Study on Effectiveness of Kaltenborn Mobilization Techniques Grade III in Patient with Frozen Stage of Adhesive Capsulitis of Shoulder Joint

A. K. M. Rezwan, T. M. Shahriar, A. N. M. Rasal, M. Rahman, T. Haque and N. A. Sharmin

ABSTRACT

Background: Frozen shoulder is the stage II of adhesive capsulitis characterized by progressive loss of shoulder movement and symptoms of pain, decrease joint range of motion.

Objective: To determine the effectiveness of kaltenborn mobilization technique grade-III to the treatment of frozen stage of adhesive capsulitis of shoulder joint.

Methods: This quasi-experimental study in total number of 40 respondent were diagnosed with frozen stage of adhesive capsulitis of shoulder joint and randomly allocated into 2 groups. Within both group (n=20) & experimental group were treated by kaltenborn mobilization technique grade III whereas control group were treated by routine physiotherapy treatment and apply one session per day for four weeks. Outcome measures used were Visual analog scale (VAS) and Shoulder disability questioner (SDI). Paired 't'-tests was used to compare the pre and posttest value of treatment within both groups. Participants were selected based on the inclusion and exclusion criteria.

Statistics & Results: Data was collected on a data sheet & encoded for computerized analysis using SPSS version 19. The statistical analysis of post values of Group A (Kaltenborn mobilization technique grade III) where VAS mean of pretest (6.90 ± 1.02) and posttest (4.35 ± 1.60) value where ($p < 0.0001$). SDI mean of pretest (4.1 ± 1.45) and posttest (2.9 ± 1.20) value where ($p < 0.0002$). In group B (Routine physiotherapy treatment) where VAS mean of pretest (6.75 ± 1.07) and posttest (6.25 ± 1.06) value where ($p < 0.0003$). SDI mean of pretest (4.1 ± 1.45) and posttest (3.5 ± 0.49) value where ($p < 0.0077$).

Conclusion: It was concluded that both techniques were effective but kaltenborn mobilization techniques grade III was more effective then routine physiotherapy technique.

Keywords: Frozen shoulder, kaltenborn mobilization, mobilization, routine physiotherapy, shoulder disability index, visual analogue scale.

Submitted: September 8, 2021

Published : October 27, 2021

ISSN: 2593-8339

DOI: 10.24018/ejmed.2021.3.5.1050

A. K. M. Rezwan*

Gono Bishwabidyalay, Dhaka, Bangladesh.

(e-mail: drreza85@gmail.com)

T. M. Shahriar

Gono Bishwabidyalay, Dhaka, Bangladesh.

A. N. M. Rasal

Gono Bishwabidyalay, Dhaka, Bangladesh.

M. Rahman

Islami Bank Hospital, Dhaka, Bangladesh.

T. Haque

Islami Bank Central Hospital, Dhaka, Bangladesh.

N. A. Sharmin

Anowara Taher Lions Physiotherapy Clinic, Chittagong, Bangladesh.

*Corresponding Author

I. INTRODUCTION

Frozen shoulder is a condition of uncertain etiology characterized by pain and a progressive loss of both active and passive range of motions (ROMs) [1]. Globally, the overall prevalence ranges from 23-30%. Frozen shoulder is remunerative load on the healthcare system anticipated to excessive generality and chronic characteristics for the range of therapeutic treatment procedure [2]. The annual financial burden of shoulder pain management in the United States has been estimated to be \$3 billion [3]. This type of condition mainly affects people of the age around 40, most commonly

occurs within the women, different types of diseases aggregate the occurrence of adhesive capsulitis more commonly the frozen shoulder condition, within the different diseases the diabetes mellitus and thyroid diseases condition were most seen [4]. Different types of treatments for frozen shoulder were used to try to help patients to recuperate from the frozen shoulder and relieve of pain. Gradually decrease the necessity of pharmacological treatment and surgical intervention for frozen shoulder, the physiotherapy is most common treatment procedure for treatment of frozen shoulder that includes thermotherapy, rehabilitation exercise, and joint mobilization [5],[6]. Kaltenborn mobilization technique is relates to appeal of a passive sustained stretching exercise to

increase joint mobility without articular surface suppression. The forces applied to increase joint mobility are graded from I–III [7]–[10]. Various methods of treatment are available for FS which helps in maintaining and improving strength of shoulder girdle muscles and improve function. Stretching exercises by physiotherapist or auto stretching by patients [11],[12]. Kaltenborn mobilization evaluates the motion on the articular surface and applies them to treatment, this treatment is according to macconail's classification, which politest most articular surfaces have concave exteriors and convex interiors. Passive comfort stretch approach were applied to the treatment of kaltenborn mobilization. It increases the joint mobility without articular surface repression. Within this techniques grade 1-3 are graded and applied to increase joint flexibility [13],[14]. Routine physiotherapy comprises electric stimulation, UST, isometric exercise, shoulder laden exercise, pulley exercises, home exercise as well as basic and advanced equipment [15]. This study was conducted to compare the effectiveness of kaltenborn mobilization technique grade III and conventional physiotherapy treatment to rehabilitation of shoulder pain and hypo mobility due to frozen stage of adhesive capsulitis of shoulder joints.

II. MATERIAL AND METHOD

The quasi-experimental study design was carried out in 40 respondents with frozen stage of adhesive capsulitis of shoulder joint and age between 40-65 years of male and female subsequently after briefing about the study, written consent was collected & concealed. Select the respondent by maintain exclusion and inclusion criteria. In Group A- subjects received kaltenborn mobilization technique grade III and Group B- subjects received routine physiotherapy treatment (Passive movement, pendulum exercise, heating pad and home advice). Each subject was treated for 4 weeks, every day in one session. Standard treatment protocol was applied within two group. Statistical analysis was done by used SPSS version 19 software. Paired t test was used to analyze the significant changed between pre and posttest treatment value with respect to all parameters in Group A and Group B separately.

III. DATA ANALYSIS AND INTERPRETATION

SPSS version 19 software was used for analysis of the gathered data. "Paired sample -test" was done to analyze within group variables for VAS and SDI. 19 degrees of freedom and 5% as level of significance was set.

TABLE I: COMPARISON OF PRE AND POSTTEST TREATMENT VALUE OF GROUP-A (KALTENBORN MOBILIZATION TECHNIQUE GRADE III) BY VISUAL ANALOG SCALE.

Group- A	Mean	Standard Deviation	t-Value	p-Value
Severity of pain (Pretest)	6.90	1.02	7.5849	0.0001
Severity of pain (Posttest)	4.35	1.60		

Used paired 't' test with 19 degrees of freedom and 5% as level of significance, the table 't' value is 2.093 which was lesser than the calculated 't' value 7.5849 and p value was

0.0001. This test showed that there was significant effectiveness of Kalterborn mobilization technique grade III to reduction of pain with frozen stage of adhesive capsulitis of shoulder joint.

Fig. 1. Kaltenborn mobilization technique Grade III visual analog scale.

TABLE II: COMPARISON OF PRE AND POSTTEST TREATMENT VALUE OF GROUP-B (ROUTINE PHYSIOTHERAPY TREATMENT) BY VISUAL ANALOG SCALE.

Group- B	Mean	Standard Deviation	t-Value	p-Value
Severity of pain (Pretest)	6.75	1.07	4.3589	0.0003
Severity of pain (Posttest)	6.25	1.07		

Used paired 't' test with 19 degrees of freedom and 5% as level of significance. The table 't' value is 2.093 which was lesser than the calculate 't' value 4.3589 and P value was 0.0003. This test showed that there was significant effect of Routine Physiotherapy Treatment in reduction of pain with frozen stage of adhesive capsulitis of shoulder joint.

Fig. 2. Routine physiotherapy treatment visual analog scale.

TABLE III: COMPARISON OF PRE AND POSTTEST TREATMENT VALUE OF GROUP-A (KALTENBORN MOBILIZATION TECHNIQUE GRADE III) BY SHOULDER DISABILITY INDEX.

Group- A	Mean	Standard Deviation	t-Value	p-Value
Severity of pain (Pretest)	4.1	1.45	6.00	0.0002
Severity of pain (Posttest)	2.9	1.20		

Used paired t test with 19 degrees of freedom and 5% as level of significance. The table 't' value is 2.093 which was lesser than the calculated 't' value 6.00 and p value was 0.0002. This test showed that there was significant role of Kalterborn mobilization technique grade III in reduction of disability with frozen stage of adhesive capsulitis of shoulder joint.

Fig. 3. Kaltenborn mobilization technique Grade III shoulder disability index.

TABLE IV: COMPARISON OF PRE AND POSTTEST TREATMENT VALUE OF GROUP-B (ROUTINE PHYSIOTHERAPY TREATMENT) BY SHOULDER DISABILITY INDEX.

Group- A	Mean	Standard Deviation	t-Value	p-Value
Severity of pain (Pretest)	4.32	1.25	2.30	0.0077
Severity of pain (Posttest)	3.5	0.49		

Used paired t test with 19 degrees of freedom and 5% as level of significance. The table 't' value is 2.093 which was lesser than the calculated 't' value 2.30 and p value was 0.0077. This test showed that there was significant role of Routine Physiotherapy Treatment in reduction of disability with frozen stage of adhesive capsulitis of shoulder joint.

Fig. 4. Routine physiotherapy treatment shoulder disability index.

IV. DISCUSSION

The present study was designed to know the efficacy of Maitland mobilization techniques grade III in the treatment of frozen stage of adhesive capsulitis of shoulder joint compared with routine physiotherapy treatment. The outcome measures of this study, it was observed that both the groups have shown significant improvement over time [16]. 40 subjects were selected who fulfilled the predetermined inclusion and exclusion criteria [17]. The subjects were divided into two groups, 20 respondents were each group. The mean age of the respondents was 44.20 ± 6.52 years with a range from 40-65 years. Here found that 40-45 age groups were more affected by this condition [18]. Male and female respondents were near about equal 50% same number was found by another's researchers [19]. More of the respondent were married 75% and half of the respondent were higher secondary pass. Joint involvement of the respondents in these disorders were more in right shoulder joint it was near about 50%. Maximum respondent 90% felt pain in

continuous types, most commonly increase at night, within the frozen shoulder the muscle wasting is very common it was 85% in this study, History of trauma were more risk factor to develop this condition and near about 85% complained of history of trauma, in lots of study showed the frozen shoulder were more commonly related to diabetic mellitus [20] within this study found 65% respondents had DM. Most of the respondent (80%) were consult with doctor for this condition and average 20% respondent taken self-treatment. For group comparison Used paired t test with 19 degrees of freedom and 5% as level of significance. The statistical analysis of post values of Group A (Kaltenborn mobilization technique grade III) where VAS mean of pretest (6.90 ± 1.02) and posttest (4.35 ± 1.60) value where ($p < 0.0001$). SDI mean of pretest (4.1 ± 1.45) and posttest (2.9 ± 1.20) value where ($p < 0.0002$). In group B (Routine physiotherapy treatment) where VAS mean of pretest (6.75 ± 1.07) and posttest (6.25 ± 1.06) value where ($p < 0.0003$). SDI mean of pretest (4.1 ± 1.45) and posttest (3.5 ± 0.49) value where ($p < 0.0077$). Thus, with this discussion kaltenborn mobilization technique grade III is more effective than routine physiotherapy treatment for frozen stage of adhesive capsulitis of shoulder and can be incorporated into rehabilitation of this condition.

V. CONCLUSION

We conclude that both treatments are effective for the rehabilitation of frozen stage of adhesive capsulitis but kaltenborn mobilization technique grade III is more effective than routine physiotherapy treatments.

VI. LIMITATION

The study was conducted for short period of time and small size was very small. There was no investigation to follow the long-term effect of treatment in present study. In the present study data were collected from one outpatient rehabilitation center.

VII. RECOMMENDATION

The number of respondents should be increased for a more reliable outcome. The period of study time should be increased, further study should need to measure the effect on other outcome measurements.

DISCLAIMER

None.

CONFLICT OF INTEREST

None.

SOURCE OF FUNDING

None.

REFERENCES

- [1] S. M. Hammad, A. Arsh, M. Iqbal, W. Khan and A. Shah, "Comparing the effectiveness of kaltenborn mobilization with thermotherapy versus kaltenborn mobilization alone in patients with frozen shoulder. A randomized control trial," *Journal of the Pakistan Medical Association* 69(10): 2019. 1421-1424.
- [2] C. Robinson, K. M. Seah, Y. Chee, P. Hindle and I. Murray, "Frozen shoulder," *The Journal of Bone and Joint Surgery* 94:1-9, 2012.
- [3] A. Rangan, L. Goodchild, J. Gibson, P. Brownson, M. Thomas, J. Rees and R. Kulkarni, "Frozen shoulder," *Shoulder Elbow* 7:299-307, 2015.
- [4] J. F. Bridgman, "Periarthritis of the shoulder and diabetes mellitus," *Annals of the Rheumatic Diseases* 31(1):69, 1972.
- [5] A. S. Nviasser and J. A. Hannafin, "Adhesive Capsulitis: A review of current treatment," *The American Journal of Sports Medicine* 38, 2346-2356, 2010.
- [6] T. K. Jain, N. K. Sharma, "The effectiveness of physiotherapeutic interventions in treatment of frozen shoulder/adhesive capsulitis: A systematic review," *Journal of Back and Musculoskeletal Rehabilitation* 27, 247-273, 2014.
- [7] W. I. Hammer, *Functional Soft Tissue Examination and Treatment by Manual Methods*, Jones & Bartlett Learning 713-727, 2007.
- [8] Hand, R. W. Beck and B. W. Bode, "Continuous Glucose Monitoring and intensive Treatment of type 1 Diabetes" *New England Journal Medicine* 359, 1464-1476, 2008.
- [9] D. T. Harryman, J. A. Sidles, S. L. Harris and F. A. Matsen "The role of the rotator interval capsule in passive motion and stabilizing of the shoulder," *Journal of Bone and Joint Surgery* 74(1): 53-66, 1992.
- [10] M. H. Jan, J. L. Yang, C. W. Chang and J. J. Lin, "Effectiveness of the end-range mobilization and scapular mobilization approach in a subgroup of subjects with frozen shoulder syndrome: a randomized control trial," *Manual Therapy* 17(1): 47, 2012.
- [11] P. K. Levangie and C. Norkins, *Joint Structure and Function*, 3rd Edn, Jaypee Brothers Medical Publishers, 215-216.
- [12] C.A. Oatis, *Kinesiology- mechanics and pathomechanics of human movement* Lippincott Williams and Wilkins, 132-133, 2016.
- [13] J. Neviaser and T. J. Neviaser, "The frozen shoulder diagnosis and management," *Clinical Orthopaedics and Related Research* 223:59-64, 1987.
- [14] L. Diercks and M. Stevens, "Gentle thawing of the frozen shoulder: a prospective study of supervised neglect versus intensive physical therapy in seventy-seven patients with frozen shoulder syndrome followed up for two years," *Journal of Shoulder and Elbow Surgery* 13(5):499-502, 2004.
- [15] S. Arshad, I. H. Shah and R. H. Nasir, "Comparison of Mulligan Mobilization with Movement and End-Range Mobilization Following Maitland Techniques in Patients with Frozen Shoulder in Improving Range of Motion," *IJSR* 4(4): 2761-2767, 2015.
- [16] A. Kumar, S. Kumar, A. Aggarwal, R. Kumar and P. Ghosh Das, "Effectiveness of Maitland Techniques in Idiopathic Shoulder Adhesive Capsulitis," *International Scholarly Research Notices* 8, 2017.
- [17] D. Rathod, G. Priyanka and A. Palkar, "Comparative study of kaltenborn mobilisation versus mulligan mobilisation in patients with frozen shoulder," *International Journal of Health Sciences and Research* (9):320-324, 2019.
- [18] J. K. Martin, P. W. McClure and B. G. Leggin, "Frozen Shoulder: Evidence and a Proposed Model Guiding Rehabilitation," *Journal of Orthopaedic and Sports Physical Therapy* 39(2):135-148, 2009.
- [19] M. Junaid, S. I. A. Burq, S. Rafique, S. Malik, A. Rasool, I. Mubeen, S. Khalid, "A comparative study to determine the efficacy of routine physical therapy treatment with and without kaltenborn mobilization on pain and shoulder mobility in frozen shoulder patient," *International Journal of Physiotherapy* 3(3): 316-319, 2016.
- [20] J. R. Roberts and M. L. Lan, "How is diabetes associated with frozen shoulder syndrome (FSS) (adhesive capsulitis)," *Medscape* 2021.