced LBP is high in the second trimester of pregnancy. Early interventions targeting this muscle group could reduce the burden of LBP.

INTRODUCTION

Pregnancy is associated with various physiological and biomechanical changes that significantly impact the musculoskeletal system, leading to common complaints such as low back pain (LBP). Low back pain during pregnancy is a frequent and distressing condition, often beginning in the second trimester and intensifying as gestation progresses. The growing fetus increases the load on the lumbar spine and pelvic region, which alters the center of gravity, increases lumbar lordosis, and results in compensatory postural changes that exacerbate musculoskeletal discomfort (1). One key muscle often implicated in this type of pain is the quadratus lumborum (QL), a deep muscle of the posterior abdominal wall, which functions as a stabilizer for the spine and assists in lateral flexion. When the QL becomes tight, it can lead to significant pain and functional limitations, sometimes referred to as myofascial pain syndrome (2). Tightness in the QL can result in pain that radiates to the lower back, hips, or even the groin, contributing to the heightened discomfort experienced by pregnant women (3).

Quadratus lumborum muscle tightness, particularly in the context of pregnancy, is not frequently recognized or thoroughly investigated. The presence of this muscle stiffness can be attributed to the compensatory mechanisms that occur due to weakened abdominal

muscles and the increased curvature of the lumbar spine, making the QL muscle overactive and prone to tightness (4). This pain can be debilitating and may worsen during activities such as walking, stair climbing, or prolonged standing, ultimately affecting the quality of life and mobility in pregnant women (5). Despite its prevalence, the specific role of QL muscle stiffness in contributing to pregnancy-induced LBP has not been widely studied. Moreover, the lack of awareness among pregnant women regarding the detrimental effects of QL tightness underscores the need for better educational and interventional strategies.

Previous studies have documented that musculoskeletal pain, particularly LBP, is experienced by up to 70% of pregnant women (6). While several etiological factors have been implicated, including hormonal changes and increased joint laxity, the role of specific muscular imbalances like QL tightness remains underreported. Investigating the prevalence of QL muscle stiffness and its association with LBP during pregnancy is crucial for early diagnosis, management, and prevention of chronic pain conditions. Current evidence suggests that tightness in this muscle may not only cause low back pain but may also interfere with daily activities, sleep, and overall well-being during pregnancy (7). Given the paucity of data focusing specifically on QL muscle tightness, this study aims to fill the knowledge gap by evaluating its prevalence and

association with LBP in pregnant women during the second trimester.

Understanding the specific contribution of QL muscle tightness to pregnancy-induced LBP will provide a foundation for targeted therapeutic approaches, including stretching, strengthening, and manual therapy techniques to alleviate pain and improve function. Ultimately, raising awareness about QL muscle involvement in LBP during pregnancy can contribute to better management strategies and reduce the burden of musculoskeletal discomfort in this population (8). The findings from this study are expected to offer valuable insights and contribute to developing effective interventions to improve maternal health and quality of life during pregnancy.

MATERIAL AND METHODS

This cross-sectional survey was conducted on pregnant females presenting to the outpatient departments of Madina Teaching Hospital, Allied Hospital, and Chinniot General Hospital, Faisalabad, Pakistan. The study duration was four months, from February 2024 to May 2024, and ethical approval was obtained from the Ethical Committee of The University of Faisalabad, following the principles outlined in the Declaration of Helsinki. The participants were selected through a convenient sampling technique, and a total of 78 pregnant women aged 18-35 years in their second trimester were included after obtaining informed written consent. Inclusion criteria for the study required participants to have lumbar lordotic posture, lumbar extension of less than 25 degrees, and lumbar side bending of less than 20 degrees. Women with any known musculoskeletal or neurological conditions, previous spinal surgeries, or systemic illnesses that could affect their mobility were excluded to ensure the sample's homogeneity.

Data collection was performed using a self-constructed, structured questionnaire, which consisted of demographic information and specific questions addressing the clinical signs and symptoms associated with quadratus lumborum muscle tightness. The assessment involved evaluating the tightness of the quadratus lumborum muscle using specific muscle tests, including side bending and extension maneuvers. For the side bending test, the participant was asked to stand facing the wall with both arms extended. The movement required sliding the arm down the lateral side of the thigh without tilting forward or backward, ensuring equal weight distribution between both legs. The test was

performed bilaterally to compare the range of motion on each side, and the movement was assessed until the participant's fingers reached the knee boundary. The lumbar range of motion was measured using a goniometer, while pain intensity was assessed using the Visual Analog Scale (VAS), which is a reliable and valid tool for measuring pain intensity levels (1). Additionally, tenderness was evaluated through palpation of the quadratus lumborum muscle to identify the presence of trigger points, which are commonly associated with muscle tightness and myofascial pain.

The study employed a descriptive analysis to quantify the prevalence of low back pain and its association with quadratus lumborum muscle tightness. Data was analyzed using IBM SPSS version 25, with the results presented in terms of frequencies and percentages for categorical variables. The chi-square test was applied to examine the association between quadratus lumborum muscle tightness and the presence of low back pain, with a significance level set at $p \leq 0.05$ to determine statistically significant findings. The results were interpreted in the context of existing literature to assess the potential impact of quadratus lumborum muscle stiffness on low back pain during the second trimester of pregnancy (2).

The study adhered to all ethical considerations, ensuring participant confidentiality and the right to withdraw from the study at any stage. Furthermore, participants were provided with educational materials on postural correction and exercises to prevent musculoskeletal issues, which aimed to minimize potential discomfort and enhance overall awareness regarding the importance of maintaining muscle flexibility during pregnancy.

RESULTS

The study sample consisted of 78 pregnant females in their second trimester, aged between 18 and 35 years. Out of the total participants, 75 (96.2%) reported experiencing low back pain. The results indicated that the majority of participants (61.5%) experienced pain during walking, while 56.4% reported pain during stair climbing. The onset of pain varied, with 28.2% reporting worsening pain in the morning, 16.7% experiencing increased pain in the evening, and 55.1% complaining of back pain at night. Bilateral quadratus lumborum stiffness was identified in 91% of the participants, while only 9% exhibited unilateral quadratus lumborum tightness. The distribution of pain during different activities is presented in Table 1.

Table 1: Distribution of Pain During Activities Among Participants

Activity	Participants Reporting Pain (%)	Participants Not Reporting Pain (%)
Pain during walking	61.5	38.5
Pain during stair climbing	56.4	43.6
Pain worsening in the morning	28.2	71.8
Pain worsening in the evening	16.7	83.3
Pain worsening at night	55.1	44.9

In addition, 51.28% of the participants reported pain during weight-bearing activities in the second trimester of pregnancy. Chi-square analysis revealed a significant

association between quadratus lumborum muscle tightness and the occurrence of low back pain in the second trimester, with a p-value of 0.02 ($p \leq 0.05$), indicating a

Table 2: Chi-Square Results for Association Between Quadratus Lumborum Muscle Tightness and Low Back Pain

Variables	Chi-Square Value	p-value	Significance
Quadratus lumborum muscle tightness	0.02	0.02	Significant

strong correlation. The detailed chi-square results are presented in Table 2. The high prevalence of quadratus lumborum muscle tightness-induced low back pain among the participants underscores the critical need for targeted interventions to address musculoskeletal discomfort during pregnancy. The findings suggest that quadratus lumborum muscle tightness significantly contributes to low back pain in the second trimester, particularly during weight-bearing activities and movements requiring lumbar stability.

DISCUSSION

The present study investigated the prevalence of quadratus lumborum muscle tightness-induced low back pain and its association with low back pain in pregnant females during the second trimester. The findings indicated that 96.2% of the participants experienced low back pain, with a significant association between quadratus lumborum muscle tightness and the severity of pain during pregnancy (p=0.02). These results align with previous research, which has reported that musculoskeletal pain, particularly low back pain, is a common complaint among pregnant women, affecting approximately 70% of the population during gestation (6). The quadratus lumborum muscle, due to its anatomical role in stabilizing the lumbar spine, often compensates for weakened abdominal and paraspinal muscles during pregnancy, leading to muscle overactivity, spasm, and subsequent pain (3).

The findings of this study are consistent with the work of Bakilan and Zelveci (2020), who highlighted that musculoskeletal discomfort, particularly low back pain, tends to increase during pregnancy due to postural changes and biomechanical adaptations required to accommodate the growing fetus (5). Additionally, the study by Rabiee and Sarchamie (2018) emphasized that low back pain tends to worsen in different trimesters depending on the extent of muscular compensation and the biomechanical stress on the lumbar spine (2). The current study specifically focused on quadratus lumborum muscle stiffness, a relatively underexplored contributor to pregnancy-related low back pain, and established a strong correlation between tightness in this muscle and pain experienced during various activities, such as walking and stair climbing (6-9).

Despite the high prevalence observed in this study, several limitations must be acknowledged. One of the main limitations was the small sample size and the use of a convenient sampling technique, which may have affected the generalizability of the results. Additionally, the lack of baseline data on pre-existing musculoskeletal conditions in participants could have introduced confounding variables. Previous studies have reported that factors such as age, body mass index, and parity can also influence the prevalence of low back pain, making it challenging to isolate the impact of quadratus lumborum muscle stiffness alone (7-13). Another limitation was the reliance on subjective pain measures, which could have resulted in reporting bias.

Objective assessments, such as electromyography (EMG) for muscle activity, could have provided a more comprehensive understanding of the relationship between muscle stiffness and pain.

The study’s strength lies in its focus on a specific muscle group that has often been overlooked in previous research on pregnancy-induced low back pain. By evaluating quadratus lumborum muscle tightness, this research adds to the existing literature by highlighting the importance of targeted assessments and interventions for managing low back pain in pregnant women. The use of standardized measurement tools, such as the Visual Analog Scale and goniometer, ensured consistent assessment of pain intensity and range of motion, which contributed to the robustness of the findings. Furthermore, the study’s emphasis on evaluating pain during specific functional activities, such as walking and stair climbing, provides valuable insights into how quadratus lumborum tightness affects daily functioning in pregnant women (13-15).

Future studies should aim to include larger sample sizes and employ longitudinal designs to track changes in muscle tightness and low back pain across all trimesters of pregnancy. Incorporating a broader range of assessment tools, such as ultrasonography or MRI, would enhance the understanding of muscle morphology and its contribution to pain. Interventional studies are recommended to explore the effectiveness of specific physical therapy techniques, such as myofascial release, stretching, and stabilization exercises, in reducing quadratus lumborum tightness and alleviating pain. Additionally, educational programs focusing on postural correction, ergonomics, and physical activity modifications could help in preventing the onset of muscle tightness and associated low back pain during pregnancy.

CONCLUSION

In conclusion, this study confirmed a high prevalence of quadratus lumborum muscle tightness-induced low back pain among pregnant women during the second trimester and established a significant association between muscle tightness and pain. The findings suggest that quadratus lumborum stiffness plays a substantial role in pregnancy-related low back pain, particularly during activities requiring lumbar stabilization. Addressing this muscle’s tightness through targeted therapeutic interventions and patient education could improve maternal quality of life and reduce the burden of low back pain during pregnancy.

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