

PILOT DATA: ASSOCIATION BETWEEN GLUTEUS MEDIUS WEAKNESS AND LOW BACK PAIN DURING PREGNANCY

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ABSTRACT

This cross-sectional study examines whether there is an association between gluteus medius weakness in the presence of low back pain in pregnant women at any stage of gestation. Prevalence of low back pain during pregnancy is high, and identifying potential etiologies and targeted interventions is lacking. Thus, identification of an association between specific muscle weakness and pain would have clinical relevance. Initial pilot data suggests that weakness of the gluteus medius is strongly associated with the presence of low back pain during pregnancy.

INTRODUCTION

Low back pain during pregnancy is considered a significant public health issue due to its high prevalence and associated health care costs. Prevalence ranges between 49-68.5%^{2,13,14} with up to one third of these women having pain that limits their ability to perform basic activities of daily living.¹³ Ten percent of women with chronic low back pain link the onset of their pain to pregnancy.²⁷ Physical therapy literature and physical therapy clinical practice relating to low back pain in pregnancy has historically involved discussion of postural dysfunction, sacroiliac joint dysfunction, and “sciatica.” The authors of this proposal would like to offer another possible correlation explaining back pain during pregnancy relating to gluteus medius performance.

It is the experience of the authors of this proposal that pregnant women routinely present to our physical therapy clinic with “radiculopathy” or “sciatica.” In fact, the incidence of herniated disc in pregnancy is actually quite rare (1%).¹⁶ Often, the physical exam does not reveal any neurologic findings indicative of radiculopathy, but instead reveals weakness and/or strain of the gluteus medius. Gluteus medius strain can present as low back pain either due to facet joint irritation relating to Trendelenburg gait, or can be referred pain from the gluteus medius itself. If a true neurologic weakness were

present, one would expect to find both tensor fascia lata (TFL) and posterior gluteus medius (PGM) weak as they are commonly innervated (L5). Rather, in our experience weakness is specific to the gluteus medius. Foti et al. performed 3-dimensional gait analysis on 15 pregnant women during the second half of their pregnancy and again one year post-partum. Gait analysis includes both kinetic and kinematic parameters. The authors found significant changes in kinetic gait parameters during pregnancy, and offer this as an explanation for how gait motion overall remains relatively unchanged. They found increased demand on the ankle plantar flexors, hip abductors, and hip extensors.¹¹ Atrophied tissues, or weak muscles, are less tolerant of physical stresses applied.¹⁹ Pregnant women with weakness of the gluteus medius are therefore vulnerable for tissue injury—both because of the increased magnitude of stress applied (weight gain), and a decrease in stress tolerated before injury/strain.

Thus, the primary aim of this pilot study was to determine the association between weakness of the gluteus medius and the presence of low back pain during pregnancy.

METHODS

All women (pilot data with N = 65) underwent a basic physical examination by one of three blinded examiners (KB, DB, or DM). Standardization of muscle grading was done prior to the initiation of the study with several review sessions throughout the study. Physical exam involved supine passive straight leg raise (SLR) testing for neural tension, and manual muscle testing of the bilateral gluteus medius and tensor fascia lata. Tension signs were graded as absent/present. Muscle grading was based on the method described by Florence Kendall. Strength was graded as 0, 1, 2, 3, 4, or 5/5 then grouped as either ‘weak’ (3/5 or less) or ‘strong’ (4 or 5/5). Participants were recruited from private clinics and resident clinics at a tertiary care center. All participants were 18 years or older, and at any gestational stage. Exclusion criteria included non-English speaking women, incarcerated women, and women with any known history of neuromuscular disease (such as multiple sclerosis). All participants completed questionnaires (see Table 1) in addition to the aforementioned testing. Data was analyzed using Chi-squared to test significance of the

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TABLE 1				
	GM Left		GM Right	
	Strong (%)	Weak (%)	Strong (%)	Weak (%)
No Back Pain	19 (73.08)	9 (24.32)	19 (67.86)	9 (24.71)
Back Pain	7 (26.92)	28 (75.68)	9 (32.14)	26 (74.29)

association between weakness and pain, and Fisher’s exact test was applied when expected count of frequency table was small. Wilcoxon rank-sum test used to compare body mass index (BMI) and activity levels between those with low back pain (LBP) and without LBP (>0.05 is significant).

RESULTS

We identified a significant correlation between gluteus medius weakness and presence of low back pain. Gravid women were 8.44 times more likely to have low back pain if there was left gluteus medius weakness (p=0.0002, 95% CI is (2.68, 26.58)), and 6.10 times more likely to have low back pain if there was right gluteus medius weakness (p=0.0010, 95% CI is (2.04, 18.27)).

One individual was found to have a positive SLR. However, there were no neurologic findings on further exam (negative bowstring, normal/symmetric deep tendon reflexes, symmetric myotomal strength). While BMI was marginally positively correlated with severity of low back pain, women with LBP had gained more weight during pregnancy than those without LBP. This fits with weeks of gestation (those with low back pain have more weeks gestation, p=0.009).

DISCUSSION

As mentioned, prevalence of low back pain in pregnant women is high. Yet our knowledge is limited to descriptions of natural history. Unfortunately, most clinicians are limited in both work-up and treatment options due to the pregnancy. Often, women are advised to wait until after delivery for appropriate tests and treatment.

The rationale for postural change as a contributor to back pain during pregnancy involves increased lumbar lordosis with subsequent extension-related facet pain. Treatment is then guided toward improving posture, abdominal strengthening, and improved lumbopelvic stability. Lengthening of the abdominal muscles is a known consequence of a growing uterus, causing possible weakness of this musculature. It is thought that this lengthening and weakness contributes to poor lumbar stabilization and pain. Few studies exist showing a correlation between abdominal weakness and back pain in pregnant women. Fast et al. looked at rectus abdominus

function in terms of ability to perform a sit-up. They found no significant difference between performance of a sit-up and incidence of back pain.¹⁰ Moore et al. performed a longitudinal study of 30 pregnant women and found the line of gravity, measured using special markers along the spinous processes, to be unaffected for the majority of women. Those who did experience a change, tended toward flattening of the lumbar spine.¹⁸ Other studies have found no correlation between postural patterns and the presence of low back pain.^{7,11}

Sacroiliac joint dysfunction is a much debated issue in the physical therapy literature. There is disagreement relating to whether the sacroiliac joints are mobile, and if so, to what extent. An excellent review by Walker documents review of multiple articles citing greater tendency toward fracture than joint displacement with high impact injury.²⁹ This review also notes motion of the SI joint averaging about four degrees or three millimeters.²⁹ This brings into question whether this small amount of movement can be detected through physical exam alone. The discussion changes somewhat in the context of pregnancy, as there is known joint laxity around the pelvis. As the SI joint is not crossed by any muscle, we assume that stability is achieved through bony morphology and ligaments. During pregnancy, it is thought that the hormone relaxin contributes to the decreased strength of collagen. There appears to be conflicting evidence relating to whether a correlation exists between relaxin levels, pain, and SI joint movement/sympheseal distension.^{1,5,7,14,23} Specific provocative maneuvers to detect SI joint pain, as well as tests to determine symmetry/joint motion exist. However, at this time, reliability and validity of these tests does not appear sound, particularly in the case of detecting symmetry/abnormal joint motion.^{24,29}

CONCLUSION

Pregnant women with gluteus medius weakness were roughly 6 to 8 times more likely to have low back pain than those without weakness. There were no neurologic findings indicative of radiculopathy. This pilot data encourages us to continue this study with larger numbers. We also will consider a treatment trial looking to see if strengthening exercises prescribed at the first OB visit can reduce incidence of LBP.

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