

Comparison of Mulligan Internal Rotation Mobilization and Post Isometric Relaxation Technique on Pain And Function In Patients With Glenohumeral Internal Rotation Deficit

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Abstract- Background: Glenohumeral internal rotation deficit (GIRD) is shared physical deficiency found in teenagers and overhead many sports. GIRD is usually categorized as simultaneous internal rotation deficits (IR).

Objective: The study's objective was to compare the effects of Mulligan internal rotation Mobilization and post isometric relaxation technique on Pain, Range of motion and function in patients.

Methods: A randomized clinical trial was conducted in the Physiotherapy department of A.R hospital Lahore. A convenient sample of 24 diagnosed patients with GIRD were randomly distributed into two groups with the use of the lottery method. Group A patients got Mulligan internal rotation mobilization treatment and Group B got Post Isometric relaxation (PIR) treatment. The goniometry, Numeric pain rating scale (NPRS), Shoulder range of motion (ROM), and The Shoulder Pain and Disability Index (SPADI) were used to assess all patients before and after two weeks of intervention. Statistical analysis was computed by SPSS 25.0.

Results: There is a statistically significant difference between group analysis. Pain decreased to a greater extent in post-treatment of Mulligan internal rotation MWM group with mean value 2.50 ± 1.88 as compared to 4.42 ± 1.16 of Post isometric relaxation group. SPADI Score showed a greater extent in posttreatment of Mulligan Internal rotation MWM with mean value 50.08 ± 8.02 as compared to Post isometric relaxation group 60.00 ± 13.67 . Mulligan Internal rotation MWM group showed greater improvement in Range with a mean value of 68.92 ± 11.97 as compared to Post isometric relaxation group with a mean value of 54.92 ± 8.45 .

Conclusion: The study concludes that Mulligan internal rotation Mobilization was more effective than post isometric Relaxation for pain, function, and internal rotation range of motion in patients with Glenohumeral internal rotation deficit.

Index Terms- Pain, function, movement, Mobilization with movement, post-isometric relaxation)

I.INTRODUCTION: The Glenohumeral junction has the greatest significant importance among all other joints of the shoulder complex. It is a 360-degree moving ball and

socket type of joint between the humerus bone head & the glenoid cavity of the scapular bone (1). GIRD is a physical deficiency found in teenagers and Overhead sports games like cricket and baseball such as baseball. GIRD is commonly categorized as simultaneous deficiency of internal rotation (IR) shoulder range and complete arc of motion in the primarily involved shoulder (2). Tightness in the back of the shoulder capsule and posterior muscles, such as the posterior fibers of deltoid muscle, infraspinatus muscle, and teres minor muscle, can lead to GIRD, although the mechanism is not precise yet (3). Rolling, gliding (sliding) and distraction type of accessory movement are the movements performed by Physiotherapists by themselves within the involved joint (4). Manual Physical therapy approaches are very effective in the treatment of many musculoskeletal issues. Mulligan manual techniques Introduced by Brain mulligan are beneficial in treating and correcting joint dysfunction. The Mobilization with movement technique has its parameter (5). It is done with both therapist-patient participation, i.e. passive glide done by a Physiotherapist at the peripheral joint while the patient performs the pain-free physiologic movement. The stamp of the Mobilization with movement (MWM) technique is that Pain should be decreased after the application of the technique (6, 7). METs/ PIR techniques are soft tissue osteopathic manipulation performed accurately and in controlled manners; patients do isotonic or isometric contractions, which are very useful in function and reduce Pain. Post Isometric Relaxation technique are primarily indicated to reduce the Pain, relaxing the taut muscle groups and fascia problems, decrease muscle tone, enhance local circulation, increase the strength of weak musculature and mobilize joint restrictions. This leads to improvement in overall postural position and the restore the correct joint function(8, 9). Contracture in the posterior capsule is caused by immense distraction force within the follow-through phase of pitching. Poster inferior capsular contracture may cause a loss in internal rotation in the thrower. This also leads to humeral head shift postero superior. Humeral head shifts allow hyper external rotation when the posterior capsule reaches the last length, although the anterior side of the capsule still

has extra external rotation. In the end, this shows results related to type two SLAP lesions in throwing players(10)(11). To increase ROM, stretching has been used as effective in many joints pathologies (12). To decrease the chance of GIRD stretching of the posterior capsule of the shoulder has been used. GIRD has been treated by stretching of deltoid and rotator cuff muscle (13). Mulligan's Mobilization with movement (MWM) has reliably shown results without any doubt in relieving the Pain to an excellent extent and increasing mobility of multiple joints in which the technique was applied (14). Mulligan theories that the MWM technique has its effect by showing corrections and adjustments to positional faults in the joints due to injuries or strains. The instant corrective glide application to the joint following active movement by the patient is MWM technique (15, 16). Passive over-pressure is applied by the patient or secondary in the end range possible(17). As per as researcher's Knowledge most of the studies were conducted on overall mobility of the shoulder; only a few studies worked purely on internal rotation deficit. So this study will be beneficial for GIRD. The rationale of education was to check the additive Results of Mulligan's internal rotation mobilization on Pain, ROM and function in players with GIRD besides the application of sleeper stretch, a conventional protocol.

II. MATERIALS AND METHODOLOGY: A randomized clinical trial was conducted in the Physiotherapy department of A.R hospital Lahore. The trail registry number is NCT04894786. Sample size as 14 in each group, calculated by EPITOOL sample size calculator. A convenient sample of 24 diagnosed patients with GIRD were then randomly distributed into two groups with the use of the lottery method. Group A patients got Mulligan internal rotation mobilization treatment and Group B got Post Isometric relaxation treatment. Both groups were given Sleeper stretch as a baseline treatment. The study was completed within the time duration of 6 months (April 2021 to September 2021) after the approval of the synopsis. Both gender participants within the age 18-35 years was enrolled. Participants with at least a fifty percent % decrease in the internal rotation range of motion were taken compared to the unaffected side. Baseline Ranges included were shoulder abduction ROM at least 90 degrees, shoulder Extension ROM at least 20 degrees and a Positive Lift off test. Participants with history of shoulder surgery, Any Shoulder joint complex fracture, Adhesive capsulitis, Diabetes, Post-traumatic and rotator cuff tear, Neurological deficit affecting the shoulder, Pain or disorder of cervical spine and a recent steroid injection and previous manipulation under anesthesia were excluded for the study. The goniometry, Numeric pain rating scale (NPRS), Shoulder range of motion (ROM), and The Shoulder Pain and Disability Index (SPADI) were used to assess all patients before and after two weeks of intervention. The Shoulder Pain and Disability Index

(SPADI) is a self-administered questionnaire that consists of two dimensions, one for Pain and the other for functional activities. The pain dimension consists of five questions regarding the severity of an individual's Pain. Functional activities are assessed with eight questions. During first visit of the patients, a complete physical examination, history and thorough assessment done by the assessor and the patient completed (SPADI) and numeric pain rating scales (NPRS) as subjective measurements. The assessor then took the measure of shoulder in-rotation range of motion through a goniometer. Finally, Treatment was then continued to the selected subject according to the allocation by the researcher. In next visits Patient was reassessed by the assessor. Three sessions of treatment per week was given. Post-treatment readings had taken at the end of the second week. Total treatment was of 2 weeks.

III. TREATMENT APPROACHES:

a) Sleeper's Stretch (Baseline Treatment): Position of stretching for the posterior capsule is half side laying just like the position with horizontal and lateral laying, the shoulder to be pulled must be down or in touch in the mat abduction arm at the shoulder 90 flexion the arm at the elbow to ninety using up arm apply load in between wrist and elbow joint to move the arm into inside rotation. Half minute hold for every rep. The stretching protocol remained for 14 days (18)

b) Mulligan Internal Rotation MWM: The therapist placed a grip of his one hand around patient's armpit and thumb of opposite hand in the flexed elbow and the glide was performed to the head of the humerus down in the glenoid fossa with the help of thumb while supporting the scapula with another hand. The therapist made it sure that the other hand is supporting up and inwards. While this disturbance held place, the patient internally rotated his shoulder with the assistance of the opposite hand; at the exact time, his defected upper arm was stretched by the therapist's belly pulling the head of the humerus outward. The hand in the armpit works as a fulcrum. Mulligan Mobilization With Movement was performed for 72 Hours. Randomized days by obeying the rule of three, i.e. day one three glides, second day three sets of 6 glides, third day three sets of Ten glides was performed. A patient who failed to come for three days continuously had discontinued from the study. The treatment had been applied three times per week, for two weeks, for a total of Six times (3).

c) Post Isometric Relaxation (PIR): The Patients were in a horizontal laying place on the clinical bed with ninety degrees flexion and abduction at synovial & glenohumeral joint. The glenohumeral joint was stabilized at the acromion process with one hand, and the opposite hand was used as assistance to take the arm into internal rotation even the 1st hurdle of movement was reached. The participant was then taught to do a five-sec isometric contraction of approximately twenty-five percent maximal effort in the direction of external rotation and against pressure applied at the distal forearm. Following the contraction, the participant

was taught to internally rotate the arm toward the Floor as a half minutes active support stretch was performed. The participant was taught to rest, and a new motion hurdle was then engaged. This program was applied for a total of three repetitions (12).

IV. RESULTS:

SPSS for windows software, version 25 was used to analyze the data using statistical significance $p=0.05$. Shapiro-Wilk Test was used to check the normality of data. The value of Shapiro-Wilk Test was greater than 0.05, the data was normally distributed, and parametric tests of analysis were used. Difference between groups was analyzed by

Independent sample t Test. Within between groups was analyzed by paired t Test. Pain decreased to a greater extent in post-treatment of Mulligan internal rotation MWM group with mean value 2.50 ± 1.88 as compared to 4.42 ± 1.16 of Post isometric relaxation group. SPADI Score showed a greater extent in posttreatment of Mulligan Internal rotation MWM with mean value 50.08 ± 8.02 as compared to Post isometric relaxation group 60.00 ± 13.67 . Mulligan Internal rotation MWM group showed greater improvement in Range with a mean value of 68.92 ± 11.97 as compared to Post isometric relaxation group with a mean value of 54.92 ± 8.45 .

Table 1: Within Group Pair Wise Comparison Of Nprs, Spadi Score And Shoulder Internal Rotation Ir-Rom (Paired Sample T Test):

Variables	Mulligan internal rotation MWM group	Post isometric relaxation group		
Pre Treatment NPRS	7.41	7.75		
Post Treatment NPRS	2.50	4.41		
Comparison of NPRS after treatment	Mean Difference	P value	Mean Difference	P value
	4.91	< 0.05	3.34	< 0.05
Pre Treatment SPADI	79.75	76.08		
Post Treatment SPADI	50.08	60.00		
Comparison of SPADI after treatment	Mean Difference	P value	Mean Difference	P value
	29.67	< 0.001	16.08	< 0.001
Pre Treatment IR- ROM	31.75	35.67		
Post Treatment IR- ROM	68.92	54.92		
Comparison of IR-ROM after treatment	Mean Difference	P value	Mean Difference	P value
	37.17	< 0.001	19.25	< 0.001

Table 2: Across The Group Comparison Of Nprs, Spadi Score And Shoulder Internal Rotation Ir-Rom (Independent Sample T Test):

Variables	Mulligan internal rotation MWM group	Post isometric Relaxation group	Mean Difference	Sig
Pre Treatment NPRS score	7.41	7.75	0.33	0.47
Post Treatment NPRS score	2.50	4.41	1.91	<0.001
Pre Treatment SPADI score	79.75	76.08	3.36	0.49
Post Treatment SPADI score	50.08	60.00	9.91	<0.001
Pre Treatment IR- ROM	31.75	35.67	3.31	0.29
Post Treatment IR- ROM	68.92	54.92	14.00	<0.001

V. DISCUSSION: This study directed the focus of researchers on the effectiveness of Mulligan internal rotation MWM and Post isometric Relaxation technique in males and females suffering from Glenohumeral internal rotation deficit. While analyzing different variables, group A showed a statistically significant difference when it is compared to group B in terms of Pain, function, and ranges of the shoulder. The literature shows that overhead activities like throwing sports person have adaptations to their dominant shoulders that result in a decrease in passive ROM (19). The mechanism of this pain decrease by MWM is

still not reasonable, though neurophysiological, and biomechanical mechanisms might be the reason (20). Biomechanically, it was originated that MWM might correct the arrangement of bones making a joint and some sources propose positional fault (21). These results were supported by another RCT done by R. K. Minerva and Nityal Kumar et al. in which there was a significant improvement in SPADI Scores and ROM (22). The current project's stats disclosed a statistically significant difference between Post-treatment SPADI Score values of 02 groups with p-value < 0.05. The score decreased to a greater extent in post-treatment of Mulligan's MWM with a mean value 50.08 ± 8.02 as compared to the post isometric relaxation group of 60.00 ± 13.67 .

Results of the current study show statistically as well as clinically significant results in terms of NPRS, SPADI score and Shoulder internal rotation ranges. Both post isometric relaxation and Mulligan internal rotation MWM are well accepted and recognized treatment methods of subjects with GIRD. The present study indicated that a combination of internal mulligan rotation MWM and sleeper stretch was helpful in pain relief, improving Range of motion and functional status in subjects with Glenohumeral internal rotation deficit.

VI. CONCLUSION: The study concludes that both Mulligan internal rotation Mobilization and post isometric Relaxation effectively improve pain, function, and internal rotation range of motion in patients with Glenohumeral internal rotation deficit, but Mulligan internal rotation mobilization showed more improvement.

VII. CONFLICT OF INTEREST: There was no conflict of interest.

VIII. FINANCIAL STATEMENT: No fundings were given by any authorities; it was a project thesis of Masters of Science in Orthopedics Manual Physical Therapy.

IX. DATA AVAILABILITY: Data will be provided on the demand by corresponding author.

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