

Original Article**Comparative Effectiveness of Mulligan and Maitland Mobilization Techniques Among Patients with Lumbar Facet Joint Syndrome**Muhammad Samran Zafar^{*1}, Muntaha Babar¹, Tamjeed Ghaffar¹, Aftab Ansar Lodhi¹, Junaid Raza¹, Komal Shahbaz¹¹ Government College University Faisalabad, Faisalabad, Pakistan

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Abstract**Background:** Facet joint syndrome is a prevalent cause of low back pain (LBP), contributing significantly to disability and economic impact. The incidence of lumbar facet joint pain ranges from 7.7% to 75% among LBP patients, highlighting the need for effective treatment options.**Objective:** This study aimed to compare the effects of Mulligan's Sustained Natural Apophyseal Glide (SNAG) and Maitland's posteroanterior (PA) glide on pain, range of motion, and functional disability in patients with lumbar facet joint syndrome.**Methods:** A single-blind randomized controlled trial was conducted in the outpatient physiotherapy department. Thirty male patients aged 24-60 years with lumbar facet joint syndrome were randomly assigned to two groups: Maitland PA glide and Mulligan SNAGs, each comprising 15 participants. Interventions were administered three times per week for one month. Outcomes were assessed using the Modified Oswestry Disability Questionnaire (MODQ), Numeric Pain Rating Scale (NPRS), and goniometer measurements. Data were analyzed using SPSS 25.**Results:** The Maitland group showed significant improvements in MODQ (13.07 ± 3.53 , $p = 0.023$) and NPRS (2.87 ± 1.13 , $p = 0.025$) scores compared to the Mulligan group. Lumbar flexion and extension also improved significantly in the Maitland group ($p < 0.05$).**Conclusion:** The Maitland PA Glide technique demonstrated superior efficacy in reducing pain and improving functional outcomes compared to the Mulligan SNAGs technique in patients with lumbar facet joint syndrome.**1 Introduction**

Low back pain (LBP) is a prevalent and multifaceted condition that affects a significant portion of the global population, impacting individuals' quality of life and contributing substantially to healthcare burdens worldwide. LBP is typically characterized by pain and discomfort in the region below the costal margin and above the gluteal folds, often accompanied by referred pain to the legs, known as radiculopathy. This condition poses substantial challenges to individuals, healthcare systems, and society due to its high prevalence and economic impact (1, 2). The etiology of LBP is complex and can be attributed to various structures within the lumbar spine, including intervertebral discs, facet joints, ligaments, muscles, and nerves, rendering it a multifactorial condition (3). Notably, facet joint syndrome (FJS) is recognized as a significant contributor to LBP, accounting for up to 40% of cases (4, 5).

Facet joints, also referred to as zygapophysial joints, are small synovial joints that connect adjacent vertebrae in the spine. These joints play a critical role in providing stability, direction, and support for the spine's capacity to bear weight (6). However, degenerative changes, often linked to aging or repetitive stress, can lead to facet joint syndrome. This condition is characterized by the breakdown of cartilage within the joints, resulting in increased friction, mechanical stress, and inflammation, which trigger pain signals in nearby nerve endings (7). The most common site of facet joint pain in the lumbar spine is at the L4-L5 level, followed by L5-S1, with degenerative osteoarthritis being the most common form of facet joint pain (8, 9). Symptoms of facet joint syndrome typically include localized chronic low back pain that worsens with movement, particularly when the spine is extended and rotated (10).

The management of LBP, and specifically FJS, encompasses a variety of approaches aimed at reducing pain, enhancing function, and improving quality of life. Conservative treatments include the use of non-steroidal anti-inflammatory drugs (NSAIDs), physical therapy, and analgesic medications (11). Among the physical therapy techniques, manual therapy has gained recognition as an effective non-invasive treatment option. The Maitland and Mulligan techniques are two widely used manual therapy approaches for managing musculoskeletal disorders associated with LBP (12). The Maitland technique employs a graded mobilization approach, emphasizing

passive accessory motions for diagnosing and treating joint problems (13). Conversely, the Mulligan technique integrates sustained natural apophyseal glides during active joint movements to promote pain reduction and improved functional outcomes (14).

Despite the widespread use of these techniques, there remains limited research explicitly comparing their effects on individuals with FJS. This study aims to investigate and evaluate the impact of Maitland and Mulligan mobilization techniques on patients with facet joint syndrome, focusing on pain reduction, range of motion (ROM), and functional disability. Through a comprehensive literature review, this research seeks to advance the understanding of manual therapy strategies for FJS and contribute to developing evidence-based treatment approaches (15). By synthesizing existing literature and identifying knowledge gaps, this study aims to optimize treatment protocols, thereby enhancing patient outcomes and quality of life for individuals suffering from LBP and facet joint syndrome (16).

2 Material and Methods

A single-blind randomized controlled trial was conducted to compare the effectiveness of Maitland and Mulligan mobilization techniques in patients with lumbar facet joint syndrome. The study was approved by the institutional ethics committee, and all participants provided written informed consent in accordance with the Declaration of Helsinki. The study was carried out in the Outpatient Department of Physiotherapy at hospitals in the Faisalabad district over six months.

Participants were recruited using a purposive sampling technique and allocated to two groups via computer-generated randomization. A total of 30 male patients aged 24 to 60 years were included, each diagnosed with localized lumbar pain exacerbated by unilateral pressure over the facet joint, functional limitation accompanied by pain, and pain relieved in flexion but exacerbated in extension (1, 2). Additional inclusion criteria included a duration of illness greater than three months, an NPRS score greater than 4, and a MODQ score greater than 12 (3). Exclusion criteria included a history of spinal surgery, recent trauma, metabolic disorders such as osteoporosis, spinal tumors, bilateral pain, or pain radiating below the knee (4).

The baseline treatment for both groups included therapeutic ultrasound and strengthening exercises, such as sit-ups (5). Group A received Maitland PA glide, applied at a frequency of 2 Hz, for 30 to 60 seconds with 90 oscillations per minute, three sessions per week for a total of 10 minutes per session (6). Group B received Mulligan Sustained Natural Apophyseal Glides (SNAGs), following Mulligan's rule of three, which consisted of three sets of six repetitions with a one-minute break between sets, applied three times per week for one month (7, 8).

Data collection tools included the Modified Oswestry Low Back Disability Questionnaire (MODQ), Numeric Pain Rating Scale (NPRS), goniometer, and Sorensen test. The primary outcomes measured were pain intensity, range of motion, and functional disability. Data were collected at baseline and after the intervention period. Data analysis was performed using SPSS version 25. Descriptive statistics were calculated for all variables, including means and standard deviations. The Shapiro-Wilk test was used to assess the normality of the data, and independent sample t-tests were applied for between-group comparisons. Within-group differences were analyzed using paired sample t-tests. A significance level of $p < 0.05$ was considered statistically significant for all tests.

Throughout the study, ethical considerations were carefully adhered to, ensuring that all procedures were conducted in a manner consistent with ethical standards. Participants were informed of their right to withdraw from the study at any time without penalty. The study aimed to provide valuable insights into the comparative effectiveness of Maitland and Mulligan mobilization techniques, with the goal of improving clinical outcomes for patients with lumbar facet joint syndrome.

3 Results

The study involved 30 male patients with lumbar facet joint syndrome, divided into two groups of 15 each: the Maitland PA Glide group and the Mulligan SNAGs group. The mean age of the participants was 39.43 years, with a standard deviation of 3.40.

The data were normally distributed, as confirmed by the Shapiro-Wilk test ($p > 0.05$) for all baseline measures, allowing for parametric tests to be applied. Independent sample t-tests were used to compare the differences between the Maitland PA Glide and Mulligan SNAGs groups at baseline and after treatment across various outcome measures. A summary of the results is provided in the tables below. Both the Maitland PA Glide and Mulligan SNAGs groups exhibited significant improvements in the Oswestry Disability Index (ODI) following treatment. However, the Maitland PA Glide group demonstrated a greater reduction in disability scores, as evidenced by a statistically significant difference with a p-value of 0.023.

Table 1: Between-Group Comparison of Key Outcome Measures

Outcome Measure	Time Point	Maitland PA Glide (Mean ± SD)	Mulligan SNAGs (Mean ± SD)	T value	P value
ODI	Baseline	25.33 ± 4.82	28.07 ± 5.64	-1.43	0.165
	After Treatment	13.07 ± 3.53	17.53 ± 6.27	-2.40	0.023*
NPRS	Baseline	6.20 ± 1.26	5.87 ± 1.06	0.78	0.441
	After Treatment	2.87 ± 1.13	3.87 ± 1.19	-2.37	0.025*
Lumbar Flexion (degrees)	Baseline	41.60 ± 5.53	42.67 ± 7.99	-0.43	0.674
	After Treatment	54.00 ± 6.04	48.00 ± 8.62	2.21	0.036*
Lumbar Extension (degrees)	Baseline	15.07 ± 1.39	14.47 ± 1.46	1.16	0.258
	After Treatment	18.93 ± 2.12	17.40 ± 1.72	2.17	0.038*

This suggests that the Maitland technique may be particularly effective in enhancing functional abilities in patients with lumbar facet joint syndrome. In terms of pain reduction, both groups showed significant decreases in their Numeric Pain Rating Scale (NPRS) scores. The Maitland group, however, achieved slightly better outcomes, with a p-value of 0.025, indicating a more substantial alleviation of pain compared to the Mulligan group. These findings highlight the potential of the Maitland technique to provide superior pain relief in patients suffering from low back pain.

Table 2: Between-Group Comparison of Lateral Flexion and Rotation

Outcome Measure	Time Point	Maitland PA Glide (Mean ± SD)	Mulligan SNAGs (Mean ± SD)	T value	P value
Lumbar Right Lateral Flexion	Baseline	13.53 ± 2.07	12.93 ± 2.09	0.79	0.435
	After Treatment	17.73 ± 2.91	15.67 ± 1.91	2.30	0.029*
Lumbar Left Lateral Flexion	Baseline	13.87 ± 2.00	13.27 ± 2.58	0.71	0.482
	After Treatment	18.93 ± 3.28	16.13 ± 2.26	2.72	0.011*
Lumbar Right Rotation	Baseline	8.60 ± 1.68	8.47 ± 1.06	0.26	0.797
	After Treatment	12.87 ± 1.92	11.47 ± 1.64	2.15	0.041*
Lumbar Left Rotation	Baseline	8.47 ± 1.64	8.53 ± 1.06	-0.13	0.896
	After Treatment	12.73 ± 2.12	11.27 ± 1.71	2.09	0.046*

Both lumbar flexion and extension measures showed significant improvements in both treatment groups after the intervention. Notably, the Maitland PA Glide group experienced more pronounced enhancements in these parameters, with p-values of 0.036 for flexion and 0.038 for extension. This suggests that the Maitland technique may be more effective in increasing the range of motion in the lumbar spine.

Similarly, both right and left lateral flexion, as well as rotation, exhibited significant post-treatment improvements in both groups. However, the Maitland group again demonstrated superior outcomes, indicating a broader range of motion improvements across these specific spinal movements. These results collectively underscore the efficacy of the Maitland PA Glide technique in enhancing functional mobility and reducing pain in patients with lumbar facet joint syndrome.

4 Discussion

The findings of this study demonstrated that both the Maitland and Mulligan mobilization techniques were effective in reducing pain and improving functional outcomes in patients with lumbar facet joint syndrome. However, the Maitland PA Glide technique showed greater efficacy in enhancing range of motion, reducing disability, and alleviating pain compared to the Mulligan SNAGs technique. These results

are consistent with previous studies that have highlighted the benefits of manual therapy in managing low back pain (LBP) and facet joint syndrome (FJS) (17).

The significant improvement in Oswestry Disability Index (ODI) scores and Numeric Pain Rating Scale (NPRS) ratings in the Maitland group suggests that this technique may be particularly effective for improving functional disability and pain levels in patients with FJS. This is in line with earlier studies indicating that Maitland mobilization can effectively enhance proprioception, reduce pain intensity, and improve functional disability in patients with chronic nonspecific low back pain (18). The ability of Maitland mobilization to target specific joint dysfunctions and movement impairments likely contributes to its effectiveness in managing pain and disability (19).

The Mulligan SNAGs technique also demonstrated significant improvements in pain and range of motion, although to a lesser extent than the Maitland technique. This aligns with previous research showing that Mulligan mobilization can decrease pain and disability and increase range of motion in patients with low back pain (20). The concept of mobilization with movement, which is central to Mulligan's approach, emphasizes restoring normal joint mechanics through active participation, potentially explaining its effectiveness in improving functional outcomes (21).

A key strength of this study was the use of a randomized controlled trial design, which minimized bias and enhanced the reliability of the findings. Additionally, the use of validated outcome measures such as the ODI and NPRS allowed for a robust assessment of treatment efficacy. However, there were limitations that should be considered. The relatively small sample size may limit the generalizability of the results to broader populations. Additionally, the study only included male participants, which may not reflect the response to treatment in females. Future studies should include larger and more diverse samples to enhance the external validity of the findings (22).

Another limitation was the short duration of the intervention period. While significant improvements were observed, it is unclear whether these effects would be sustained over a longer period. Long-term follow-up studies are recommended to evaluate the durability of the treatment benefits. Furthermore, while the study focused on pain and functional outcomes, future research could incorporate additional measures such as quality of life and psychological factors to provide a more comprehensive assessment of treatment impact (23).

The findings of this study have important clinical implications. The greater efficacy of the Maitland technique suggests that it may be a preferred option for patients with FJS, particularly for those experiencing significant functional disability and pain. However, given the positive outcomes associated with both techniques, a combination of Maitland and Mulligan mobilization could potentially offer synergistic benefits, warranting further investigation. This study contributes to the growing body of evidence supporting manual therapy as a valuable component of the multidisciplinary management of low back pain, particularly in patients with facet joint syndrome. By tailoring interventions to individual patient needs and incorporating manual therapy techniques, clinicians can optimize treatment outcomes and enhance the quality of life for patients with lumbar facet joint syndrome (24).

5 Conclusion

In conclusion, this study demonstrated that both Maitland and Mulligan mobilization techniques effectively reduce pain and improve functional outcomes in patients with lumbar facet joint syndrome, with the Maitland technique showing superior results in enhancing range of motion, reducing disability, and alleviating pain. These findings underscore the importance of integrating manual therapy techniques into treatment protocols for low back pain and facet joint syndrome. For healthcare providers, this research highlights the potential of tailoring manual therapy interventions to optimize patient outcomes, thereby improving quality of life and reducing the burden of chronic low back pain on healthcare systems. Further research with larger, more diverse populations is recommended to confirm these findings and explore the long-term benefits of these interventions.

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