COMPARISON OF GONGS MOBILIZATION AND MAITLAND'S MOBILIZATION IN POST OPERATIVE SHOULDER STIFFNESS

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Abstract

Background: After knee discomfort and low back pain, shoulder pain and stiffness is believed to be the third most typical musculoskeletal presentation in primary care**.** Shoulder stiffness makes it harder to carry out regular tasks since it gradually reduces range of motion and produces pain. Patients usually experience severe discomfort and gradually lose their ability to move their shoulders in both active and passive ways. Numerous physiotherapy approaches, such as massage, are available to reduce shoulder stiffness. While gong mobilization is a relatively new therapy for shoulder mobility, there aren't many studies on it. The mobilization can be given in the dynamic position also. **Method:** The study consisted of patients who had tight shoulders. According to the study's criteria, 69 participants were recruited for the experiment and allocated to one of three groups to receive one of three types of treatment. Group A had conventional therapy, Group B underwent Gong mobilization, Group C received Maitland mobilization. The goniometer, NPRS, and OSS were used to measure the outcome. **Result:** A descriptive analysis of 69 participants showed that group C, which received Maitland mobilization, significantly exceeded group B, which received Gongs mobilization, and group A, which received conventional therapy, in terms of outcome measures. **Conclusion:** The treatment procedures were relatively good but the group C which received Maitland Mobilization improved the value of outcome measure in a positive aspect.

Keywords: shoulder stiffness, mobilization, range of motion, pain, instability.

INTRODUCTION

The shoulder complex is the joint with highest mobility among all joints. [1] The shoulder moves above the horizontal plane, causing the pectoral girdle to rotate. Not only do the scapula and clavicle rotate. For complete abduction and forward flexion of the shoulder, the scapula must rotate upward (the glenoid cavity travels superiorly). Upper and lower trapezius fibres as well as the serratus anterior are the main drivers of upward rotation. When the AC joint's capsule and ligaments are under tension, the clavicle passively rotates axially. Gravity usually aids in the passive downward rotation of the pectoral girdle.[2]

Appropriate glenohumeral joint posture is essential for optimal stability and long-term joint health. An important aspect of many shoulder therapy plans is the glenohumeral joint's alignment. The ball-and-socket structure of the glenohumeral joint for unhindered motions including medial-lateral rotation, abduction-adduction, and flexion-extension. In general, depictions of these movements are overly simplistic because the pectoral girdle moves in tandem with the glenohumeral joint. The pectoral girdle protracts during flexion and retracts during extension. [3] Both the pectoral girdle and the glenohumeral joint are involved in full range of shoulder motion. Any restrictions in one area of the complex have an impact on the whole.[3]The glenohumeral joint and pectoral girdle work together to raise the arm over the head for flexion or abduction.[4] The shoulder is thought to have a tremendously dynamic, yet intrinsically unstable, structure when compared to the hip. While there is no denying the validity of this analogy between the hip and shoulder, shoulder stability is frequently underestimated.[4]

At the shoulder, end-range stability is achieved through distinct mechanisms compared to mid-range stability. End-range stability is influenced by three factors: muscular, ligamentous, and bony. Although not the primary component, bone characteristics at the shoulder play a considerable role; the glenoid fossa's size and form are particularly crucial. On the other hand, a deep ball-and-socket joint, which is by nature more stable, centres the hip joint. The glenoid narrow arc only partially encloses the humeral head. There is limited room for mistake and unstable conditions within the glenoid.[5]

A variety of anatomical variations that jeopardise the glenoid may lead to instability.[3] The glenohumeral joint's ligaments and capsule are loose in the majority of joint positions until the end range is reached to provide sufficient movement. At the boundaries of motion, these

tissues then function as check reins. Lastly, end-range stability is supplied by muscles and the tendons that link them.[3]

Pathology of the rotator cuff is the most common cause of shoulder pain, which affects 3.7 people out of every 100,000.4,7 The outcomes of rotator cuff replacements (RCRs), whether open or arthroscopic, have demonstrated sufficient pain alleviation, enhanced shoulder function, and enhanced patient satisfaction.[3] A postoperative shoulder stiffness is a well-known adverse outcome of both open and arthroscopic surgery. It is believed to result from an intra-articular inflammatory process that thickens and fibroses the joint capsule.[6] Postoperative resistive stiffness—defined as persistent range of motion [ROM] loss—or transitory stiffness—defined as [ROM] loss that responds to non-operative treatment—are highly prevalent after arthroscopic surgery. Even if a patient's rotator cuff rupture is completely repaired, this prevalence, which varies from 3% to 23%, may cause them to feel unsatisfied with the procedure. Joint mobilisation is a manual therapy technique where a therapist applies hand pressure to a joint to try to improve its mobility and range of motion. It is applied to those who have joint discomfort or stiffness. [7] Shoulder stiffness in post-operative conditions is very common where joint thickens and tightens which results in pain and decrease in joint movement. Shoulder stiffness if not treated in time may lead to severe pain and lack of mobility which will further hamper the ADLS. Gongs & Maitland mobilization are the mobilizations used to increase the range and decrease the stiffness and pain. Both the methods are cost effective and economical. It's also critical to identify risk factors associated with shoulder stiffness; a recent study found that prevalence rates were higher in women, shoulders with partial rips, low-baseline passive abduction, non-degenerative tears, and those not undergoing acromioplasty.[1]

Studies on the Gongs Mobilisation technique to improve range of motion and reduce discomfort are extremely limited. Gongs mobilization & Maitland mobilization on post-operative shoulder joint stiffness has not been studied much and hence the above study was conducted.

MATERIALS & METHODOLOGY

The study was carried out in the physiotherapy outpatient department of the Dr. D. Y. Patil Medical College Hospital and Research Institute in Kolhapur. Based on the inclusion and exclusion criteria, 69 subjects with post-operative shoulder stiffness were chosen for the study.

Inclusion criteria

Participants either gender, aged between 35-45 years, having post-operative shoulder stiffness (4 to 6 weeks) willing to participate.

Exclusion criteria

Participants with Fractures of humerus, scapula, clavicle, taking analgesic, having inflammatory changes like-Rheumatoid arthritis, degenerative changes like-Osteoarthritis, Frozen shoulder.

Pre-test examination for pain, range of motion which included shoulder flexion, extension, abduction, internal rotation, external rotation and shoulder disability was taken through following test: Numerical pain rating scale, Goniometer, Oxford shoulder score. Pre assessment was taken and after 2 weeks of treatment post assessment was taken. Participants was randomly selected by simple random method by using Graphed software.

After that, the 69 participants were split up into three groups: Group A, Group B, and Group C. Conventional therapy was administered to Group A, Gongs Mobilisation and conventional therapy to Group B, and Maitland's Mobilisation and conventional therapy to Group C. For two weeks, the treatment was administered in three sessions per week. Each session lasted for forty-five minutes.

Sessions 3 Times/Week for 2 weeks	**GROUP A Conventional therapy**	**GROUP B Gongs Mobilization with Conventional therapy**	**GROUP C Maitland Mobilization with Conventional therapy**
Pre and Post	Assessment will be taken	Assessment will be taken	Assessment will be taken
Week 1	Hot moist pack and Scapular stretches, Codman's exercise.	Hot moist pack and Scapular stretches, Codman's exercise. Gongs mobilization	Hot moist pack and Scapular stretches, Codman's exercise. Maitland mobilization

Week 2	Same as above	Same as above	Same as above

A visual analogue scale was used to evaluate pain. SPSS version 22 was used to examine the data.

RESULT

Table 1- Pre-Post Comparison in CONVENTIONAL Group A

CONVENTIONAL Group A		Time Point	Mean	S.D.	p-value
ROM (Using Goniometer)	Flexion	Pre	82.74	12.42	2.21E-08*
		Post	88.70	13.88	
	Extension	Pre	34.04	6.26	7.64E-15*
		Post	39.04	6.27	
	Abduction	Pre	81.43	12.45	1.12E-13*
		Post	88.00	12.84	
	Internal	Pre	34.83	4.75	6.26E-18*
		Post	40.13	4.48	
	External	Pre	34.30	6.00	6.54E-17*
		Post	39.70	6.03	
Pain	NPRS	Pre	8.30	0.76	3.67E-08*
		Post	7.57	0.66	
	Oxford	Pre	53.70	3.47	2.64E-06*
		Post	49.26	3.56	

(* indicates P-value (<0.001) is significant)

Flexion increased (88.70 ± 13.88) post treatment than at the beginning of treatment (82.74 ± 12.42). Extension pre-treatment was (34.04 ± 6.26) which slight increased post treatment (39.04 ± 6.27). Abduction pre-treatment was (81.43 ± 12.45) which slight increased post treatment (88.00 ± 12.84). Internal rotation pre-treatment (34.83 ± 4.75) which slight increased post treatment (40.13 ± 4.48). External rotation pre-treatment (34.30 ± 6.00) which slight increased post treatment (39.70 ± 6.03)Table 2- Pre-Post Comparison in Gongs Group B

GONGS Group B		Time Point	Mean	S.D.	p-value
ROM (Using Goniometer)	Flexion	Pre	100.96	12.02	1.26E-13*
		Post	122.91	12.17	
	Extension	Pre	42.17	4.39	1.65E-12*
		Post	48.17	3.81	
	Abduction	Pre	101.00	11.93	6.55E-14*
		Post	125.65	10.99	
	Internal	Pre	36.09	4.33	2.59E-18*
		Post	48.04	4.31	
	External	Pre	45.22	4.68	3.71E-18*
		Post	57.13	4.24	
Pain	NPRS	Pre	7.35	0.65	2.24E-12*
		Post	4.43	0.99	
	Oxford	Pre	51.61	1.64	3.18E-17*
		Post	35.78	2.83	

(* indicates P-value (<0.001) is significant)

Flexion minimal increased (122.91 ± 12.17) post treatment than at the beginning of treatment (100.96 ± 12.02). Extension pre-treatment was (42.17± 4.39) which minimal increased post treatment (48.17 ± 3.81). Abduction pre-treatment was (101.00 ± 11.93) which minimal increased post treatment (125.65 ± 10.99). Internal rotation pre-treatment (36.09 ± 4.33) which minimal increased post treatment (48.08 ± 4.31). External rotation pre-treatment (45.22± 4.68) which minimal increased post treatment (57.13 ± 4.24)

Table 3- Pre-Post Comparison in Pre-Post Comparison in Maitland's Group C

MAITLANDS Group C		Time Point	Mean	S.D.	p-value
ROM (Using Goniometer)	Flexion	Pre	101.39	15.23	3.08E-16*
		Post	145.74	9.34	
	Extension	Pre	44.09	4.10	4.20E-13*
		Post	54.74	2.00	
	Abduction	Pre	101.39	14.58	6.24E-16*
		Post	152.04	12.43	
	Internal	Pre	45.83	6.84	4.84E-13*
		Post	61.35	3.93	
	External	Pre	54.43	7.24	2.25E-14*
		Post	75.00	5.43	
Pain	NPRS	Pre	7.61	1.03	1.16E-19*
		Post	2.61	0.66	
	Oxford	Pre	53.22	3.94	5.77E-17*
		Post	26.39	2.76	

(* indicates P-value (<0.001) is significant)

Flexion moderately increased (145.74 ± 9.34) post treatment than at the beginning of treatment (101.39 ± 15.23). Extension pre-treatment was (44.09 ± 4.10) which moderately increased post treatment (54.74 ± 2.00). Abduction pre-treatment was (101.39 ± 14.58) which moderately increased post treatment (152.04 ± 12.43). Internal rotation pre-treatment (45.83 ± 6.84) which moderately increased post treatment (61.35 ± 3.93). External rotation pre-treatment (54.43 ± 7.24) which moderately increased post treatment (75.00 ± 5.43)

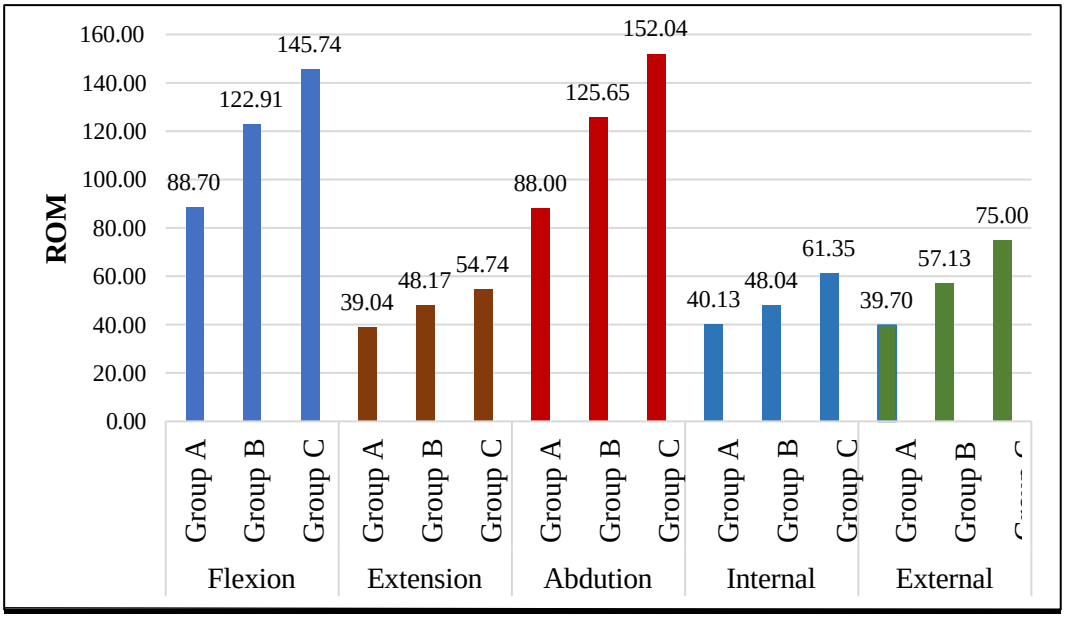
Table 4 - Group wise comparison and Pair wise comparison

Group-wise Comparison		Pair-wise Comparison		Mean		Mean diff	p-adj
		Group 1	Group 2	Group 1	Group 2		
ROM	Flexion	A	B	88.70	122.91	34.22	0.00*
		A	C	88.70	145.74	57.04	0.00*
		B	C	122.91	145.74	22.83	0.00*
	Extension	A	B	39.04	48.17	9.13	0.00*
		A	C	39.04	54.74	15.70	0.00*
		B	C	48.17	54.74	6.57	0.00*
	Abduction	A	B	88.00	125.65	37.65	0.00*
		A	C	88.00	152.04	64.04	0.00*
		B	C	125.65	152.04	26.39	0.00*
	Internal	A	B	40.13	48.04	7.91	0.00*
		A	C	40.13	61.35	21.22	0.00*
		B	C	48.04	61.35	13.30	0.00*
	External	A	B	39.70	57.13	17.43	0.00*

		A	C	39.70	75.00	35.30	0.00*
		B	C	57.13	75.00	17.87	0.00*
Pain	**NPRS**	A	B	7.57	4.43	-3.13	0.00*
		A	C	7.57	2.61	-4.96	0.00*
		B	C	4.43	2.61	-1.83	0.00*
	Oxford	A	B	49.26	35.78	-13.48	0.00*
		A	C	49.26	26.39	-22.87	0.00*
		B	C	35.78	26.39	-9.39	0.00*

(* indicates P-value (<0.001) is significant)

For group wise comparison there were notable differences between Groups A, B, and C and One-way ANOVA was used. There is significant difference between group so for pairwise comparison Tukey post hoc test is used.



Graph 1. Group-wise Comparison in ROM

Group wise comparison for ROM by using Goniometer for the shoulder joint.

Flexion- Compared among the three groupings Group C showed more

increased in the ROM compared to Group A and Group B.

Extension- Compared among the three groupings Group C showed more

increased in the ROM compared to Group A and Group B.

Abduction- Compared among the three groupings Group C showed more

increased in the ROM compared to Group A and Group B.

Internal Rotation- Compared among the three groupings Group C showed more increased in the ROM compared to Group A and Group B.

External Rotation - Compared among the three groupings Group C showed more increased in the ROM compared to Group A and Group B.

DISCUSSION

In the above study, pre intervention mean and SD of NPRS of Maitland's group was 7.61 $\pm$ 1.03 and post intervention mean and SD for same was 2.61 $\pm$ 0.66. As a result, it was determined that interference was extremely significant (p=<0.0001) of NPRS.

In a study conducted by **Dr. Shalinder Kumar Sharma et al.{2024}**, In participants with adhesive capsulitis, the Maitland mobilisation approach and the muscular energy technique produced considerably better and equivalent results ($p<0.001$) in terms of shoulder pain, range of motion, and disability index scores. All evaluated indicators showed statistically insignificant clinical improvement ($p>0.05$) when the data and intergroup comparison were analysed.[8]

Muhammad Rizwan et.al (2019) conducted study on "Comparing The Effect of Kaltenborn and Maitland Mobilization On Pain and Disability in Adhesive Capsulitis" concluded that In both groups and between the groups, there was a significant difference in pain and disability (measured by the Spadi index) before and after therapy ($p=0.000$; $p<0.05$); however, Maitland appears to be more successful than Kaltenborn. In Kaltenborn, the mean value and standard deviation for the NPRS and SPADI index after treatment were 3.4000 ± 1.60263 and 21.4500 ± 12.06768, whereas in Maitland, they were 1.5500 ± 0.75915 and 3.9500 ± 2.39462.[9]

According to **Sghir et al. (2020)**, regarding epidemiologic characteristics, there was no statistically significant difference between idiopathic and diabetic acute coronary syndrome (ACS) ($p < 0.05$). Compared to diabetic ACS, idiopathic ACS was significantly more prevalent in women ($p = 0.009$). Initially, there was a statistically significant difference between the two groups' VAS scores ($p > 0.05$). The groups' mobility for external rotation and abduction did not differ significantly at the beginning of the trial ($p > 0.05$). At baseline, both groups' HBB reach levels were statistically similar ($p > 0.05$). The initial revised

evaluations from constant showed statistical equality. The idiopathic ACS patients reported significantly less pain than the DM patients when comparing the VAS pain levels obtained at baseline and following the most recent therapy session in both groups. As a result, this study

suggests using rehabilitation as a successful treatment in practice for ACS, which significantly reduces pain and improves range of motion (ROM) based on VAS and goniometer results.[10]

In the above study the Gongs mobilization with conventional therapy compare with only conventional therapy have greater effect in pain by using NPRS with post intervention of mean and SD 51.61 $\pm$ 1.64(p=<0.0001) for Gongs mobilization and post intervention of mean and SD 7.57 $\pm$ 0.66 (p=<0.0001) for conventional therapy.

Gong W, in 2020 concluded found the flexion and abduction ranges of motion were noticeably larger in the post group. The aforementioned study reports that post-group values for ROM abduction and extension were considerably greater after four weeks, which is similar to Gong W. This suggests a successful outcome for both the traditional group and the Gong's mobilisation group. It improves quality of life, reduces pain, and increases shoulder movements and functional ability.[11]

In 2020, **Ramteke et al**. came to the conclusion that treating frozen shoulders with a combination of Gong's mobilisation and conventional therapy is more beneficial than utilising conventional therapy alone in terms of ROM and pain relief. The study indicates that treating individuals with frozen shoulders can be accomplished with a combination of Gong's mobilisation and traditional therapy.[12]

In the above study, giving Gongs and conventional therapy did not only decreased pain but it increased ROM of shoulder with lowering score for shoulder disability while using the Oxford shoulder score.

Gui Do Moon et al. (2015) concluded indicated there were notable variations in discomfort between the KM and MM groups before and after the intervention in both internal and exterior shoulder rotation ranges ($p < 0.05$). In patients with FS, however, there were no discernible variations in range of motion improvement or discomfort between the MM and KM groups ($p > 0.05$).[13]

Above study has used Maitland's mobilization with Gong's mobilization for improving shoulder pain and ROM in shoulders stiffness. Internal rotation in Maitland's mobilization

per intervention of mean and SD was 45.83 ± 6.84 post intervention of mean and SD 61.35 ± 3.93 (p=<0.0001). External rotation in Maitland's mobilization per intervention of mean and SD was 54.43 ± 7.24 post intervention of mean and SD 75.00± 5.43 (p=<0.0001).

Internal rotation in Gong's mobilization per intervention of mean and SD was 36.09 ± 4.33 post intervention of mean and SD 48.04 ± 4.31 (p=<0.0001). External rotation in Gong's mobilization per intervention of mean and SD was 42.22 ± 4.68 post intervention of mean and SD 57.13± 4.24 (p=<0.0001). As a result, it was determined that interference was extremely significant.

According to the study's conducted by **DR. S. Senthilkumar (2022)**, shoulder mobilisation must be included in the supervised exercise programme in order to meet the objectives of lowering discomfort and increasing range of motion, which would then improve performance in daily functional activities. Consequently, applying the Maitland approach led to a notable improvement in pain relief, increased range of motion, and effective treatment of the Periarthritis Shoulder. [14]

Maitland's mobilization with combined conventional therapy used Oxford Shoulder Score as an outcome measured for shoulder disability which showed a lower value of disability as oxford shoulder score have highest reliability and validity compare to Shoulder pain and disability index.

CONCLUSION

The techniques used in the above study showed clinical and statistically significant effectiveness on the post- operative shoulder stiffness .According to the scores, both group's' range of motion has increased, their instability and pain decreased. Patients in both groups report an improvement in their functional activities. It demonstrates that both groups' patient problems have significantly improved clinically. However, the statistical conclusion indicates that Maitland's mobilisation approach is more successful than Gong's in reducing instability and range of motion pain. This means that Codman's exercise and Maitland's mobilisation technique with stretching are more successful in treating post-operative shoulder discomfort.

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