EFFECTIVENESS OF KALTENBORN VERSUS MULLIGAN MOBALIZATION AS PHYSICAL THERAPY INTERVENTION IN MANAGEMENT OF UNILATERAL FROZEN SHOULDER

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ABSTRACT: Frozen shoulder (FS) is a common condition affecting the population between the ages of 30 and 60 for which joint mobilization techniques such as Maitland, Mulligan, and Kaltenborn .

Objective: To check the effectiveness of Kaltenborn versus Mulligan mobilizations as physical therapy intervention in management of unilateral Frozen shoulder.

Methodology: This was a randomized clinical trial. Data was collected from DHQ Mandi Bha-ud-Din (Physical Therapy Department with data size of 52 with equal distribution in two groups. Group A received Kaltenborn Mobilization while group B received Mulligan mobilization. Mulligan mobilization belt was used to apply both techniques and goniometer was used to measure the range of motion. The Shoulder Pain and Disability Index for quantifying shoulder pain and SF-36 for quantifying quality of life was used. SPSS version 21 was used to interpret the data.

Results: Within group analysis using paired samples T-test indicated that subjects receiving treatment with Kaltenborn mobilization with conventional physical therapy showed statistically significant improvement in functional status with p- value<0.05. Statistically significant improvement in the mulligan mobilization group which had greater effects on QOL and Functional disability than the Inspiratory Kaltenborn mobilization group.

Conclusion: This study revealed that mulligan mobilization proved to be more efficacious as compared to Kaltenborn mobilization.

Index Terms- Frozen shoulder, Adhesive capsulitis, Kaltenborn mobilization, Mulligan mobilization, Quality of life, unilateral shoulder pain.

I. INTRODUCTION:

The glenohumeral joint (shoulder joint) is a ball and socket joint that connects the scapula and the humerus.⁽¹⁾ The glenohumeral joint is constructed by the articulation of the head of the humerus with the glenoid cavity of the scapula.⁽²⁾⁽³⁾ Pain, loss of

movement, and loss of joint range of motion are all symptoms of the disease.⁽⁴⁾ Synovial inflammation, joint capsule hypertrophy, and the formation of fibrous structures are all part of the pathology of frozen shoulder. ⁽⁵⁾ Frozen shoulder (FS) is a common condition affecting the population between the ages of 30 and 60; the causative agent is idiopathic, sedentary lifestyle, post-traumatic, or secondary to any pathological conditions.⁽⁶⁾ The common clinical features are pain, and reduction in the range of motion in the capsular pattern. ⁽⁷⁾

The present literature shows the incidence of FS is 2 to 5% worldwide. FS is commonly seen in the population lying in the age group 40-60. The incidence of FS is less common after the 70s except in certain cases with a traumatic shoulder injury.⁽⁸⁾The prevalence is more common in women than in men. On the other hand, in the population suffering from the above-mentioned conditions such as diabetes, hypothyroidism, etc., the risk of FS is increased by 10% to 38%.⁽⁹⁾ Individuals suffering from type 1 diabetes are at the greatest risk whereas the risk further increases if the individual's age is more than 45 years. This is because of the increased level of glycated hemoglobin A1c (HbA1c) which is a deciding factor. Individuals with poor glycemic control have a higher risk of developing FS. (10)

Functional disability is one of the most common complaints for patients with shoulder pain.⁽¹¹⁾ The aim of shoulder pain treatment is generally to reduce pain and strengthen functional disabilities.^(12, 13) The treatment modalities are medical therapy, physical therapy, manipulations under anesthesia, nerve blockers, and steroid injections.⁽¹⁴⁾ Surgical treatment is used when conservative treatment fails over a period of three to six months.⁽¹⁵⁾ The management of FS changes with the progression of the disease; during the initial phase, which is the freezing phase, the duration is 13-36 weeks.⁽¹⁶⁾ Pain reduction and maintaining the available range of motion (ROM) is the mainstay of

the treatment for pain; steroid injection and pendulum exercises are the choices of treatment.⁽¹⁷⁾

The main clinical features presented by the patients are reduction of the range of motion and moderate pain for which joint mobilization techniques such as Maitland, Mulligan, and Kaltenborn, can be used while in recent years newer mobilization technique is also found to be effective. ⁽¹⁸⁾ For the individuals who are in the thawing stage of the FS, the duration of the thawing phase is 12-42 months; in this phase, progressive reduction of the pain and gradual increment in the range of motion are seen ⁽¹⁹⁾ ⁽²⁰⁾ Physical functional activities are restored and joint stiffness and pain are reduced because of Maitland's mobilization.⁽²¹⁾

Various treatment methods are being used by medical professionals, physiotherapists and surgeons to treat adhesive capsulitis. Physiotherapy plays vital role in treatment of frozen shoulder through electrotherapy and manual therapy. Previous literature has compared Mulligans and Maitland mobilization more often while comparative study for kaltenborn and Maitland mobilization were found less often. Current study aimed to explore the effects of Kaltenborn versus Mulligan mobilizations as physical therapy intervention in management of unilateral Frozen shoulder.

II. MATERIAL AND METHODS

This was a randomized clinical trial. Data was collected from DHQ Mandi Bha-ud-Din (Physical Therapy Department with data size of 52 with equal distribution in two groups. Group A received Kaltenborn Mobilization while group B received Mulligan mobilization. Simple random sampling technique was used. Inclusion criteria was based on both genders, aged between 20-40 years diagnosed frozen shoulder patient, idiopathic as well secondary to diabetes, All stages of frozen shoulder, Pain of any level and Limited range of motion (ROM). Exclusion criteria was based on history of fracture or trauma around shoulder joint, reported cancer around shoulder, Open reduction & internal fixation (ORIF) of shoulder and Unwilling patient. Mulligan mobilization belt was used to apply both techniques and goniometer was used to measure the range of motion. The Shoulder Pain and Disability Index for quantifying shoulder pain and SF-36 for quantifying quality of life was used. SPSS version 21 was used to interpret the data. Independent samples T-test was applied for between group comparison. Paired samples T-test was applied for within group comparison. Pvalue was set to 0.005.

III. RESULTS

A comparative study was done to find the efficiency of Kaltenborn versus Mulligan mobilizations as physical therapy intervention in management of unilateral frozen shoulder. А comparative experimental study was conducted to carry out the research. 52 subjects were randomized in this study design. 26 subjects included in the Kaltenborn mobilization in company with conventional physiotherapy group and 26 subjects were included in the Mulligan mobilization in company with conventional physiotherapy. One and all participant of the two groups was scored on SPADI Questionnaire and SF-36 Questionnaire before and after end of treatment session. The outcome of this experimental study revealed the efficacy of Mulligan mobilization had finer treatment results than Kaltenborn mobilization on pain, disability of the shoulder and quality of life in patients with unilateral frozen shoulder. In this study total patient were 52, in which 15 males and 11 females were obtain the kaltenborn mobilization while 17 males and 09 females were obtaining mulligan mobilization.

Table	1:	Baseline	measurement	of	outcome
variab	les:				

	Kaltenborn mobilization (n=26)	Mulligan mobilization (n=26)	P value
	Mean ± SD	Mean ± SD	
SPADI	76.23±5.46	76.57±6.03	0.829
SF-36	35.46±5.01	34.07±4.38	0.294

Both groups were similar in SPADI questionnaire and MLHFQ at baseline treatment values with p-value>0.05. Pre-treatment Mean±SD of SPADI questionnaire in kaltenborn mobilization is 76.23±5.46 while in mulligan mobilization is 76.57±6.03. Pre-treatment mean value of SF-36 in kaltenborn mobilization is 35.46±5.01 while in mulligan mobilizations are 34.07±4.38. Independent sample t-test was applied to compare pre-treatment and post-treatment SPADI questionnaire between two groups.

 Table 2: Between group comparisons of SPADI
 guestionnaire:

SPADI	Kaltenborn mobilization (Mean ± S.D) (n=26)	Mulligan mobilization (Mean ± S.D) (n=26)	P- value
Pre- treatment	76.23±5.46	76.57±6.03	0.829
Post treatment	33.38±6.11	16.84±3.09	0.00

The results showed that there was statistically significant difference between two groups with p < 0.05. Pre-treatment Mean \pm SD of SPADI questionnaire in kaltenborn mobilization is 76.23 \pm 5.46 while in mulligan mobilization is 76.57 \pm 6.03. Independent sample t-test was applied to compare pre-treatment and post-treatment SF-36 value between two groups.

Table 3: Between group comparison of SF-36:

SF-36	Kaltenborn mobilization (Mean ± S.D) (n=26)	Mulligan mobilization (Mean ± S.D) (n=26)	P- value
Pre- treatment	35.46±5.01	34.07±4.38	0.294
Post treatment	46.03±4.54	64.19±6.19	0.00

The results showed that there was statistically significant difference between two groups with p < 0.05. Pre-treatment mean value of SF-36 in kaltenborn mobilization is 35.46 ± 5.01 while in mulligan mobilizations are 34.07 ± 4.38 .

Table 4: Within group comparisons for SPADIquestionnaire:

SPADI questionnaire	Kaltenborn mobilization (Mean ± SD) (n=26)	Mulligan mobilization (Mean ± S.D) (n=26)
Pre- treatment	76.23±5.46	76.57±6.03
Post treatment	33.38±6.11	16.84±3.09
P-value	0.00	0.00

The comparison of SPADI questionnaire within each treatment group using paired sample t-test. The results

showed statistically important variation for both groups (p-value less than 0.05) with greater difference seen in group of mulligan mobilization.

Table 5: W	ithin group	comparisons	for	SF-36:
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SF-36	Kaltenborn mobilization (Mean ± SD) (n=26)	Mulligan mobilization (Mean ± S.D) (n=26)
Pre- treatment	35.46±5.01	34.07±4.38
Post treatment	46.03±4.54	64.19±6.19
p-value	0.00	0.00

While the comparison of SF-36 within each treatment group using paired sample t-test. The results showed statistically important variation for both groups (pvalue less than 0.05) with greater difference seen in group of mulligan mobilization.

IV. DISCUSSION

A study was performed to find the comparative effect of mulligan mobilization with movement (MWM) technique versus Kaltenborn mobilization technique on pain, disability and end range of motion of shoulder joint in patients with adhesive capsulitis. Study showed that the effect of Mulligan MWM technique and Kaltenborn mobilization technique was significant in reducing pain and improving end range of motion but on comparison Mulligan 'MWM' was more effective than Kaltenborn mobilization technique.(22) Now current study also indicated statistically significant improvement in the mulligan mobilization group which had greater effects on QOL and Functional disability than the Inspiratory Kaltenborn mobilization group. Another study performed to compare the effectiveness of Kaltenborn mobilization combined with thermotherapy versus Kaltenborn mobilization alone in patients with adhesive capsulitis. Shoulder pain and disability index (SPADI) was used at baseline and post-treatment to evaluate pain and disability of AC patients. The result of study found that Kaltenborn mobilization combined with thermotherapy was found to be more effective than Kaltenborn mobilization alone in patients with adhesive capsulitis.(23) Present study results for within group analysis using paired t test indicated that subjects receiving treatment with Kaltenborn mobilization with conventional physical therapy

showed statistically significant improvement in functional status with p- value<0.05.

Previous study conducted by Deepali Rathod to compare the efficacy of Kaltenborn versus mulligan mobilization in frozen shoulder. The baseline data of ROM of all movements of shoulder was obtained using universal goniometer, pain and disability data was obtained using SPADI. Results found that Mulligan mobilization is more effective in improving VAS (Pain), ROM of shoulder and Shoulder pain and disability index (SPADI) than Kaltenborn mobilization.(24) In favor to above results, this study revealed that mulligan mobilization proved to be more efficacious as compared to Kaltenborn mobilization regarding pain, functional disability and quality of life among frozen shoulder patients.

Current study results for between group analysis using independent sample t test indicated that subjects receiving treatment with mulligan mobilization with conventional physical therapy showed statistically significant improvement in pain, QOL and functional status with p- value<0.05. This has also been proved in a previous study which concluded that application of mulligan's mobilization with movement (MWM) technique did add to the effectiveness of a regimen of supervised exercises and HEP in frozen shoulder patients with type 2 diabetes mellitus. Based on these results, it is suggested to incorporate MWM techniques along with routine exercise regimens while treating these patients in clinical practice.(25) Present study shows a statistically significant difference between two groups with p- value < 0.05 in terms of all outcome measures by using paired t test and independent sample t test. But there is more improvement in the group receiving Mulligan's mobilization as compared to that of other group in which participants were treated with Kaltenborn mobilization technique. There is marked improvement in pain, QOL and improvement in functional status. Recommendation(s):

It was suggested that more randomized controlled trials should be conducted to prove effects of Mulligan's mobilization as an independent technique. Sample population should comprise of approximately equal number of both male and female. Further research should be conducted to determine the longterm consequences of intervention by continuing follow-up sessions. The study should be conducted in multi-centered clinical settings.

LIMITATION(S):

Effects were not categorized according to chronicity of the condition. Study was conducted in single setting so results cannot be generalized. Data was not equally distributed for males and females so outcomes cannot be differentiated for genders.

V. CONCLUSION:

The study concluded that both Kaltenborn and Mulligan's mobilization technique were useful in reducing pain and functional disability, and quality of life among patients unilateral frozen shoulder. However, Mulligan's mobilization technique was more effective in terms of mentioned outcome measures based on their mean differences.

Conflict of Interest

There was no conflict of interest.

Financial Statement

No fundings were given by any authorities; it was a project thesis of doctor of physical therapy.

Data availability

Data will be provided on the demand by corresponding author.

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