

## Comparison Of Effectiveness Between Scapular Mobilization Using Kaltenborn Technique and General Scapular Mobilization in Adhesive Capsulitis: A Randomize Control Trial.

**Shaista rani<sup>1</sup>, Rehana Hayat<sup>2</sup>, Sumbal Salik<sup>3</sup>, Misdaq Batool<sup>4</sup>, Rizwan Haider<sup>5</sup>, Arooba Nawaz<sup>6</sup>**

1, Mafaza-Tul-Hayat Hospital, 2, Akhtar Saeed Medical & Dental College Lahore, 3, Johar Institute of Professional Studies, 4, Sargodha medical college, 5, Mayo Hospital Lahore, 6, Sargodha institute of health sciences, Pakistan

**Abstract:** Frozen shoulder is the painful inflammatory condition of the shoulder, which affects normal movements of shoulder having different etiological causes, but if it is untreated then it progresses to person's lifetime disability and limit all functional activities of person.

**Objective:** To determine the comparative effectiveness of Kaltenborn Scapular mobilization and General scapular mobilization in frozen shoulder for better recovery in patients.

**Material and Method:** A single-blinded randomized control trial was conducted in Physiotherapy Department of Mayo Hospital Lahore from 20<sup>th</sup> December to 30<sup>th</sup> January 2020. The study included 45 patients who were suffering from frozen shoulder of both genders and age group of 30-50 years had no local infection. The patients were randomly placed in three groups i.e.; conservative and two trial groups by computerized generated list. In conservative group; 15 patients were treated with conventional therapy. In trial groups; one was treated with Kaltenborn scapular mobilization and Conventional therapy and the other trial group were treated with General scapular mobilization and Conventional therapy 3 sessions per week. Pain intensity, Shoulder ROM and level of disability were outcome measures by Numeric Pain Rating Scale (NPRS), Goniometer and Shoulder Pain and Disability Index scale (SPADI).

**Results:** The results showed that pain intensity, ROM and disability was improved all groups. However, statistically significant improvement in ROM and reduction in pain were observed among which were treating with Kaltenborn Scapular mobilization along with Conventional treatment with p-value <0.05 as compared to the general scapular mobilization. The study provides the opportunity to the patients to consider physiotherapy as an effective treatment for the frozen shoulder. It also provides the statistical knowledge about the role of the Kaltenborn scapular mobilization in treating the disability among Frozen shoulder patients.

**Conclusion:** It was concluded that Kaltenborn Scapular mobilization was more effective than General scapular mobilization in frozen shoulder not only in decreasing pain but also improves function and flexibility of shoulder.

**Index Terms:** Frozen shoulder, Kaltenborn Scapular

mobilization, General scapular mobilization.

### I. Introduction:

Frozen shoulder or Adhesive capsulitis was a painful self-limiting (1) inflammatory condition in which fibrosis of capsule occurs causing severe pain at rest and limited active and passive range of motions (2) having an appearance of capsule peeling off from humeral head like an-adhesive plaster from skin (3). Frozen shoulder was first identified by Duplay in 1872 as periarthritis but term Frozen shoulder was introduced to medical world by Codman in 1930 (4). Frozen shoulder also known as -Scapulaohumeral periarthritis (5). The etiology of Frozen shoulder was mostly unknown and unclear (6) except Idiopathic Frozen Shoulder. Frozen shoulder had a incidence of 3% in general population (7) as it mostly affect Women than men of 40 to 60years of age but peak age was 56years mostly in non-dominant shoulder (8) without any genetic or racial incidence. Frozen shoulder had two basic types which are Primary ( no specific pathology) and Secondary frozen shoulder (have a specific pathology ) further divided into *Intrinsic* (due to shoulder structures), *Extrinsic* (structures around shoulder) and *Systemic* (other systemic disorders diabetes mellitus) (9,10). While there was another type called Secondary Diabetic Frozen shoulder that was separated due to sever disease course (2, 11). Frozen shoulder clinically had three phases which were *FREEZING or painful phase* ( 2-9 months), *FROZEN or progressive stiffness phase* ( 10-36 weeks) and last was *THAWING or resolution phase* ( 15- 24 weeks) (5,12). Frozen shoulder was treated by medicines, injections, surgery (arthroplasty, arthrodesis), acupuncture (13,14). But studies proved that Physiotherapy like mobilization (MWM Mobilization with movement, Kaltenborn mobilization and Scapular mobilization) and manual therapy, isometrics and stretching; cause long term effects than other treatment interventions (15). According to pervious researches, Kaltenborn mobilization used to cause decrease in pain and increase ROM (16). On the other hand, General Scapular mobilization was used to improve the scapula-humeral rhythm to enhance the shoulder movements (17). Previous literature mostly focused on the effectiveness of the mobilization

techniques and exercises on the shoulder joint. However, still, there is the gap about the role of the scapular mobilization in treating the Frozen shoulder joint. Scapular movement plays the significant role in scapulohumeral rhythm and in the end range of all shoulder movements. Therefore, the purpose of this study was to evaluate the efficacy of Kaltenborn Scapular mobilization with a comparison of General Scapular mobilization in frozen shoulder patients to find out which technique provides better results in decreasing pain and improving shoulder ranges and the disability level in patients.

## II. Materials and Methods:

The study was single blinded randomized control trial which was conducted at Physiotherapy department of the Mayo hospital Lahore after getting the ethical permission from the research committee with the reference number 2198/RC/KEMU. In this study, 50 patients referred from the orthopedic department from 20<sup>th</sup> December to 30<sup>th</sup> January 2020 were assessed through the general examination including demographic data, mode of onset, and duration of symptoms and location of symptoms. The 45 patients both male and female of 30-50 years age having no local infection suffered from Frozen Shoulder were selected according to inclusion criteria of study by using Simple random sampling technique. The patients were equally divided into three groups by random allocation to prevent biasness as 15 individuals in each group. **Group – A;** patients were treated with *Conventional Therapy* as Hot pack applied for 10 minutes, Shoulder isometrics, Wall and Codman exercises. **Group –B** patients were treated with *Conventional therapy and General scapular mobilization*. **Group – C** patients were treated with *Conventional therapy and Kaltenborn Scapular mobilization*. For the assessment of each patient's General shoulder test like Apply scarf test was used to assess shoulder disability along with Shoulder Disability Questionnaire having 16 items which measures patient's limitation and functional status. Numeric pain rating scale (NPRS) and ROM by Goniometer measured pain before the treatment and immediately after treatment session. The difference in the improvement and reduction in symptoms was noted and compared before the treatment session and after the treatment session. In *Group A*; *Conventional therapy* was applied in which hot pack; all shoulder isometrics, wall exercises and Codman exercises were performed in sitting and standing position. In *Group B*; hot pack was applied for 10 minutes then *General scapular mobilization* was performed as techniques in which therapist passively move scapula in rotations and inferiorly without any sustained stretch or oscillatory movements for 5-10 minutes. In *Group C*; hotpack as it applied for 10 minutes. After this, *Kaltenborn scapular mobilization* is applied on

scapula as sustained stretch applied on the scapula by moving scapula in upward rotation, downward rotation and inferiorly by the therapist for 5-10 minutes. After all the sessions, Home guided physiotherapy program was instructed to each patient which include Conventional therapy and patient have to perform each guided exercises three times in a day for almost 15 minutes.

The sample size of the study was calculated from the research center of King Edward Medical using G power program. Total 45-sample size was estimated with 95% confidence interval. The data was collected through the written questionnaire forms and the analysis was done by the SPSS version 23. Paired sample t-test and ANOVA were used to analyze results. Demographic data were shown by bar chart and other factors such as marital status, socioeconomic status, gender, duration with behavior of pain and education are analyzed through descriptive statistics and shown by pie and bar charts.

**Table I: Baseline Characteristics of participants of all groups:**

Variables	Result		
	group A	group B	group C
<b>1. Age:-</b>	50.37±9.852.	47.00 ±10.6	51.13 ±7.482
<b>2. Gender:-</b>	Male =5 Female=10	Male = 6 Female = 9	Male = 7 Female = 8
<b>3. Mode of pain:-</b>	Night = 7 Rest =2 Movement=6	Night = 6 Movement = 9	Night =3 Rest = 2 Movement = 10
<b>4. Behavior of pain:-</b>	Localized = 5  Radiating = 10	Localized = 3  Radiating = 12	Localized = 4  Radiating = 11

**Table II: NPRS and SPADI Between group difference of all groups:-**

Outcome Measure	Group A			Group B			Group C		
	Pre	Post	p	Pre	Post	p	Pre	Post	p
<b>NPRS</b>	6.40 ±1.5	5.53 ±1.5	0.00	6.08 ±1.20	4.20 ±1.2	0.00	6.6±1.5	3.1±0.83	0.00
<b>SPADI</b>	80.0 ±17.8	79.4 ±17.62	0.00	94.7 ±15.15	90.5 ±15.48	0.00	89.0 ±16.1	80.9 ±15.9	0.00

**Table 3: Range of motions Between group difference of all groups:-**

Ranges	Group A post	Group B post	Group C post	p value
Flexion	102.6±17.41	90.7±20.73	107.933±26.35	0.029
Extension	28.06±13.05	37.40±12.43	39.93±15.65	0.026
Abduction	106.26±30.74	96.80±26.104	116.86±28.45	0.168
External Rotation	43.66±27.99	29.00±16.970	44.53±17.45	0.05
Internal Rotation	62.66±18.90	50.06±21.12	73.46±14.42	0.005

**III. Results:**

The results of the study showed that the mean age of patient's were 49.3 as it varied among all three groups. The baseline characteristics of the patients were described in *Table 1*. There was no significant difference among the baseline characteristics of all groups. *Table 1* showed that among groups, group A had 5 males and 10 females; group B had 6 males and 9 females while group C had 7 males and 8 females. The mode of pain among frozen shoulder patients varied among different groups. Among group A, 7 had night pain, 6 had pain on movements while 2 had pain at rest. However, 6 had night pain and 9 had pain on movements in group B patients while 3 had night pain, 10 had pain on movements while 2 had pain at rest in

group C patients. Similarly, *Table 1* described about the behavior of pain in which 5 had localized pain and 10 had radiating pain in group A, 3 had localized pain and 12 had radiating pain in group B while 4 had localized pain and 11 had radiating pain in group C. *Table II* provides the results about the improvement in pain and disability level among the frozen shoulder patients. *Table II* showed that Pain was statistically reduced by all three techniques in all groups according to NPRS scoring with 5.53±1.5, 4.20 ±1.2 and 3.1±0.83 but significant reduction in pain intensity was observed in-group treated with Kaltenborn scapular mobilization with p-value 0.00. *Table II* shows that there is improvement in SPADI score among all groups with 79.4±17.62, 90.5±15.48 and 80.9 ±15.9 but there is no significant difference among all groups as p-value = 0.00 which described that more time is required for treating disability completely and to determine the significant difference among groups. *Table III* shows that Active flexion, extension, abduction, external and internal rotation improved in all groups with group A flexion (102.6±17.41), extension (28.06±13.05), abduction (106.26±30.74), external rotation (43.66±27.99) and internal rotation (62.66±18.90). While in General Scapular mobilization flexion (90.7±20.73), extension (37.40±12.43), abduction (96.80±26.104), external rotation (29.00±16.970) and internal rotation (50.06±21.12). However, Kaltenborn scapular mobilization in flexion (107.933±26.35), extension (39.93±15.65), abduction (116.86±28.45), external rotation (44.53±17.45) and internal rotation (73.46±14.42) with p-value <0.05 but the significant improvement in all ranges by Kaltenborn scapular mobilization among the patients treated with frozen shoulder

**IV. Discussion:**

The study was conducted to find out the effectiveness of Kaltenborn scapular mobilization VS General Scapular mobilization in the treatment of the Adhesive capsulitis. Studies shows positive results that Conventional treatment, Kaltenborn scapular and General scapular mobilization all involve in the relief of pain, improve disability and range of motion. Pain was relieved in each group as isometrics of shoulder cause development of effective strength in muscles and decrease fatigability (18) but Kaltenborn Scapular mobilization have marked significant results in reduction of pain as joint mobilization had hypo-analgesic effect and cause stimulation of mechanoreceptors which indirectly inhibits the activity of type IV nociceptors (19). Range of motion was improved in all three groups but Kaltenborn and general scapular mobilization both involve in increasing the range of motion of shoulder by increasing the Scapulohumeral rhythm and treating tipping of scapula (20,21) but Kaltenborn Scapular mobilization have more beneficial effects as it also cause

sustained stretching effect on shoulder soft tissues and scapular structure cause lifting the arm above the head and reduced disability (22). Physiotherapy played important role in managing the frozen shoulder as mobilization, heating modalities and exercises. As disuse atrophy was very common in these patients<sup>8</sup>, which eventually lead to severe the condition and pathology. Therefore; physiotherapy played important role in educating the patient, prevent the complications which eventually better the prognosis in the patients (23). Post rehabilitation of frozen shoulder have better and long-lasting effect in improving the range of motion in frozen shoulder in all movements (24).  
Limitation: The study was conducted on very small sample size and the time duration of research was also very small.

#### 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.

### V. Conclusion:

Frozen shoulder is the most common joint disease which affects daily activity of human being. Physiotherapy plays an important role in treatment of frozen shoulder along with other medical treatments. According to this research; symptoms of the frozen shoulder decreased by using physiotherapy treatment but Klatenborn Scapular mobilization is more effective in the management of frozen shoulder as compared to General scapular mobilization in improving range of motions, reduce pain and reduce disability by enabling the patients to life independently and perform the normal activities of daily living. So, by using<sup>16</sup>. Physiotherapy and this technique recovery rate in the patients increased and help patients to return to their normal daily activity easily and earlier.

#### References:

1. Grey RG. The natural history of "idiopathic" frozen shoulder. *JBJS*. 1978;60(4):564.
2. Robinson C, Seah KM, Chee Y, Hindle P, Murray I. Frozen shoulder. *The Journal of bone and joint surgery British volume*. 2012;94(1):1-9.
3. Mengiardi B, Pfirrmann CW, Gerber C, Hodler J, Zanetti M. Frozen shoulder: MR arthrographic findings. *Radiology*. 2004;233(2):486-92.
4. Dias R, Cutts S, Massoud S. Frozen shoulder. *BMJ: British Medical Journal*. 2005;331(7530):1453.
5. Amanat S, Sajjad AG, Kausar F, Mehmood Q, Hussain SA. Comparison of Manual Therapy Techniques in Adhesive Capsulitis
6. Hannafin JA, Chiaia TA. Adhesive Capsulitis: A Treatment Approach. *Clinical orthopaedics and related research*. 2000;372:95-109
7. Tighe CB, Oakley JW. The prevalence of a diabetic condition and adhesive capsulitis of the shoulder. *Southern medical journal*. 2008;101(6):591-5.
8. Dias R, Cutts S, Massoud S. Frozen shoulder. *Bmj*. 2005;331(7530):1453-6.
9. Zuckerman JD, Rokito A. Frozen shoulder: a consensus definition. *Journal of shoulder and elbow surgery*. 2011;20(2):322-5.
10. Maund E, Craig D, Suekarran S, Neilson A, Wright K, Brealey S, et al. Management of frozen shoulder: a systematic review and cost-effectiveness analysis. *Health Technology Assessment (Winchester, England)*. 2012;16(11):1.
11. Guyver P, Bruce D, Rees J. Frozen shoulder—A stiff problem that requires a flexible approach. *Maturitas*. 2014;78(1):11-6.
12. Pearsall IV AW, Holovac TF, Speer KP. The intra-articular component of the subscapularis tendon: anatomic and histological correlation in reference to surgical release in patients with frozen-shoulder syndrome. *Arthroscopy: The Journal of Arthroscopic & Related Surgery*. 2000;16(3):236-42.
13. Calis M, Demir H, Ulker S, Kirnap M, Duygulu F, Calis HT. Is intraarticular sodium hyaluronate injection an alternative treatment in patients with adhesive capsulitis? *Rheumatology international*. 2006;26(6):536-40.
14. Asheghan M, Aghda AK, Hashemi E, Hollisaz M. Investigation of the effectiveness of acupuncture in the treatment of frozen shoulder. *Materia socio-medica*. 2016;28(4):253.
15. Favejee M, Huisstede B, Koes B. Frozen shoulder: the effectiveness of conservative and surgical interventions—systematic review. *British journal of sports medicine*. 2011;45(1):49-56.
16. Neumann DA. The convex-concave rules of arthrokinematics: flawed or perhaps just misinterpreted? : *JOSPT, Inc. JOSPT*, 1033 North Fairfax Street, Suite 304, Alexandria, VA ...; 2012.
17. Shakil-ur-Rehman S. Comparison between Klatenborn and General Scapular Mobilization in Adhesive Capsulitis Patients. *Journal of Rawalpindi Medical College*. 2012;16(2):121-2.
18. Sökk J, Gapeyeva H, Erelina J, Kolts I, Pääsuke M. Shoulder muscle strength and fatigability in patients with frozen shoulder syndrome: the effect of 4-week individualized rehabilitation. *Electromyography and clinical neurophysiology*. 2007;47(4-5):205-13.
19. Moss P, Sluka K, Wright A. The initial effects of knee joint mobilization on osteoarthritic hyperalgesia. *Manual therapy*. 2007;12(2):109-18.
20. Celik D. Comparison of the outcomes of two different exercise programs on frozen shoulder. *Acta orthopaedica et traumatologica turcica*. 2010;44(4):285-92.

21. Fayad F, Roby-Brami A, Yazbeck C, Hanneton S, Lefevre-Colau M-M, Gautheron V, et al. Three-dimensional scapular kinematics and scapulohumeral rhythm in patients with glenohumeral osteoarthritis or frozen shoulder. *Journal of biomechanics*. 2008;41(2):326-32.
22. Yang J-l, Chang C-w, Chen S-y, Wang S-F, Lin J-j. Mobilization techniques in subjects with frozen shoulder syndrome: randomized multiple-treatment trial. *Physical therapy*. 2007;87(10):1307-15.
23. Anton H. Frozen shoulder. *Canadian family physician*. 1993;39:1773.
24. Kibler WB. Shoulder rehabilitation: principles and practice. *Medicine and Science in Sports and Exercise*. 1998;30(4 Suppl):S40-50.