



Original Research

Comparative effects of mulligan's mobilization and proprioceptive neuromuscular facilitation technique on pain and disability in patients with sacroiliac joint dysfunction

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Abstract

Purpose: To evaluate the efficacy of Mulligan's Movement of Mobilization and contract-relax technique on pain and disability in patients suffering from sacroiliac joint Dysfunction. **Method:** A randomized clinical trial was done at DHQ hospital Jhang. 38 persons including both genders old enough 20-35 years were associated with this review who meet the inclusion criteria were recruited by consecutive sampling technique and allocated to the groups by simple random sampling process and by sealed opaque enveloped labeled as 0 for group A and 1 for group B and indiscriminately allocated into two sets. One set A was specified to mulligan mobilization technique and the second set B was specified to contract-relax technique for 6 weeks as three sessions per week. Baseline treatment of hot pack and ultrasound was given to both groups. All the patients were assessed for pain with NPRS and for disability with MOPDQ before and after treatment. Data was analyzed using SPSS 22. **Results:** After treatment, both groups significantly improved in terms of pain and disability. Mean value of NPRS was reduced from 6.89±1.15 to 1.68±.58 in MWM Group while in Contract-Relax from 6.78±1.18 to 2.57±.90. Mean Value of MOPDQ improved from 31.00±6.24 to 2.95±.911 and 32.26±7.14 to 4.31±1.20 in MWM and Contract-Relax group. However, group that received mulligan technique had significantly better improved NPRS and MOPDQ values than contract-relax group in patients with Sacro-iliac dysfunction (p<0.05). **Conclusion:** In the management of sacroiliac joint dysfunction, Mulligan mobilization is more efficient than contract-relax approach.

Keywords: Mulligan mobilization, contract-relax, Sacro-iliac joint dysfunction, NPRS, MOPDQ

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Introduction: Most people will at some point in their lives have low back pain, which is a relatively common ailment. For instance, estimates for the one-year incidence of any episode of low back pain are as high as 36%. The incidence of experiencing a first-ever episode of low back pain is roughly 6.3%-15.4% [1]. The sacroiliac joint (SI) is amongst the most likely reasons of persistent low back pain, represents 15 to 30 percent of all convalescents with persistent low back torment. In individuals who have had lumbar region or lumbo-sacral fusion treatment procedures, the Sacro-Iliac joint is also the most frequent site of low back discomfort [2]. LBP seems to be a typical adult ailment that affects 70-80% of people at some point in their lives. LBP and buttock pain discomfort are frequently caused by the sacroiliac joint [3]. This is supported by more recent research, since up to 30% of patients with chronic low back pain following lumbar fusion also experience SI pain [4]. Due to its anatomical and biophysical characteristics, the SIJ plays an essential role to the mechanical stability of the human body [5]. SIJ is the body's biggest hub articulation, joining spine to pelvis region and transmitting stress through lower back region to the distal appendages. Both the sacral and iliac bones are connected by the sacroiliac joint that interfaces the spinal column and pelvic region. SIJ moves huge bowing minutes and pressure burdens to bring down furthest points [6]. A combined effect of axial force and unexpected pivot is the chief component of SIJ discomfort and brokenness. The causes of SIJ distress can be divided into two types: traumatic and non-traumatic. Unexpected events, like car mishaps, tumbles, and lifting/turning wounds are traumatic grounds. Diseases, aggregate harm, various pregnancies, and incendiary arthropathies are instances of non-traumatic reasons. Pace abnormalities, earlier lumbar region combination, corpulence, lumbar spinal stenosis, pregnancy, leg length disparity, and Scoliosis are all hazard factors for SIJ stress [7]. Radiographic views make it difficult to profile SIJ dysfunction. The analgesic response to the SIJ injection and pain provocation tests are typically used for clinical screening. The first step in identifying SIJ dysfunction is to look for abnormal SIJ position or motion [8]. SIJD causes aching between the back iliac creases, gluteal overlays and lower back which may be transmitted to back thigh [9]. Pain in patients with sequestered SI joint dysfunction frequently centers inferiorly and medially to the PSIS. The Fortin finger test involves pointing your finger in this direction [10]. Sacroiliac joint distress occurs from an irritation that causes torment in hindquarters or lower back stretching out to legs [11]. SIJ discomfort is often described as a dull ache below the L5 level that may be or not accompanied by insensitivity or loss of sensation. Back discomfort is commonly reported by patients, and it is exacerbated by extended seated awkward posture, stooping forwards, and staying out of bed or going to stand up out of a low seat or lavatory. These patients' pain may intensify when they do weight-bearing activities like ascending stairs, crouching, rotating, or even walking for long periods of time. Vacuuming, cleaning, wiping, picking plants, and stacking a dishwasher all require repetitive bending, which can aggravate SIJ pain. Individuals with SIJ pain may have problems with their gait. Lacking coactivation of the gluteus maximus and opposite latissimus dorsi, which on the whole give joint dependability while strolling, is a trait

of this dysfunction [7]. Physiotherapy techniques are used to correct SIJ mal-alignment manually by restoring the normal function and balance of lumbar and pelvic muscles and ligaments. Mulligan described the positional fault theory in which articular mal-alignment leads to altered kinematics and eventual dysfunction [3]. The Mulligan idea emphasizes joint alignment issues that limit physiological movement. Joint injuries or sprains are to blame for these modifications to the articular surfaces. Mobilization through movement, sustained natural apophyseal glides, and natural apophyseal glides are the three main mobilization techniques that make up the Mulligan idea. Mobilization with movement is the active patient performance of a limited physiological or functional movement while simultaneously applying a sustained passive accessory glide to a joint. The use of mobilization combined with movement in the spine is known as sustained natural apophyseal glides. Natural apophyseal glides are passive oscillatory movements made along the facet joint plane. The "PILL" acronym refers to Pain-free mobilizations that produce Immediate effects, and achieve Long-Lasting results [12]. In order to rectify instability, the joint is moved and repositioned during mobilization, allowing the joint to track normally [13]. PNF is an effective treatment for neuromuscular and structural disorders [14]. It is distinguished by the use of fast, bouncing movements that generate momentum and propel the body segment across the range of motion in order to stretch shortened tissues [15]. In Contract Relax stretching, the target muscle is extended and then kept in that position for an assigned amount of time while the participant contracts the target muscle isometrically to its utmost. The target muscle was then relaxed for a shorter period of time [16]. If a specific muscle is made to contract isometrically to its utmost potential in a specific extended position, this is followed by a shorter period of relaxation of that specific muscle, PNF has been shown to enhance muscle function when used as a therapy [17]. Kawishwar SS and his colleagues did a study in 2020 to compare the effects of mulligan mobilization and conventional therapy on pain, functional disability and lumbar range of motion in SIJD patients. There were 93 candidates in this study. Mulligan mobilization was found to be more effective than conventional therapy [18]. In 2019, Kaur H and his co-workers conducted a research to examine the efficiency of Maitland and Mulligan mobilization in the treatment of SIJD, as well as to look into the results of mobilization on pain, Lumbar range of motion, and disability using NPRS and MODs scales. Group that receiving Mulligan mobilization observed to be more helpful in lessening disability in SIJD patients [19]. The current study was done to compare the efficacy of Mulligan's Mobilization and Contract-Relax technique on SIJD patients.

Materials and Methods: A single-blinded (assessor) randomized clinical trial was conducted at the DHQ Hospital Jhang, Pakistan conducted from January to March 2022. The Clinical research Ethical Committee approved this study prior to subject enrolment. Patient who meet the inclusion criteria were recruited by consecutive sampling technique and allocated to the groups by simple random sampling process & by sealed opaque enveloped labeled as 0 for group A and 1 for group B. At the start of study a formal education session lasting about 30 minutes was

given by physiotherapist dealing with the treatment/intervention. The INCLUSION CRITERIA were as: **1)** Age 20 to 35 years. **2)** Both genders (male & female) **3)** Hypo-mobile SIJ. **4)** Subjects with positive provocation test (Faber's test\Patrick's test, Gaenslen test, distraction test, compression test, sacral thrust test). **5)** Positive innominate test (Stork Test\Gillet Test). **6)** Subjects who agree to fill the informed consent. The EXCLUSION CRITERIA were as: **1)** Pregnant women **2)** Presence of neurological signs **3)** Musculoskeletal disease other than SIJ dysfunction **5)** Any congenital posture problem or previous surgery **6)** SLR less than 45 degree **7)** Patient having any mental problem or reduced cognitive ability **8)** Hyper-mobile SIJ. Baseline measurements of outcome measures of pain and disability assessed by NPRS and MOPDQ respectively. The NPRS was chosen as a method for quantifying pain. The patients were asked to rate their level of discomfort on an 11-point scale (0–10), with 0 being no pain and 10 denoting the most agonising pain they could imagine^[20]. A relevant and accurate method for assessing disability improvement related to manual treatment has been identified as the MODI. It is frequently utilised as a result in people with non-specific LBP. MODI has been found to be a valid and reliable instrument for assessing acceptable responsiveness to change ($r: 0.94-0.99$). The questionnaire consists of 10 items focusing on different aspects of function. Each item is scored from 0 to 5, with higher values demonstrating greater disability. The total score is multiplied by 2 and expressed as a percentage^[20]. In **group A**, patients were treated with Mulligan's Mobilization. The participant was lying on his stomach. The physical therapist secured the sacrum with one hand and positioned the fingers of the other hand beneath the anterior superior iliac spine (ASIS). The patient was then told to perform press-ups after the therapist pulled the ilium on the sacrum. This therapy session was given with frequency of 3 sets with 10 repetitions on sacroiliac joint 3 times a week for 6 weeks^[19]. In **group B**, patients were treated with Contract-relax technique, the patient was in supine, prone, and side-lying positions according to the muscle that was targeted. PNF stretching was carried out employing contract-relax techniques of agonists. Contract-relax was applied with a 6-second contraction with 80% force of the maximal isometric contraction on the muscles (iliopsoas, rectus femoris, hamstrings and gluteal muscles) and followed by a 15-second passive static stretching in the opposite direction of that muscles. 3 sets of stretching of each muscle were performed for each position with the frequency of 3 times a week for 6 weeks^[21]. Both groups received a baseline treatment (Moist Heat Pack for 10 minutes and 10 minutes of Ultrasound (0.75 MHz, continuous wave). The data analysis was done by using SPSS version 22 for window software. Statistical Significance was $p=0.05$. Shapiro-wilk Test was used to check the normality of data. As the data was normal, parametric tests were used to compare two population at different various intervals. Paired t-test was used for within group data analysis and Independent t-test was used or between group analysis. Frequency tables and bar charts were used to show summary of descriptive statistics.

Results: This study aimed to find the effects of MWM and Contract-Relax Technique on pain and disability in

patients with Sacroiliac Joint Dysfunction. 38 participants were assessed who meet the inclusion criteria. Randomization was done and 38 participants were divided into two groups. 19 patients were allocated to MWM Group and 19 patients were allocated into Contract-Relax group. There was no dropout found in any group. Therefore, data of all participants was included in data analysis. In table 6.1 baseline values of socio-demographic data is comparable on mean and standard deviation. Table 6.1 showed comparison of age, height, Body Mass Index (BMI) of participants in both groups. In mulligan group mean Age of subject was 27.84 ± 4.04 and in Contract-Relax was 27.84 ± 4.32 . The mean Weight of Mulligan Group 60.37 ± 9.21 and in Contract-relax was 61.68 ± 6.76 . The mean values of Height in MWM group was 164.04 ± 8.32 and in Contract-Relax group was 163.89 ± 7.58 . The baseline mean values of BMI in MWM Group was 22.31 ± 1.82 and 22.91 ± 1.46 was in second Contract-Relax group. The Normality of our data was assessed by Shapiro-wilk test. Data was normally distributed because p value is >0.05 . Parametric test were used to compare groups on Baseline and Post Treatment Values. Between groups comparison was performed by independent t test on different outcome measure

Table 2 showed baseline measurements of NPRS and MOPDQ. Pre values of both groups were comparable on NPRS and MOPDQ. Mean value of NPRS was 6.89 ± 1.15 in MWM Group while in Contract-Relax was 6.78 ± 1.18 . Baseline Mean Value of MOPDQ was 31.00 ± 6.24 and 32.26 ± 7.14 in MWM and Contract-Relax group respectively. Table 3 showed results of between groups comparison of NPRS of pre and post treatment values by independent sample t test. There is significant difference in (p value <0.05) between groups on NPRS pre and post values. There was significant reduction in mean value of pain intensity in MWM Group. Mean value in MWM Group was 1.68 ± 0.58 and in contract-relax group was 2.57 ± 0.90 . Table 4 showed between groups comparison of MOPDQ. Between groups comparison of pre and post treatment values was performed using independent sample t-test. There was significant difference in amending in pain intensity (p value <0.05) in Group A (MWM group). Mean value of MOPDQ in MWM Group was 2.94 ± 0.91 while in other Contract-Relax group was 4.31 ± 1.20 . Table 6.5 showed results of NPRS across both groups. Paired sample t-test was used for within group comparison for each outcome measure. Mean post value of MWM Group was 5.21 ± 0.92 while in Contract-Relax group was 4.21 ± 0.79 . P-value <0.05 showed that noticeable reduction in pain was seen in MWM group in contrast with other group. Table 6.6 showed results of MOPDQ across both groups. Within a group Paired sample t test was used for each outcome measure. Mean post value for MWM Group was 28.05 ± 5.73 as compared to Contract-Relax group was 27.94 ± 6.21 . As p-value <0.05 showed there was significant improvement in quality of life in MWM group rather than the other group.

Discussion: Sacroiliac joint is a typical wellspring of LBP. Sacro-iliac joint pain (SIJP) principal reason of (SIJD). Normal SIJD is anterior innominate Dysfunction which is the significant gamble concern for idiopathic LBP. Physiotherapy procedures are utilized to address SIJ mal-arrangement physically by reestablishing the ordinary

capability and equilibrium of lumbar and pelvic muscles and tendons. (MWM) is utilized to address the joint track, positional shortcoming and mechanical glitch [3]. This research was aimed to find the comparative effects of Mulligan Mobilization and Contract-Relax techniques at SIJD. This was randomized controlled study. Two groups were involved in the study. Baseline treatment of hot pack and ultrasound was given to both groups. One set got treatment of Mulligan Mobilization Technique while the other set got treatment of Contract-Relax Technique. Sample size was 38 and the treatment time was 6 weeks as session of treatment was 3 session per week. Data was analyzed using SPSS while patient condition was assessed through (NPRS) and (MOPDQ) for pain and disability outcome measures. Generally, both treatments are effective but results showed that Mulligan Mobilization is more effective than Contract-Relax Technique as it improves pain and functional activities assessed through NPRS and MOPDQ while comparing their Pre and Post treatment values. Results of between groups comparison of NPRS and MOPDQ shows pre and post treatment values by independent sample t test. There is significant difference in (p value <0.05) between groups on NPRS pre and post values. There was significant reduction in mean value of pain intensity in MWM Group. Mean value in MWM Group was $1.68 \pm .58$ and in contract-relax group was $2.57 \pm .90$. There is significant difference in (p value <0.05) between groups of MOPDQ pre and post values. Mean value of MOPDQ in MWM Group was $2.94 \pm .91$ while in other Contract-Relax group was 4.31 ± 1.20 . Previous research revealed that Mulligan Mobilization has a significant effect on improving pain and disability. This study shows Mulligan Mobilization improve more pain and disability than Contract-Relax Technique when outcomes were assessed through NPRS and MOPDQ tools. A study was conducted in 2021 on 64 patients to compare the effects of manual therapy (Mobilization group) plus home exercise plan and home exercise program in the management of SIJDS. Physical assessment tests, visual simple scale, and SF-36 assessment were executed toward the start of the review, at 24 h, at 1 week, and 1 month after the treatment. Results displayed that the VAS values of the patients with SIJDS compared to pretreatment values were clearly decreased ($p < 0.05$). All tests performed in the SIJ physical examination presented significant improvement within both groups ($p < 0.05$). However, there was no statistical difference between the two groups in 1-month period ($p > 0.05$). Results showed that both treatment were equally effective in improving pain and quality of life [22]. The main intention of this experimental research was to compare the effects of MWM and Contract-Relax practice in patients with SIJDS. Results showed that Mulligan Mobilization technique is more effective than Contract-Relax Technique in upgrading outcome measures that were pain and disability. In 2019 an analysis was done to regulate the effects of Mulligan and Maitland Techniques on patients with ant and post innominate dysfunction. A RCT study was conducted on 48 patients. Two groups were made, one group received Maitland Technique while second group received Mulligan Technique. Their outcome measures Pain, Range of Motion and disability were assessed through Visual Analogue Scale, Goniometer and Modified Oswestry Disability Index correspondingly.

When pre and post treatment values were compared, results showed that both the treatment techniques are equally effective in showing improvement in their outcome measures [23]. This study collaborates with current study that Mulligan Mobilization shows more efficacy in reduction of pain and improving disability in SIJD patients than other Contract-Relax Group. This study demonstrated that the Mulligan Mobilization is more factual than Contract-Relax technique in amending pain and disability in SIJ patients when data was analyzed through SPSS 23 using independent sample t test. Another study was made to find out the effects of Mulligan mobilization and kinesio-taping on 30 subjects with patients of SIJD with ant innominate dysfunction in 2018. Two groups were made, with one group treated with mobilization with kinesio-taping while the other group treated with mulligan mobilization alone. Baseline treatment of ultrasound was given to both groups. Baseline measurements of pain and disability were assessed through VAS (Visual Analogue Scale) and Modified Oswestry Disability Questionnaire. Both groups showed significant improvement in outcome measures ($p < 0.05$), with combined technique group showed better results than other group in terms of disability ($p = 0.001$), but not in terms of pain ($p = 0.20$) [3]. This experimental study aimed to compare the results of Mulligan Mobilization and Contract-Relax Technique on pain and disability in patients with SIJDS. Results revealed that Mulligan Mobilization is more factual in improving pain and functional activity of participants. A comparative study was also done to compare the effects of Mulligan and Maitland Mobilization Technique. There were 60 participants in the study with one Group treated with Maitland Mobilization and second group treated with Mulligan Mobilization. Pre plus Post treatment values of Pain and Disability were assessed through NPRS and MODS. Results showed that mean Modified Oswestry Disability Index (MODS) score of Mulligan group decreased from 43 to 3.33 percent whereas the mean MODS score using Maitland mobilization Technique decreased from 43 to 13 percent. It shows Mulligan shows more efficacy than Maitland Mobilization technique. This research reinforces the present study that Mulligan is more beneficial in reduction of pain and improving functional disability [19].

Conclusion: The present investigation showed that mulligan mobilization & contract-relax techniques equally are well accepted and renowned methods of treatments in improving pain and disability as assessed through NPRS and MOPDQ respectively in patients suffering from Sacroiliac joint dysfunction. However, it is concluded based on statistically data analysis that mulligan mobilization is of great value in improving outcome measures (pain and functional disability) than other contract-relax technique. MWM focused to correct the positional faults of the joint.

Conflict of Interest: None

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Table 1. Comparison of Socio-Demographic Variables of two Groups.

Study Group	Group A MWM (19) (Mean ± SD)	Group B Contract-Relax (19) (Mean ±SD)	p-VALUE
Age of Participants	27.84±4.04	27.84±4.32	.077*
Height in cm	164.05±8.32	163.89±7.58	.276
Weight in kg	60.37±9.21	61.68±6.79	.273
Body Mass Index of Participants	22.31±1.82	22.91±1.46	.592

Table 2. Base line measurement for NPRS and MOPDQ

	Group A MWM (n=19)	Group B Contract-Relax Technique (n=19)	P value
	Mean ± SD	Mean ± SD	
Numeric Pain Rating Scale	6.89±1.15	6.79±1.18	.782
Modified Oswestry Pain and Disability questionnaire score	31.00±6.24	32.26±7.15	.565

Table 3. Between Group Comparison of NPRS

Variables	Treatment group		P value	
	Group A MWM (n=19)	Group B Contract-Relax Group (n=19)		
NPRS	Pre-treatment (Mean±SD)	6.89±1.14	6.78±1.18	0.782
	Post-treatment (Mean±SD)	1.68±.58	2.57±.90	0.001*

Table 4. Between Group Comparison of Modified Oswestry Pain and Disability Questionnaire

Variables	Treatment group		P value	
	MWM (n=19)	Contract-Relax Technique (n=19)		
MOPDQ	Pre-treatment (Mean±SD)	31.00±6.236	32.26±7.14	0.565
	Post-treatment (Mean±SD)	2.95±.911	4.31±1.20	< 0.05*

Table 5. Comparison of NPRS within MWM Group and Contact-Relax technique group (within Group)

Variables	Paired Difference	P value		
			Mean	Std. Deviation
MWM Group	NPRS Pre. NPRS Post.	5.21	0.92	< 0.05*
Contract-Relax group	NPRS Pre. NPRS Post.	4.21	0.79	< 0.05*

Table 6. Comparison of MOPDQ within MWM Group and Contact-Relax technique group (within Group)

Variables	Paired Difference	P value		
			Mean	Std. Deviation
MWM Group	MOPDQ Pre. MOPDQ Post.	28.05	5.73	<0.05*
Contract-Relax group	MOPDQ Pre. MOPDQ Post.	27.94	6.21	<0.05*