OPEN ACCESS

Original Article

DOI: 10.55735/hjprs.v4i6.280

HJPRS

The Healer Journal of Physiotherapy and Rehabilitation Sciences

SCAN ME

Journal homepage: www.thehealerjournal.com

Assessment of Gluteus Maximus and Medius Weakness in Postpartum Females with Pelvic Pain

Tamknat Ilyas[1], Rabia Jawa[1], Rabia Majeed[1*], Saba Riaz[1], Syeda Mahrukh Gillani[1], Nida Hamid[1]

[1*]Department of Physical Therapy and Rehabilitation, University of Management and Technology, Lahore, Pakistan

KEYWORDS

Gluteus Maximus
Gluteus Medius
Pelvic Pain
Trendelenburg Sign
Visual Analogue Scale

DECLARATIONS

Conflict of Interest: None
Funding Source: None

CORRESPONDING AUTHOR

Rabia Majeed
University of Management and Technology, Lahore, Pakistan.
rabia.majeed@umt.edu.pk

ABSTRACT

Background: In postpartum females, pelvic pain is a common issue that can significantly impact daily functioning and quality of life. Weakness in the gluteus maximus and medius muscles impacts pelvic stability and movement and may cause pain. **Objective:** To assess gluteus maximus and medius weakness in postpartum females with pelvic pain. **Methodology:** This cross-sectional study was done on 196 postpartum females. Data was collected from different hospitals in Lahore. Participants with an age range above 18 years who had postpartum in the previous three months were selected for this study. Participants with any history of trauma, cancer, disability or any prior history of pelvic floor muscle tear of grade 3 or 4 were excluded. Data was collected using a visual analogue scale, Trendelenburg test, and hip-prone extension test. The quantitative variables were present as mean and standard deviation, range and histogram. Categorical variables were presented as frequencies, percentages, cross-tabulation, bar charts and pie charts. The chi-square test was applied to see the association between categorical variables. **Results:** The mean age of participants was 29.36±4.37. The Trendelenburg sign test revealed that 74.5% of participants showed positive results on the right leg side and 69.4% showed positive results on the left leg side. Additionally, 34.7% of participants exhibited positive results on the hip-prone extension test for the right gluteus maximus, while 37.2% showed positive results for the left gluteus maximus. The visual analogue scale indicated that varying degrees of pain were reported by participants, with 10.7% reporting no pain and 17.3% reporting the worst possible pain. Mild to severe pain levels were reported by the remaining participants. Significant associations were found between gluteus medius and gluteus maximus weakness with gravida, as well as pelvic pain, for the right leg ($p<0.05$). **Conclusion:** The study concludes that there is an association between gluteus medius and gluteus maximus muscle weakness in postpartum females with pelvic pain.

How to cite the article: Majeed R, Gillani SM, Khawar L, Hamid N, Larain S, Hussain G. Assessment of Gluteus Maximus and Medius Weakness in Postpartum Females with Pelvic Pain. The Healer Journal of Physiotherapy and Rehabilitation Sciences. 2024;4(6):16-21.

INTRODUCTION

The body during pregnancy goes through many changes which proceed in the postpartum stage as well.[1] Laxity of joints and excessive abdominal muscle weakness start from the period of pregnancy and continue in the puerperium period.[2] Puerperium period duration which starts at the time of delivery of the placenta and lasts for a few weeks after the delivery. The duration of the puerperium period is usually 6 weeks. It is also known as the postpartum period or the postnatal period.[3] It is seen that postpartum females go through many factors like biomechanical stress, and hormonal and musculoskeletal changes.[4] During childbirth, women go through many changes which also include changes in muscle tone of the pelvis which includes gluteus medius and gluteus maximus.[5]

Normal delivery plays a significant role in weakening these muscles as vaginal birth involves excessive stretching of these muscles. This over-stretching also increases the risk of developing postpartum pelvic pain. It was seen that over-stretching of the gluteal muscles causes alteration in the normal biomechanics of the pelvis. This impacts the stability of the pelvis and limits the activities like lifting, standing and walking. This alters the normal biomechanics causing stress on other muscles leading towards low back pain.[6] Problems such as sacroiliac joint dysfunction also occur as a result of the weakness of the gluteus medius muscle which causes altered mechanics and enhances pelvic pain.[7] In some studies, it was also seen that problems like urinary incontinence and pelvic organ prolapse can also occur as a result of gluteus muscle weakness.[8]

During postpartum many women experience pelvic pain which might impact their quality of life and activity of daily living. Pelvic pain in postpartum females is multifactorial and involves hormonal, musculoskeletal, and biomechanical factors.[9] Pelvic pain is described as discomfort between the hips in the lower abdominal area. Issues like musculoskeletal strain, dysfunction of the pelvic floor muscles and problems like ovarian cysts or endometriosis lead towards this pain.[10] Additionally, it is more common among women who have undergone childbirth. Pelvic pain is considered a major health-related issue among pregnant women.[11] Its prevalence is from 5.7% and 26.6% according to research.[12] It was seen that around one-third of the females have limited activities of daily living due to this pain.[13] It was seen that as the weight of the baby increases during pregnancy more stress is placed on the pelvis which may lead to pain. This pain may be caused after vaginal childbirth due to delivery trauma. This trauma causes muscles to go in spasm which can cause pelvic pain.[14] Recent studies have shown that vaginal and C-section delivery both have shown similar prevalence of pelvic pain after delivery. This prevalence was common among women who had given birth to a baby with more than 4 kg weight.[15] It is seen that weakness in the gluteus maximus and medius muscles can contribute to pelvic pain which affects the pelvic stability and its alignment.[16]

These muscles play a very crucial role in stabilizing the pelvis and in supporting proper movement patterns during activities like walking, running, and climbing stairs.[17] When the gluteal muscles are weak other muscles compensate which leads towards an imbalance in the pelvic region. As a result increased stress on the pelvis, hips, and lower back is seen which causes pain and discomfort in the pelvic region.[18] Additionally, there is a lack of comprehensive understanding regarding the role of gluteus maximus and medius weakness in contributing to this pain. Therefore, this study is conducted to evaluate the assessment of the prevalence and severity of weakness of gluteus maximus and medius in postpartum females with pelvic pain which will help in understanding the normal physiology and might help in improving the quality of life among postpartum females.

METHODOLOGY

Approval for this cross-sectional study was obtained from the institutional review board under letter number RE-024-2024. This observational study was conducted on 196 post-partum females in Mansoorah Hospital, Sheikh Zayed Hospital, and Central Park Teaching Hospital from December 2023 to May 2024. Non-probability convenient sampling techniques were used. The sample size of 196 was calculated from this formula with Epitool at a 95% confidence interval $n = \frac{Z^2_{1-\alpha/5} P(1-P)}{d^2}$

Participants with an age greater than or equal to

18 with a child delivery period of 3 months and with pain above 5 on a visual analogue scale were included in this study. Patients were excluded if there were chronic pelvic pain and pelvic tear grade III/IV. After taking informed written consent, data were collected. For data collection visual analogue scale was used to assess the intensity of the pelvic girdle pain. The Trendelenburg sign test was used for gluteus medius muscle weakness and the hip prone extension test for gluteus maximus weakness. The visual analogue scale (VAS) is a known pain assessment scale, it has a scoring range from 0 to 10 where 0 shows no pain and 10 shows worst pain.[19] Tredelenburg sign test is a test used for hip dysfunction to assess hip abductor muscle weakness. It is a fast physical examination in which the gait pattern of the person is assessed. In this test contralateral side pelvis drop is seen during a single leg stand and compensation of truck side flexion is observed.

These signs indicate a positive test which represents weakness of gluteus minimus and gluteus maximus.[20] Hip-prone extension test is a simple method to assess the hip extensors. In this test patient is asked to lift the leg towards to ceiling while lying in a prone position by keeping the knee flexed. Failure to do this test results in the positive sign which shows weakness of the gluteus maximus muscle.[21] Before asking questions importance of this study was explained and written consent was taken from the participants. To analyze the data collected IBM SPSS STATISTICS-26.0 was used. The quantitative variables were present as mean and standard deviation, range and histogram. Categorical variables were presented as frequencies, percentages, cross-tabulation, bar charts and pie charts. After obtaining informed written consent, data was collected through a visual analogue scale, Trendelenburg test and hip prone extension test. The chi-square test was applied to see the association between categorical variables.

RESULTS

The result of the analysis showed that the mean value of age was 29.36±4.37 with 126(64.3%) participants who were primiparous and the remaining 70(35.7%) were multiparous. The findings showed that 146(74.5%) people showed the weakness in gluteus medius of the right leg and 55(28.1%) showed that in gluteus medius of the left leg according to Trendelenburg Sign. Similarly, 68(34.7%) postpartum females showed weakness of the gluteus maximus in the right leg and 8(4.1%) showed the weakness of gluteus maximus in the left leg. It was seen that 21(10.7%) participants showed no pain, 46(23.5%) showed mild pain, 43(21.9%) showed moderate pain, 35(17.9%) had severe pain, 34(17.3%) had very severe pain and remaining 17(8.7%) showed worst pain possible according to VAS.

The chi-square analysis showed that pain intensity of the pelvic girdle showed a relationship with the gluteus medius and gluteus maximus weakness of the right leg ($p<0.05$). Additionally, gravida also showed a relationship with gravida where more cases of multiparous were seen of positive weakness of the gluteal muscle, $p<0.05$. On the contrary, gluteus medius muscle showed a relationship with pain intensity, $p<0.05$, but no relationship was found between gluteus Medius weakness, $p>0.05$. Similarly, no association was seen between gluteus maximus weakness with pain intensity $p>0.05$.

Figure 1: Descriptive statistics of age

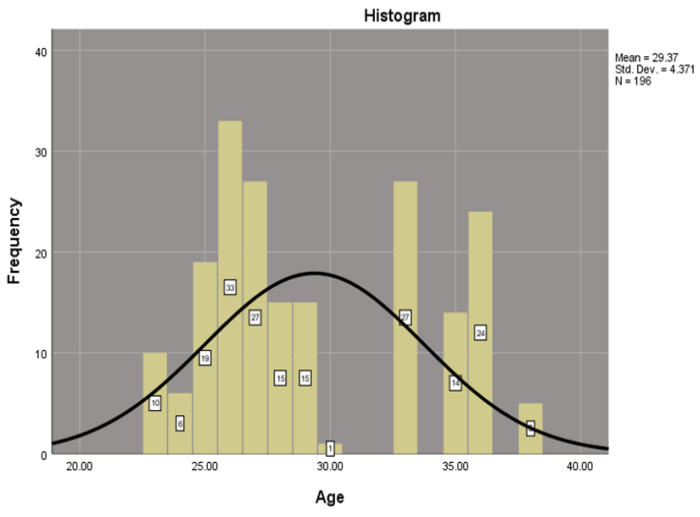

Figure 2: Visual Analogue Scale

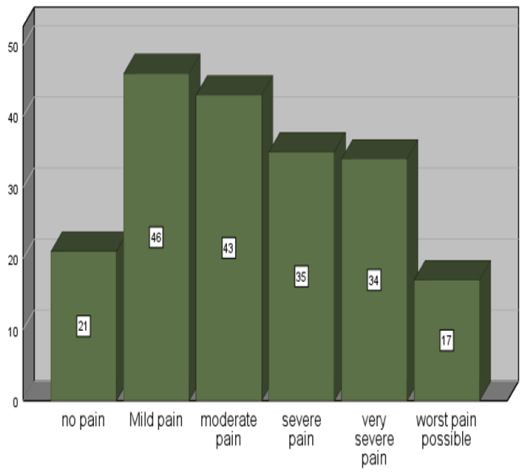

Table 1: Trendelenburg sign test for gluteus Medius right /left leg * visual analogue scale

		No pain	Mild pain	Moderate pain	Severe pain	Very severe pain	Worst pain possible	Total	p-value
Trendelenburg sign test for gluteus medius right leg	+ive	0	36 (24.6)	41 (28.0)	19 (13.0)	34 (23.2)	16 (10.9)	146	.000
	-ive	21 (0.42)	10 (20.0)	2 (4.0)	16 (32.0)	0 (0.0)	1 (2.0)	50	
Trendelenburg sign test for gluteus medius left leg	+ive	0	14 (25.4)	16 (29.0)	7 (12.7)	13 (23.6)	5 (9.09)	55	.023
	-ive	21(14.8)	32 (22.6)	27 (19.1)	28 (19.8)	21 (14.8)	12 (8.51)	141	
Total		21	46	43	35	34	17	196	

Table 2: Hip prone extension test for gluteus maximus right/ left leg * visual analogue scale

		No pain	Mild pain	Moderate pain	Severe pain	Very severe pain	Worst pain possible	Total	p-value
Hip-prone extension test for gluteus maximus left leg.	+iv	0	1 (12.5)	2 (25)	1 (12.5)	3 (37.5)	1 (12.5)	8	0.611
	-ive	21 (11.1)	45 (23.9)	41 (21.8)	34 (18)	31 (16.4)	16 (8.51)	188	
Hip prone extension test for gluteus maximus right leg	+ive	0	0	2 (2.9)	19 (27.9)	31 (45.5)	16 (23.5)	68	.000
	-ive	21 (16.4)	46 (35.9)	41 (32.0)	16 (12.5)	3 (2.3)	1 (0.78)	128	
Total		21	46	43	35	34	17	196	

DISCUSSION

Many studies have discussed the weakness of gluteal muscles in pelvic pain. Many debating results were previously done based on similar findings. Jennifer J. Bagwell et al in 2024 conducted a study. In this research gluteus maximus and gluteus medius were assessed during the swing and stance phase within pre and post-pregnant women. It was seen that weakness of the gluteus medius was seen as there was a smaller swing phase in post-pregnancy state women in comparison with other women. It was seen that hip muscles like gluteus medius and maximus showed rigidity during pelvic motion ($p<0.05$).[22] On the contrary, in our study, it was seen that postpartum females showed weakness in gluteus medius and gluteus maximus. With 74.5% positive cases of gluteus medius weakness of the right leg and 69.4% positive cases of gluteus medius weakness of the left leg. Similarly, 34.7% of cases of gluteus maximus weakness were seen in the right leg and 37.2% of left-leg positive cases were seen. This study also shows that among postpartum females weakness of gluteus medius and gluteus maximus muscle occur. Krista G. Meder et al study stated that weakness of the gluteus medius and maximus occurs during the gravida stage.

Multiparous participants are more likely to have weak gluteus muscles ($p<0.05$). It was seen that nulliparous women showed fewer cases of gluteus medius and maximus muscle.[23] Similarly, in this study, similar findings were stated that weakness of gluteus medius and Maximus had a relationship

with gravida for both the left and right leg ($p<0.05$). It is due to the gluteus medius and gluteus maximus muscles' important role in supporting the pelvis and lower back in pregnancy. As the uterus expands and the center of gravity shifts forward gluteus muscles help stabilize the pelvis and maintain balance. Additionally, these muscles are involved in activities like walking, standing, and lifting which pregnant individual do throughout their pregnancy.[24] In another study, Jennifer J. Bagwell et al in 2022 stated that weakness of gluteus medius and gluteus maximus causes pelvic girdle pain which leads towards low back pain ($p<0.001$). Based on the findings it was stated that pelvic pain occurs due to the increased weight of the fetus during the third trimester which impacts the gait and normal biomechanics of the pregnant women.[25] On the contrary, in this study, postpartum females were assessed.

This study result also showed that there is a relationship between gluteus maximus and gluteus medius weakness of both legs among postpartum females with pelvic pain ($p<0.05$). It was further seen that in postpartum women this pain is due to the birth process which disturbs the normal mechanics of the pelvis and stretches the pelvic muscles beyond its limit which leads towards weakness of this muscle and ultimately can cause pelvic girdle pain. This research was a cross-sectional study design so a detailed relationship between weaknesses of gluteal muscles in postpartum pelvic pain females couldn't be properly explored. Gluteal muscle weakness was only assessed by physical tests whose sensitivity towards gluteal muscle weakness assessment was not quite known. This might have impacted the efficacy of the results. Further study can be done in analyzing gait and walking stance with the help of EMG to further explore this relationship between pelvic pain and weakness of gluteal muscles to enhance the efficacy of the findings even more. Additionally, future research can be done to explore targeted interventions aimed at strengthening these muscles and reducing pelvic pain in postpartum females.

CONCLUSION

Based on the findings of this study it was concluded that that there is a significant association between weakness in the gluteus medius and maximus muscles and loss of function in postpartum females with pelvic pain. Additionally, it shows varying intensities of pelvic pain experienced by these pelvic pain women. These findings highlight the importance of assessing and addressing gluteal muscle weakness in postpartum care to potentially alleviate pelvic pain and improve overall function in this population.

DECLARATIONS

Consent to participate: Written consent had been taken from patients. All methods were performed following the relevant guidelines and regulations.
Availability of data and materials: Data will be available on request. The corresponding author will submit all dataset files.
Competing interests: None
Funding: No funding source is involved.
Authors' contributions: All authors read and approved the final manuscript.
Acknowledgements: We want to give special regard to Dr. Linta Khawar and Dr. Saba Laraib from the Department of Physical Therapy and Rehabilitation, University of Management and Technology, Lahore, Pakistan for their outstanding contribution in our work.

REFERENCES

1. Ferreira VB, Iuamoto LR, Hsing WT. Multidisciplinary management of musculoskeletal pain during pregnancy: A review of the literature. Journal of the International Society of Physical and Rehabilitation Medicine 2021; 4(2): 63-9.
2. Wakkar A, Patil SP. Assessment of knee and ankle proprioception during the third trimester of pregnancy and postpartum period among primiparous women: An observational longitudinal study. Journal of Education and Health Promotion 2022; 11.
3. Martínez-Galiano JM, Hernández-Martínez A, Rodríguez-Almagro J, Delgado-Rodríguez M, Rubio-Alvarez A, Gómez-Salgado J. Women's quality of life at 6 weeks postpartum: influence of the discomfort present in the puerperium. International Journal of Environmental Research and Public Health 2019; 16(2): 253.
4. Donnelly GM, Brockwell E, Rankin A, Moore IS. Beyond the musculoskeletal system: considering whole-systems readiness for running postpartum. The Journal of Women's & Pelvic Health Physical Therapy 2022; 46(1): 48-56.
5. Moore IS, James ML, Brockwell E, Perkins J, Jones AL, Donnelly GM. Multidisciplinary, biopsychosocial factors contributing to return to

running and running related stress urinary incontinence in postpartum women. British Journal of Sports Medicine 2021; 55(22): 1286-92.
6. Ashton-Miller JA, DeLancey JO. Mechanisms of pelvic floor trauma during vaginal delivery. Pelvic Floor Disorders: A Multidisciplinary Textbook 2021: 189-209.
7. Baik S-m, Cynn H-s, Kim S-h. Understanding and exercise of gluteus medius weakness: A systematic review. Physical Therapy Korea 2021; 28(1): 27-35.
8. Temme KE, Pan J. Musculoskeletal approach to pelvic pain. Physical Medicine and Rehabilitation Clinics 2017; 28(3): 517-37.
9. Zarawski M, Kołomańska-Bogucka D, Maj M, Panicz D, Opławski M, Mazur-Biały A. The impact of pelvic floor exercises on the quality of life of women with urinary incontinence: analysis of pregnancy and the postpartum period. Journal of Novel Physiotherapy and Physical Rehabilitation 2017; 4(2).
10. Bordoni B, Sugumar K, Leslie SW. Anatomy, abdomen and pelvis, pelvic floor. 2018.
11. Blomquist JL, Muñoz A, Carroll M, Handa VL. Association of delivery mode with pelvic floor disorders after childbirth. JAMA 2018; 320(23): 2438-47.
12. Ahangari A. Prevalence of chronic pelvic pain among women: an updated review. Pain Physician 2014; 17(2): E141-E7.
13. Cooper NA, Scavo KM, Strickland KJ, et al. Prevalence of gluteus medius weakness in people with chronic low back pain compared to healthy controls. European Spine Journal 2016; 25: 1258-65.
14. de Sousa VPS, Cury A, Eufrásio LS, de Sousa SES, Coe CB, de Souza Ramalho Viana E. The influence of gestational trimester, physical activity practice and weight gain on the low back and pelvic pain intensity in low-risk pregnant women. Journal of Back and Musculoskeletal Rehabilitation 2019; 32(5): 671-6.
15. Barca JA, Bravo C, Pintado-Recarte MP, et al. Pelvic floor morbidity following vaginal delivery versus cesarean delivery: systematic review and meta-analysis. Journal of Clinical Medicine 2021; 10(8): 1652.
16. Pereira BM, Castro MPd, Sanchotene CG, Ruschel C, Santos GM. Muscle activation in pelvic anteversion and retroversion. Fisioterapia em Movimento 2021; 34: e34118.
17. Buckthorpe M, Stride M, Della Villa F. Assessing and treating gluteus maximus weakness–a clinical commentary. International Journal of Sports Physical Therapy 2019; 14(4): 655.
18. Tim S, Mazur-Bialy AI. The most common functional disorders and factors affecting female pelvic floor. Life 2021; 11(12): 1397.
19. Alfonsin MM, Chapon R, de Souza CA, Genro VK, Mattia MM, Cunha-Filho JS. Correlations among algometry, the visual analogue scale, and the numeric rating scale to assess chronic pelvic pain in women. European Journal of Obstetrics & Gynecology And Reproductive Biology: X 2019; 3: 100037.
20. Gogu S, Gandbhir VN. Trendelenburg sign. 2020.
21. Goodwin JE, Bull AM. Novel assessment of isometric hip extensor function: reliability, joint angle sensitivity, and concurrent validity. The Journal of Strength & Conditioning Research 2022; 36(10): 2762-70.
22. Bagwell JJ, Avila E, Reynolds N, Smith JA, Valenzuela K, Katsavelis D. Running Biomechanics Differ During and After Pregnancy Compared to Females Who Have Never Been Pregnant. Gait & Posture 2024.
23. Meder KG. The Effect of Asymmetry on Pregnancy-Related Pain in the Postpartum Period: West Virginia University; 2018.
24. Bewyer KJ, Bewyer DC, Messenger D, Kennedy CM. Pilot data: association between gluteus medius weakness and low back pain during pregnancy. The Lowa Orthopaedic Journal 2009; 29: 97.
25. Bagwell JJ, Reynolds N, Smith JA, et al. An exploratory analysis of gait biomechanics and muscle activation in pregnant females with high and low scores for low back or pelvic girdle pain during and after pregnancy. Clinical Biomechanics 2022; 97: 105705.