International Journal of Physiotherapy and Research,
Int J Physiother Res 2022, Vol 10(5):4364-68. ISSN 2321-1822
DOI: https://dx.doi.org/10.16965/ijpr.2022.156

Original Research Article

Effect of Gleno-humeral-capsulo-Ligamentous Stretch Maneuvers on Range of motion in Bilateral Frozen Shoulder

Mariya Shahjahan *[1], Smita Patil [2].

*[1] Intern, Department of physiotherapy, Krishna Institute of Medical Sciences "Deemed to be" University, Karad, Maharashtra, India.

[2] Head of Sports department, Department of physiotherapy, Krishna Institute of Medical Sciences "Deemed to be" University,Karad, Maharashtra, India.

ABSTRACT

Background: Painful restriction of shoulder movement, without an underlying cause, which results in complete loss of motion of the glenohumeral joint is called Frozen Shoulder. The process is started with an inflammation of the lining of the joint within the shoulder. Gradually this area thickens and results in the shoulder becoming stiffer and more painful. It is seen commonly at the age of 40-65 years and more often in women. Overall, this condition affects work, leisure, and quality of life. Frozen shoulder often progresses in three stages: the freezing, frozen and thawing phases. Risk factors for frozen shoulder are diabetes, thyroid, history of shoulder trauma, cervical radiculopathy, post-operative immobilization, and shoulder surgery. Cyriax described the typical capsular patterns of the gle-no humeral joint in the frozen shoulder with abduction more limited than external rotation, and external rota-tion more limited than internalrotation. This study aims to establish the effect of gleno humeral capsulo ligamentous stretch maneuvers on bilateral frozen shoulder.

Methods: A total of 40 subjects diagnosed with bilateral frozen shoulder were selected for the study. Subjects received low load prolonged stretching, mobilization and shoulder range of motion exercises. Each session was conducted for 30 minutes duration, 5 days per week for 4 weeks. Outcome measures used were Numerical pain rating scale (NPRS), Goniometer and Shoulder Pain and Disability Index (SPADI).

Results: The results of the study demonstrate that there was a significant effect of gleno humeral capsulo ligamentous stretch on numerical pain rating scale ($p<0.0001$), range of motion (Shoulder flexion, abduction, internal rotation and external rotation ($p<0.0001$), Shoulder pain and disability index ($p<0.0001$) during the pre and post intervention assessment**.**

Conclusion: It is concluded that that the use of low load prolonged stretch and mobilization was very effective in reducing pain and improving range of motion. Shoulder range of motion exercises was effective in improving strength and flexibility of shoulder musculature.

KEYWORDS: Low load prolonged stretch, mobilization, numerical pain rating scale, Shoulder pain and disability index, Bilateral frozen shoulder.

Address for correspondence: MariyaShahjahan, Department of Physiotherapy, Krishna Institute of Medical sciences deemed to be University, Karad, Maharashtra, India. Pin code - 415539. Phone number – 8412971130 **E-Mail:** drmariyashahjahan@gmail.com

Access this Article online	Journal Information
Quick Response code	**International Journal of Physiotherapy and Research** ISSN (E) 2321-1822 | ISSN (P) 2321-8975 **https://www.ijmhr.org/ijpr.html** **DOI-Prefix:** https://dx.doi.org/10.16965/ijpr
DOI: 10.16965/ijpr.2022.156	**Article Information**
	Received: 15 August 2022 Peer Review: 17 August 2022 Revised: None Accepted: 09 September 2022 Published (O): 11 October 2022 Published (P): 11 October 2022

INTRODUCTION

Painful restriction of shoulder movement, without an underlying cause, which results in complete loss of motion of the glenohumeral joint is called Frozen Shoulder [1]. Frozen Shoulder is also known as pericapsulitis,

scapulo-humeral periarthritis, Humero-scapular fibrositis, and periarthritis, stiff and painful shoul-der [1]. The process is started with an inflammation of the lining of the joint within the shoulder. Gradually this area thickens and results in the shoulder becoming stiffer and more painful [1]. It is seen commonly at the age of 40-65 years and often in women. Overall, this condition affects work, leisure, and quality of life [1]. The patients history of progressive onset of severe shoulder pain with the developing limitation of active and passive movements in capsular pattern can be used to diagnose Frozen shoulder [1]. Cyriax described the typical capsular patterns of the gle-nohumeral joint in the frozen shoulder with the abduction more limited than the external rotation, and external rota-tion more limited than the internal rotation [1].

Ultrasound (US) is a deep tissue heating modal-ity which can increase tissue temperature. The physiologic re-sponse due to ultrasound therapy includes increased col-lagen tissue extensibility, pain threshold, and enzymatic activity, along with changes in nerve conduction velocity and contractile activity of skeletal muscle [1].

Maitland tech-nique includes the application of accessory oscillatory movements to treat stiffness which is mechanical in na-ture. The techniques aim to restore motion of spin, glide, and roll between joint surfaces and are graded according to the amplitude. Grade I and II of Maitland techniques are primarily used for treating joints limited by pain whereas grade III and IV are primarily used as stretching manoeuvres.[1]Risk factors for adhesive capsulitis are diabetes, thyroid disorder, history of shoulder trauma, cervical radiculopathy, post-operative immobilization, and shoulder surgery [1]. Possible causes are immunologic, inflammatory, biochemical, and endocrine alterations [2].

Joint mobilization techniques bring about various beneficial effects including neurophysiological, biomechanical and mechanical effects. Manual therapy techniques and mobilization have a positive effect on treatment of frozen shoulder according to researches [2]. Frozen shoulder in patients with diabetesmellitus (DM) appears to be more severe and takes more time to heal [2].

Increased flexibility is one of the fundamental concerns addressed in the day-to-day practice of physical therapy. It is essential for any patient recovering from a period of immobilization or injury involving the connective tissues [3]. The ability of a connective tissue to elongate depends on the amount of interweaving between the meshwork of its collagen fibers. The fewer the inter weavings in the meshwork of fibers, the greater the mobility of the connective tissue. Conversely, the greater the amount of fiber interweaving, as in dense connective tissue, the more restricted the range of motion (ROM).[3]The validity of a low-load prolonged stretch (LLPS) to encourage long-lasting elongation of connective tissue has been proven [3]. It has also been found that the temperature during the stretch has influence on the enduring contortion produced in the connective tissue [3].

However, moderately increasingly the temperature during the stretch to 45°C produced considerable changes in tendon lengths and create less tissue damage compared with a similar stretch at lower temperatures.[3] Clinically, LLPS has been found both useful and effective in the treatment of soft tissue contractures and beneficial in the management of shoulder stiffness [3].

Physical therapists frequently use mobilization techniques closer to articular surface in anterior, posterior and inferior direction of gleno humeral joint to improve reduced range of motion. To increase the length of a shortened soft tissue, passive stretching can be applied manually or involuntarily for 30 seconds for increased range of motion [4]. Another important modality which can control pain by directly and rapidly altering the sensation of pain and by controlling the pain transmission with the activity of cutaneous thermal reception is Cryotherapy [5]. Decreased scapular mobility in frozen shoulder patients is an important factor causing adecreased range of motion of the shoulder joint.[6]Frozen shoulder often progresses in three stages: the freezing (painful), frozen (adhesive) and thawing

phases. Freezing stage (2–9 months) in which there is a gradual onset of diffuse, severe shoulder pain that typically worsens at night. The pain will begin to subside during the frozen stage with a characteristic progressive loss of glenohumeral flexion, abduction, internal rotation and external rotation. This stage can last for 4–12 months. During the thawing stage, the patient experiences a gradual return of range of motion that takes about 5–26 months to complete [7].

METHODS

All patients diagnosed with Bilateral Frozen Shoulder were identified as the target population. An experimental study was carried out in which effect of gleno humeral capsule ligamentous stretch maneuvers was checked on range of motion in bilateral frozen shoulder patients with the help of numerical pain rating scale (NPRS), goniometry for range of motion (ROM) and shoulder pain and disability index as the outcome measure. Study duration was 3 months. Total 40 participants were selected using the convenient sampling method. Inclusion criteria was subjects with frozen shoulder having limited range of motion of shoulder abduction, internal rotation, external rotation and flexion, both male and female with Bilateral adhesive capsulitis, patient must be in frozen stage and having a painful and stiff shoulder for more than 3 months. Exclusion criteria was rotator cuff injury/ligament tear, history of osteoarthritis of shoulder, local or systemic disease aside from DM and radiating pain due to cervical radiculopathy. The participants were given with the consent form before the study was began. Pre and post assessment was taken on the basis of the following outcome measures – numerical pain rating scale (NPRS), goniometry for range of motion (ROM) and shoulder pain and disability index(SPADI). The exercise protocol and the duration of the treatment was explained to the participants. Following 4 weeks of protocol, post assessment was done, thus determining the effect of the exercise protocol.

Protocol

Techniques	Application
Low load prolonged stretch (5% of patients body weight)with hot moist pack (66C)	For 10 minutes, anteriorly and posteriorly on both shoulders [3].
Maitland Mobilization	Posteroanterior glide 4 to 5 glides for 3 to 5 minutes per session [4]
Wand exercises	10 repetitions each for 3 times per day [4]
Pendulum exercises	10 repetitions each for 3 times per day [4]
Shoulder wheel	10 repetitions each for 3 times per day [4]
Shoulder ladder	10 repetitions each for 3 times per day [4]

RESULTS

On the basis of data analysis, it can be seen that there is a significant effect of gleno-humeral capsulo ligamentous stretch maneuvers on range of motion in bilateral frozen shoulder.

Table 1: Intensity of pain according to NPRS before and after study performed.

Pre Interventional	Post Interventional	P – value
5.925±0.6558	1.80±0.6869	<0.0001 (significant)

Fig. 1: Intensity of pain according to NPRS before and after study performed.

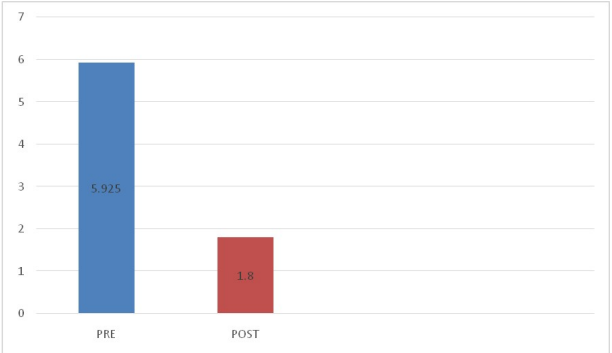


Table 2: ROM before and after study performed.

Movement	Pre Interventional	Post Interventional	P – value
SF	81.375±22.159	136.751±17.85	<0.0001(significant)
SAb	80.75±18.347	139.63±16.694	<0.0001(significant)
SER	43.55±6.076	59.85±6.024	<0.0001(significant)
SIR	49.0±8.829	73.5±7.942	<0.0001(significant)

Fig. 2: ROM before and after study performed.

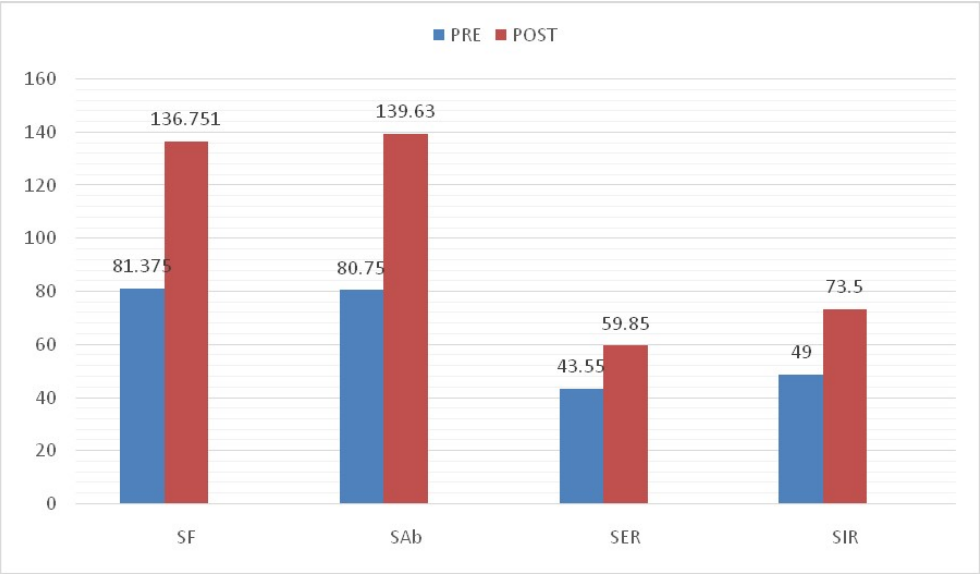
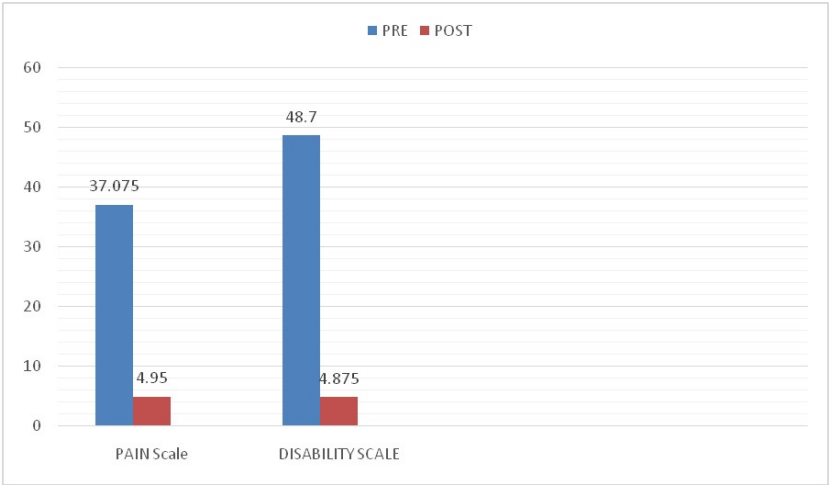


Table 3: SPADI before and after study performed.

Scales	Pre Interventional	Post Interventional	P – value
Pain Scale	37.075±3.918	4.950±0.8149	<0.0001 (significant)
Disability Scale	48.70±5.455	4.875±0.7906	<0.0001(significant)

Fig. 3: SPADI before and after study performed.



DISCUSSION

Painful restriction of shoulder movement, without an underlying cause, which results in complete loss of motion of the glenohumeral joint is called Frozen Shoulder. The process is started with an inflammation of the lining of the joint within the shoulder. Gradually this area thickens and results in the shoulder becoming stiffer and more painful. This condition affects work, leisure, and quality of life. Risk factors for adhesive capsulitis are diabetes, thyroid disorder, history of shoulder trauma, cervical radiculopathy, post-operative immobilization, and shoulder surgery. Possible causes are immunologic, inflammatory, biochemical, and endocrine alterations. Physical therapists frequently use mobilization techniques closer to articular surface in anterior, posterior and inferior direction of gleno humeral joint to improve reduced range ofmotion.Clinically, LLPS has been found both useful and effective in the treatment of soft tissue contractures and beneficial in the management of shoulder stiffness. This study was done to check the effect of glenohumeral capsule ligamentous stretch maneuvers on range of motion in bilateral frozen shoulder using NPRS, Goniometry and SPADI as theoutcome measures. In the results from figure 1, it can be seen that there is a substantial difference in the pre and post score of NPRS ($p<0.0001$). Figure 2 represents the effect of

intervention on ROM which also showed a considerable difference in the pre and post score ($p<0.0001$). It can be seen from figure 3 that the pain and disability have reduced after the intervention took place ($p<0.0001$). Multiple studies have been to one to assess the effect of various physical therapy interventions on Frozen shoulder. However , very few studies have found the effect of gleno humeral capsulo ligamentous stretch maneuvers on range of motion in Bilateral Frozen shoulder.

CONCLUSION

The results indicate that glenohumeral capsule ligamentous stretch maneuvers have a significant effect on pain and disability caused by bilateral frozen shoulder.

ABBREVIATIONS

ROM- Range Of Motion
LLPS- Low Load Prolonged Stretch
NPRS- Numerical Pain Rating Scale
SPADI- Shoulder Pain And Disability Index
SF- Shoulder Flexion
Sab- Shoulder Abduction
SER- Shoulder External Rotation
SIR- Shoulder Internal Rotation

Ethics approval and patient consent: The study was approved by the "Institutional Ethics Committee" of Krishna Institute of Medical Sciences, Deemed to be University, Karad, Maharashtra. The author had explained the study and the intervention to be given to the participants and had taken participants consent prior to the study from every participant.

ORCiD

Mariya shahjahan: 0000-0003-0823-6686
Smita patil: 0000-0002-4434-9381

AUTHORS CONTRIBUTION

Mariya Shahjahan – Data collection, research design, research process, discussion,editing, manuscript drafting.

Smita Patil– Research process, review of literature, discussion, research analysis.

ACKNOWLEDGEMENTS

The author would like to thank her guide Dr.SmitaPatil for guiding and encouraging her to pursue the study. The author would also like to extend her gratitude to Dr. G Varadharajulu, Dean of Krishna College of Physiotherapy, for approving as well as motivating her to do the study. The author would like to extend her sincere gratitude to the participants of the study.

Conflicts of interest: **None**

REFERENCES

[1]. SamikshaSathe, SukhnaKaurKhurana, Umanjali Damke, Prerna V. Agrawal**.** To Compare the Effects of Maitland Mobilization with Conventional Physiotherapy in Adhesive Capsulitis. **International Journal of Current Research and Review, 2020;**12(14).

[2]. ÝremDüzgün,GülBaltacý, ÖzgürAhmetAtay, Manual therapy is an effective treatment for frozen shoulder in diabetics: An observational study. Joint Diseases and Related Surgery, 2012;23(2):94-99**.**

[3]. Gary lentell, Thomas Hetherington leff Eagan, Mark Morgan.The Use of Thermal Agents to Influence the Effectiveness of a Low-Load Prolonged Stretch**.** Journal of Orthopaedic& Sports Physical Therapy 1992;16(5).

[4]. Antony Paul, Joshua Samuel Rajkumar,Smita Peter, Litson Lambert. Effectiveness of Sustained Stretching of the Inferior Capsule in the Management of a Frozen Shoulder. The Association of Bone and Joint Surgeons 2014;472:2262–2268.

[5]. Shahbaz Nawaz Ansari, I. Lourdhuraj, Shikhsha Shah, Nikita Patel. Effect of Ultrasound Therapy with End range mobilization over Cryotherapy with Capsular stretching on pain in Frozen Shoulder – A Comparative Study. International Journal of Current Research and Review, 2012;04(24).

[6]. DeryaÇelik and Ebru Kaya Mutlu. Effectiveness of joint mobilization combined withmanual stretching exercises in frozen shoulder: Arandomized, controlled pilot study. Clinical Rehabilitation, 2015.

[7]. Hui Bin Yvonne Chan, Pek Ying Pua, Choon.How Physical therapy in the management of frozen shoulder. Singapore Med J 2017;58(12):685-689.

How to cite this article: Mariya Shahjahan, Smita Patil. Effect of Gleno-humeral-capsulo-Ligamentous Stretch Maneuvers on Range of motion in Bilateral Frozen Shoulder. Int J Physiother Res 2022;10(5):4364-4368. **DOI:** 10.16965/ijpr.2022.156