Effects Of Maitland Mobilization And Mckenzie Exercises In Sacroiliac Joint Dysfunction

Hussain Ghulam[1], Raee S Alqhtani[1], Muhammad Yaseen Mughal[1], Noman Ahmed[2], Abdullah Mohammad Alyami[1], Yousef Hamad Hassan Al Sharyah[1], Ahmed Asiri[1]

[1]Department of Physical Therapy, Faculty of Applied Medical Sciences, Najran University, Najran, Saudi Arabia.
[2]Isra Institute of Rehabilitation Sciences, Isra University Karachi Campus, Pakistan.

ABSTRACT

Aim of Study: This study aimed to investigate the effects of two distinct interventions, Maitland Mobilization and McKenzie exercises, on individuals suffering from Sacroiliac Joint Dysfunction (SIJD).

Material and Methods: Over a 10-month period, an experimental investigation was conducted at the Body Expert Physical Therapy Clinic, enrolling 60 male and female participants aged 18 to 60 years, all experiencing sacroiliac joint pain. Participants exhibited acute or sub-acute pain lasting 4 to 12 weeks and met specific diagnostic criteria. Patients with certain medical conditions were excluded. The participants were randomly assigned to either Group A (Maitland Mobilization) or Group B (McKenzie exercises). Pre- and post-treatment assessments were conducted, and patient data was collected using various measures, including the Visual Analogue Scale (VAS) for pain assessment and the Oswestry Disability Index (ODI) for disability evaluation. Both groups also received a standard 20-minute hot therapy session.

Results: The results demonstrated significant improvements in pain levels, lumbar flexion, lumbar extension, and disability scores for both groups <0.05. In Group A, Maitland Mobilization led to a substantial reduction in pain scores and notable enhancements in lumbar mobility. Similarly, Group B, which underwent McKenzie exercises, experienced significant pain reduction and improved lumbar flexibility and extension.

Conclusion: These findings underscore the effectiveness of both Maitland Mobilization and McKenzie exercises as interventions for individuals with SIJD. Patients and healthcare providers can consider these approaches to effectively manage pain and enhance functional outcomes. Further research is warranted to explore the comparative effectiveness of these interventions in specific patient populations and clinical settings.

Keywords: Sacroiliac joint, mobilization, dysfunction, Maitland, McKenzie exercises**.**

Introduction

Low back pain (LBP) represents a substantial global health concern, with both direct and indirect costs that impose a significant societal burden. (1) The majority of low back pain (LBP) is often categorized as 'non-specific' (NS-LBP) because it typically lacks clear associations with structural changes, inflammation, or specific diseases (2) Pelvic Girdle Pain (PGP) is a subset of non-specific low back pain (LBP). These conditions encompass musculoskeletal disorders that primarily affect the pelvic region. (3) It is characterized by discomfort felt in the region between the back of the iliac crest and the fold of the buttock, typically near the sacroiliac joint (SIJ), and may extend into the posterior thigh. Additionally, it can manifest in conjunction with or independently of symptoms in the symphysis region. (4) The primary and widespread symptom associated with low back pain (LBP) is pain itself, often leading to disability within the community. Addressing patient disability poses a significant challenge for researchers due to the substantial impact of this condition. One recurring factor contributing to low back pain is sacroiliac joint dysfunction (SIJD). (5) Sacroiliac joint pain is commonly characterized as a persistent, dull ache that is felt in the buttocks and the vicinity of the sacroiliac joint. This discomfort can sometimes radiate into the groin area, around the greater trochanter, and down the back of the thigh, occasionally extending as far as the knee. In some cases, the pain can even travel to the lateral and posterior sides of the ankle, foot and calf potentially due to neural tissue involvement. (6) Joint dysfunction is characterized by limitations in a joint's ability to move freely. In cases where an individual lacks adequate anterior pelvic support while

standing, dysfunction often initiates during trunk flexion. This results in an anterior and downward rotation of the innominate bone, leading to fixation with the sacrum due to the anterior shift in the upper trunk's weight. (7,8) The sacroiliac joint is positioned between the sacrum and the pelvis, and its primary role is to facilitate the transfer of weight from the torso and upper limbs to the lower extremities. It receives additional stability from strong surrounding muscles and ligaments. Individuals with sacroiliac joint dysfunction (SIJD) often experience pain while seated, which may radiate down to the knee and back of the thigh. Activities such as stair climbing or lying on the affected side can also trigger discomfort. SIJD typically has a sudden onset and can be prompted by factors such as accidents, slips, falls, chronic stress, or pregnancy. It can result from inflammation, improper positioning, trauma, reduced mobility, joint locking, muscular imbalances, or disturbances in pelvic alignment. (9-12) The decrease in pain and the enhancement of range of motion (ROM) can be attributed to various factors. A significant contributor to this improvement is the interruption of the pain-spasm-pain cycle. This cycle is a physical process in which muscle spasms lead to reduced blood flow (ischemia) and pain, which in turn exacerbates the muscle spasm, intensifying the pain further. Additionally, joint mobilization plays a crucial role in enhancing biological activity within the joint. It does so by facilitating the flow of synovial fluid, which is essential for joint health. This increased synovial fluid flow helps deliver vital nutrients to the avascular cartilage, ensuring its proper nourishment. Furthermore, joint mobilization preserves the suppleness and resilience of the surrounding tissues. It also aids in the dissolution of adhesions that can develop due to fibrofatty proliferation. These adhesions are known to cause painful symptoms. The reduction in pain and improvement in ROM are the result of disrupting the pain-spasm-pain cycle, enhancing biological activity within the joint, and preserving tissue suppleness while reducing adhesions. (13, 14) This research aims to identify effective approaches for reducing disability in individuals suffering from sacroiliac joint dysfunction, ultimately enabling them to perform daily activities independently and with ease. The Numeric Pain Rating Score (NPRS) is a widely accepted pain assessment tool used in clinical evaluations. It employs a scale ranging from 0 to 10, with 0 indicating the absence of pain and 10 representing severe pain. In addition to pain, many individuals experience morning stiffness, which tends to decrease with weight-bearing activities. Several factors contribute to this morning stiffness. These factors can encompass extended periods of unfavorable posture, unsuitable daily activities and work habits, or excessive stress and strain on the back. It is widely acknowledged that pain can result in a reduction in an individual's range of motion (ROM) and hinder their capacity to carry out daily tasks. In clinical settings, lumbar ROM is frequently assessed through Schober's method, and the degree of disability is evaluated using the Oswestry Disability Scale. (6)

Methodology

An experimental investigation was carried out at the Body Expert Physical Therapy Clinic over a span of 10 months. The study employed a convenient sampling method to enroll both male and female participants aged between 18 and 60 years who were afflicted with sacroiliac joint pain (PSIS) that may have extended to the buttocks. To be eligible for participation, individuals had to exhibit acute or sub-acute pain persisting for a duration of 4 to 12 weeks, with at least three out of four diagnostic tests yielding positive results. The study included individuals with conditions such as lumbar stenosis, lumbar radiculopathy, spondylolisthesis, midline back pain, and pregnant women experiencing sacroiliac joint dysfunction (SIJD). However, individuals who had lower limb conditions, hip fractures, rheumatoid arthritis, histories of arthrodesis, previous orthopedic surgeries, spinal laminectomy, or ankylosing spondylitis were not eligible to participate in the study. A total of sixty patients who had been diagnosed with sacroiliac joint dysfunction and met the inclusion criteria for the study were chosen to participate. They received detailed information about the study and its procedures. Patient data were collected using a convenient sampling method. In this research, measurements were taken both before and after the treatment, and the evaluators were blinded to the treatment group assignments. The selection of outcome assessors was conducted randomly, ensuring they had no knowledge of the therapy group assignments. The allocation process remained concealed from both the researcher and the participants. After selection, the participants were randomly assigned to either Group A or Group B. Prior to the commencement of treatment, a comprehensive pre-evaluation was performed, which included an orthopedic assessment covering patient medical history, demographics, pain assessment, personal history and functional scale. Pain levels were assessed using the Visual Analogue Scale (VAS), and disability was measured using the Oswestry Disability Index (ODI). In Group A (Maitland Mobilization), the patient was positioned in a prone posture. A physiotherapist placed their hands at the center of the upper sacrum, applying direct pressure to all sacral regions, extending to the distal end of the sacrum. Additionally, pressure was administered laterally over the posterior superior iliac spine in a postero-anterior direction. The degree of pressure varied. The treatment regimen consisted of 30

oscillations, with three sets administered three times a week. (6) Group B (McKenzie exercises) were instructed to perform the exercises every two or three hours and received three treatment sessions per week. (15) Both groups received a 20-minute session of hot therapy as a component of the standard treatment. (6) Following this, participants in both groups underwent post-treatment assessments, and data were collected before and after the treatment sessions. Data analysis was performed using SPSS version 25.0. Descriptive statistics were calculated, and within-group comparisons were conducted using paired t-tests. A significance level of $p < 0.05$ was considered as statistically significant.

Results

The mean age of participants was 39.4167 with standard deviation 8.54557. Table 1 shows the analysis of the data revealed significant changes in the measured outcomes before and after the intervention of Maitland Mobilization. In terms of pain, the mean score decreased significantly from 7.3333 ± 1.23443 (pre-intervention) to 2.5333 ± 0.63994 (post-intervention), with a p-value of 0.001, indicating a substantial reduction in pain levels. Similarly, lumbar flexion demonstrated a significant improvement, increasing from 2.0667 ± 0.96115 (pre-intervention) to 5.5333 ± 0.63994 (post-intervention) with a p-value of 0.032. Lumbar extension also showed notable enhancement, rising from 1.8667 ± 0.74322 (pre-intervention) to 3.6667 ± 0.48795 (post-intervention) with a p-value of 0.014. Furthermore, the Oswestry Disability Index (ODI) displayed significant improvement, decreasing from a mean of 42.400 ± 7.13943 (pre-intervention) to 15.7333 ± 4.33370 (post-intervention) with a p-value of 0.000, indicating a substantial reduction in disability levels following the intervention.

Table 1. Mean comparison of pre and post of Maitland Mobilization intervention (Group A).

Outcome	Analysis	Mean ± SD	p-value
Pain	Pre	7.3333±1.23443	0.001
	Post	2.5333±0.63994	
Lumbar Flexion	Pre	2.0667±0.96115	0.032
	Post	5.5333±0.63994	
Lumbar Extension	Pre	1.8667±0.74322	0.014
	Post	3.6667±0.48795	
Oswestry Disability Index (ODI)	Pre	42.400±7.13943	0.000
	Post	15.7333±4.33370	

Table 2 Shows the results of (Group B) the analysis revealed significant changes in the measured outcomes before and after the intervention of McKenzie exercises. In terms of pain, the mean score decreased from 7.4667 ± 0.74322 (pre-intervention) to 2.3333 ± 0.48795 (post-intervention), with a p-value of 0.014, indicating a statistically significant reduction in pain levels. Similarly, lumbar flexion significantly improved, increasing from 2.4000 ± 0.50709 (pre-intervention) to 5.3333 ± 0.72375 (post-intervention) with a p-value of 0.001. Lumbar extension also exhibited a notable enhancement, rising from 1.3333 ± 0.48795 (pre-intervention) to 3.0667 ± 0.45774 (post-intervention) with a p-value of 0.003. Furthermore, the Oswestry Disability Index (ODI) displayed significant improvement, decreasing from a mean of 46.400 ± 9.41731 (pre-intervention) to 18.2667 ± 4.65168 (post-intervention) with a p-value of 0.000, indicating a substantial reduction in disability levels following the intervention.

Table 2. Mean comparison of pre and post of McKenzie exercises intervention (Group B).

Outcome	Analysis	Mean ± SD	p-value
Pain	Pre	7.4667±0.74322	0.014
	Post	2.3333±0.48795	
Lumbar Flexion	Pre	2.4000±0.50709	0.001
	Post	5.3333±0.72375	
Lumbar Extension	Pre	1.3333±0.48795	0.003
	Post	3.0667±0.45774	
Oswestry Disability Index (ODI)	Pre	46.400±9.41731	0.000
	Post	18.2667±4.65168	

Discussion

According to the study conducted by Kenkampha and colleagues, they observed that sacroiliac joint mobilization has the potential to enhance the healing process while also increasing tensile strength and flexibility. Moreover, joint mobilization plays a crucial role in preventing the formation of adhesions and tissue contraction by elongating shortened tissues, disrupting adhesions, and facilitating the flow of fluids to surrounding tissues. Consequently, this fosters an improved cellular environment, thereby promoting the healing process. Furthermore, joint mobilization effectively alleviates pain through the removal of inflammatory factors and the reduction of tissue swelling. (16) In 2018, Saumya Srivastava conducted a research study to assess the effectiveness of Mechanical Diagnosis and Therapy (MDT) for managing sacroiliac joint pain. The study involved patients participating in four therapy sessions, with each session comprising 30 repetitions of either anterior or posterior rotations of the innominate bone. To evaluate the treatment's efficacy, the researchers measured Pain Pressure Threshold (PPT) and used the Visual Analogue Scale (VAS). After completing these four consecutive therapy sessions, one group was compared to a control group that received alternative manual therapies. The results of the study indicated that McKenzie exercises were successful in helping individuals experiencing sacroiliac joint pain reduce their discomfort. (17) In this study show the significant effects on VAS score on both techniques. Abhay and his research team found that the increased range of motion (ROM) achieved through mobilization can be attributed to mechanical factors. These factors include the disruption of adhesions, the alignment of collagen fibers, and the improved flow of synovial fluid. Additionally, mobilization enhances blood circulation and venous drainage while dispersing substances such as substance P and nociceptors associated with free radicals, ultimately resulting in a reduction of pain. (18) In this study results of range of motion also improved significantly with the application of both techniques. Akeson and his research team's findings indicated that joint mobilization contributes to maintaining the flexibility and tensile strength of both the articular and periarticular structures. (19) A study conducted by Kaushik Guha aimed to investigate sacroiliac dysfunction and assess the impact of Maitland's Mobilization on individuals diagnosed with this condition. The study randomly assigned patients into two groups: an experimental group that received Maitland's mobilization along with abdominal and multifidus muscle strengthening exercises, and a control group that received only abdominal and multifidus muscle strengthening exercises. The study's findings concluded that Maitland's mobilization is a highly effective technique for treating sacroiliac joint dysfunction. (20) In this study show the significant effects of Maitland's Mobilization technique. The study aimed to assess the effectiveness of combining McKenzie exercises and manual therapy in managing chronic low back pain in individuals. The results of the study showed a noteworthy decrease in both pain levels and disability among patients who participated in McKenzie exercises for chronic low back pain. These results align with our own research, indicating that McKenzie exercises represent a valuable approach for addressing low back pain in patients, resulting in decreased disability and enhanced functional outcomes. (21) Furthermore, Maitland proposed that after injury or strain, minor positional issues (which might not be easily detectable through palpation or visible on X-rays) could lead to movement restrictions or pain. However, with consistent corrective mobilization, the restoration of pain-free function becomes achievable, and multiple repetitions can lead to lasting improvements. (22) The research conducted by Olivier T., who conducted a randomized controlled trial to assess the effectiveness of McKenzie exercises for low back pain patients. Olivier T.'s study identified randomized controlled trials from six databases, assessing the risk of bias. The findings suggest that while McKenzie exercises may not be highly effective in the management of disability and acute low back pain, they demonstrate greater efficacy in addressing chronic low back pain. (23) The effectiveness of the McKenzie Method in pain evaluation is closely related to the expertise of the therapists utilizing it. Optimal outcomes using the McKenzie Method were observed when it was combined with other therapeutic approaches to enhance spinal mobility, enhance overall quality of life, and decrease disability. (24) A research study evaluated the effectiveness of McKenzie exercises in patients with low back pain by comparing them to counter-strain and strain techniques. The study results suggested that McKenzie exercises, whether used independently or in combination with the counter-strain technique, were successful in alleviating pain in individuals with low back pain. (25) In this study shows the significant effects of McKenzie exercises on post results. The Modified Oswestry Disability Index assesses the impact of low back pain on daily activities, so it stands to reason that any treatment approach capable of reducing pain would also result in an improvement in the Modified Oswestry Disability Index score. (26) The results of this study also indicated an enhancement in pain and disability levels when utilizing each technique separately. A study conducted by Faryal Zaidi found that the combination of muscle energy techniques and Maitland mobilizations, when used alongside lumbopelvic stability exercises, proved effective in reducing both pain and disability in patients with

chronic sacroiliac joint dysfunction (SIJD). (27) A study demonstrated that Maitland mobilization and Mulligan mobilization were effective interventions for enhancing range of motion and reducing pain and disability in individuals experiencing sacroiliac joint dysfunction. These enhancements were statistically significant ($p < 0.05$) for both groups receiving treatment. Interestingly, it's worth mentioning that Mulligan mobilization seemed to be more successful in reducing disability when compared to Maitland mobilization. (6)

Conclusion

This study investigated the effects of two different interventions, Maitland Mobilization and McKenzie exercises, on individuals with Sacroiliac Joint Dysfunction. The results demonstrate significant improvements in various outcome measures for both intervention groups, highlighting the effectiveness of both approaches in managing pain and associated disability. For the Maitland Mobilization group, we observed a substantial reduction in pain levels, as evidenced by a significant decrease in pain scores from the pre-intervention to post-intervention assessments. Lumbar flexion and extension also showed significant improvements, indicating enhanced spinal mobility. Additionally, the Oswestry Disability Index (ODI) scores significantly decreased, indicating a marked reduction in disability levels following Maitland Mobilization. Similarly, the McKenzie exercises group exhibited noteworthy improvements. Pain levels significantly decreased, and lumbar flexion and extension demonstrated significant enhancements, signifying improved spinal function. The Oswestry Disability Index (ODI) scores significantly decreased in this group as well, indicating a substantial reduction in disability levels following the McKenzie exercises intervention. Overall, these findings emphasize the potential benefits of both Maitland Mobilization and McKenzie exercises for Sacroiliac Joint Dysfunction. Patients and healthcare providers can consider these interventions as viable options to alleviate pain and improve functional outcomes in individuals. Further research and clinical trials may be necessary to delve deeper into the comparative effectiveness of these interventions and to identify the most appropriate treatment approach for specific patient populations.

References

1. Buchbinder R, van Tulder M, Oberg B et al. Low back pain: a call for action. Lancet 2018; 391: 2384–2388. DOI: 10.1016/S0140-6736(18)30488-4
2. Balagué F, Mannion AF, Pellisé F et al. Non-specific low backpain. Lancet 2012; 379: 482–491. DOI: 10.1016/S0140-6736(11)60610-7
3. O'Sullivan PB, Beales DJ. Diagnosis and classification of pelvic girdle pain disorders. Part 1: a mechanism based approach within a biopsychosocial framework. Man Ther 2007; 12:86–97. DOI: 10.1016/j.math.2007.02.001
4. Vleeming A, Albert HB, Ostgaard HC et al. European guidelines for the diagnosis and treatment of pelvic girdle pain. Eur Spine J 2008; 17: 794–819. DOI: 10.1007/s00586-008-0602-4.
5. Kamali F, Zamanlou M, Ghanbari A, Alipour A, Bervis S. Comparison of manipulation and stabilization exercises in patients with sacroiliac joint dysfunction patients: a randomized clinical trial. Journal of bodywork and movement therapies. 2019;23(1):177-82.
6. Kaur H, Sharma M, Hazari A. Effectiveness of Maitland Mobilization and Mulligan Mobilization in Sacroiliac Joint Dysfunction: A Comparative Study. Critical Reviews™ in Physical and Rehabilitation Medicine. 2019;31(2).
7. Katada S. Principles of Manual Treatment for Sacroiliac Joint Dysfunction. Principles of Manual Medicine for Sacroiliac Joint Dysfunction: Springer; 2019. p. 23-5.
8. Thawrani DP, Agabegi SS, Asghar F. Diagnosing sacroiliac joint pain. JAAOS-Journal of the American Academy of Orthopaedic Surgeons. 2019;27(3):85-93.
9. Fortin JD, Falco FJ. The Fortin finger test: an indicator of sacroiliac pain. American journal of orthopedics (Belle Mead, NJ). 1997;26(7):477-80.
10. Raj MA, Ampat G, Varacallo M. Sacroiliac joint pain. StatPearls [Internet]. 2021.
11. Srivastava S, KU DK, Mittal H, Dixit S, Nair A. Short-term effect of muscle energy technique and mechanical diagnosis and therapy in sacroiliac joint dysfunction: A pilot randomized clinical trial. Journal of Bodywork and Movement Therapies. 2020;24(3):63-70.
12. Kawishwar SS, Samal S, Ramteke S. To Study the Effect of Mulligan Mobilization Versus Conventional Therapy in Sacroiliac Joint Pain. Indian Journal of Public Health Research & Development. 2020;11(5).
13. Kisner C, Colby LA, Borstad J. Therapeutic exercise: foundations and techniques. Philadelphia: FA Davis; 2017. p. 127–32.
14. Warude T, Shanmugam S. The effect of Mckenzie approach and Mulligan's mobilisation (SNAGS) in lumbar disc prolapse

with unilateral radiculopathy. Int J Sci Res.2014;3(10):59–63.
15. Faisal Ghafoor, Zunaira Ahmad, Mahjabeen Soomro et al. Comparison of Mulligan Mobilization Technique Versus Mckenzie Exercises Among Patient With Sacroilliac Joint Dysfunction: a Randomized Clinical Trial, 08 December 2022, PREPRINT (Version 1) available at Research Square [https://doi.org/10.21203/rs.3.rs-2277127/v1]
16. Kenkampha K. Boonprakob D, Aryawichanon P. Sacroiliac joint mobilization immediate improved clinical features of non-specific low back pain with sacroiliac joint dysfunction. KhonKaen Univ J. 2013;13(2):71–84.
17. Srivastava S, Kumar DK, Mittal H, Dixit S. Short-Term Effect of" Mechanical Diagnosis and Therapy" in the Management of Sacroiliac Joint Pain. Journal of Clinical & Diagnostic Research. 2018;12(9).
18. Kumar A, Kumar S, Aggarwal A, Kumar R, Das PG. Effectiveness of Maitland techniques in idiopathic shoulder adhesive capsulitis. ISRN Rehab. 2012 Oct 24;2012.
19. Hengeveld E, Banks K, editors. Maitland's peripheral manipulation e-book: management of neuromusculoskeletal disorders. Amsterdam, the Netherlands: Elsevier Health Sciences; 2013. p. 450–5.
20. 25. Namnaqani FI, Mashabi AS, Yaseen KM, Alshehri MA. The effectiveness of McKenzie method compared to manual therapy for treating chronic low back pain: a systematic review. Journal of musculoskeletal & neuronal interactions. 2019;19(4):492.
21. Kaushik Guha, the efficacy of maitland's mobilization on the individuals with sacroiliac joint dysfunction, IJMAES, 2016; 2 (1), 86-93
22. Weisel, H. The articular surfaces of the sacroiliac joint and relationship to the movements of the sacrum. Acta Anat. (Basel) 2010; 22:1-14.
23. Lam OT, Strenger DM, Chan-Fee M, Pham PT, Preuss RA, Robbins SM. Effectiveness of the McKenzie method of mechanical diagnosis and therapy for treating low back pain: literature review with meta-analysis. Journal of orthopaedic & sports physical therapy. 2018;48(6):476-90.
24. Czajka M, Truszczyńska-Baszak A, Kowalczyk M. The effectiveness of McKenzie Method in diagnosis and treatment of low back pain–a literature review. Advances in Rehabilitation. 2018;32(1):5-11.
25. Rahman A, Hashim M, Hassan D, Ihsan M, Ali H. Effect of McKenzie therapy with and without strain counter strain technique in patients with non-specific low back pain. Rawal Medical Journal. 2022;47(1):179-.
26. Chuang LH, Soares MO, Tilbrook H, Cox H, Hewitt CE, Aplin J, et al. "A Pragmatic Multicentered Randomized Controlled Trial of Yoga for Chronic Low Back Pain: Economic Evaluation". Spine (Phila Pa 1976). 2012; 37:1593-601.
27. F. Zaidi, I. Ahmed. Effectiveness of muscle energy technique as compared to Maitland mobilization for the treatment of chronic sacroiliac joint dysfunction. J Pak Med Assoc, 2020; Vol. 70, No. 10: 1693-1697