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Orignal Article

Comparison of Scapular Proprioceptive Neuromuscular Facilitation and Myofascial Release Techniques on Pain and Function in Scapular Dyskinesia Associated with Adhesive Capsulitis

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ABSTRACT

Adhesive capsulitis is frequently recognized as 'Frozen Shoulder', which is characterized by primarily painful joint range of motions and later progressively restricted range of motion of the glenohumeral joint. Other common names used for adhesive capsulitis includes 'Periarthritis and Painful stiff shoulder' and 'Shoulder arthrofibrosis'. **Objective:** To compare the effects of scapular proprioceptive neuromuscular facilitation and Myofascial release techniques on pain and function in scapular dyskinesia associated with adhesive capsulitis. **Methods:** Quasi Experimental study was conducted on 34 patients of Scapular dyskinesia associated with Adhesive Capsulitis. Subjects were allocated to either to PNF technique group and Myofascial release technique groups. Both were treated for 12 sessions in 6 weeks. NPRS and SPADI scale were used to evaluate the treatment effects at baseline, 2 weeks, 4 weeks and 6 weeks. **Results:** The mean age of Group A was 43.12± 5.25. The mean age of Group B was 43.0±5.95. There was a significant difference between the mean value of baseline, 2 weeks, 4 week and 6-week NPRS score and baseline, 2-week, 4 week and 6-week SPADI score with P value <0.05 in both study groups. There was more significant mean difference of 6.23 between baseline and week 6 NPRS in Group A but there was less significant mean difference of 4.00 between baseline and week 6 NPRS in Group B. There was more significant mean difference of 70.70 between baseline and week 6 SPADI in Group A but there was less significant mean difference of 46.17 between baseline and week 6 SPADI in Group B. **Conclusions:** The study concluded that PNF technique and Myofascial release techniques were led to significant difference in NPRS and SPADI score, but PNF technique had shown more significant results than myofascial release technique to improve pain and function in scapular dyskinesia associated with Adhesive capsulitis.

INTRODUCTION

Adhesive capsulitis (AC) is frequently recognized as 'Frozen Shoulder', which is characterized by primarily painful joint range of motions and later progressively restricted range of motion of the glenohumeral joint. Other common names used for AC includes 'Periarthritis and Painful stiff shoulder' and 'Shoulder arthrofibrosis'. Principally, the onset of AC is idiopathic with substantial feature of inflammation of shoulder joint anatomical structures such as; synovial joint capsule, synovial membrane and synovial fluid accompanied with fibrosis, scar tissue formation, adhesions and progressive stiffness [1]. AC may be either primary AC which has idiopathic cause with no attributable factors or it may be secondary AC which has a defined known cause or pathology including dislocation or fracture of glenohumeral joint, articular trauma, any surgical repair, stroke and other various predisposing factors [2]. In general population, the prevalence of AC has been reported about 2% to 5%, while 70% of the population who presented with the AC were females [3]. While in diabetic population it has been declared as approximately 20% of

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the diabetes mellitus patients face AC in their life [4]. While some authors reported approximately 59% of population with type 1 diabetes had diagnosed AC [5]. While a Lahore, Pakistan based study reported prevalence of AC as approximately 41.3% diabetic patients had AC [6]. Alteration and variation in the scapula position and movement pattern in relation to scapulothoracic joint results in scapular dyskinesia. Shoulder associated pathologies leading to scapular dyskinesia have a common feature that is altered glenohumeral rhythm due to abnormal position of scapula. The hallmark of scapula dyskinesia is altered positioning which is prevalent in various conditions such as AC, impingement syndrome, and rotator cuff and glenoid labrum injuries [7]. Scapular dyskinesia have been reported as associated with increased risk to further injuries, limitation in activities of daily living due to pain and may result in affecting the effect of treatment being provided [8]. In physical therapy treatment passive joint mobilization techniques, active, passive range of motion exercises, function training of activities of daily living, pendulum exercises have been proved effective [9]. In treatment options for scapular dyskinesia proprioceptive neuromuscular facilitation (PNF) regime is in practice with covering different concepts and mechanism such as reciprocal and autogenic inhibition, gate theory and stress relaxation [10]. It is reported that pain and functional abilities due positional fault of scapula can be targeted with PNF technique because one of PNF concern that focus on reciprocal activation of muscles of both domain agonists and antagonists in a particular motion which is the reason that PNF catches this effect on scapular position and dyskinesia [11].While myofascial release is soft-tissue oriented technique which involves targeting muscles and subcutaneous fascia by applying gentle sustained pressure in a therapeutic and targeted manner to eliminate the fascia and muscular tightness causing pain and movement restriction [12]. Myofascial release technique also has been investigated to decrease pain in AC population in very limited studies. Myofascial release emphases on decreasing pain by assistance the tension and tightness of trigger points [13]. The study aim was to contrast the impacts of scapular PNF and myofascial release techniques on pain and function in scapular dyskinesia associated with AC. As per recurrence knowledge, no study compared the effects of PNF and myofascial release technique to treat pain and function. To fill this study gap current study incorporated the comparison of effects of PNF and myofascial release technique on pain and function in scapular dyskinesia associated with adhesive capsulitis. There was less evidence in which long term effects of proprioceptive neuromuscular facilitation technique as compared to myofascial release technique in treating pain and functional status. The study will help to evaluate which treatment approach provide better outcomes for pain and functional status in intervention regimen.

METHODS

Subjects were allocated to either to PNF technique group and Myofascial release technique groups. Standard conventional treatment was given to both the groups which were application of moist heating pad for 10 minutes to the shoulder joint. After the application of heating pad, scapular proprioception neuromuscular facilitation was delivered for 10 minutes and classic exercises that was one set of stretching wand and pendulum exercises, one set of strengthening exercises including scapular elevation and abduction and scapular stabilization exercises were also performed with 20 repetitions for each in 3 sessions per week in 6 weeks. Treatment included scapular mobilization with PNF stretch in directions including anterior elevation, posterior elevation, anterior depression and posterior depression [14]. While for the group B after the application of heating pad muscles of shoulder complex and scapula were treated with myofascial release of 10 minutes and classic exercises that was one set of stretching wand and pendulum exercises, one set of strengthening exercises including scapular elevation and abduction and scapular stabilization exercises were also performed with 20 repetitions for each in 3 sessions per week in 6 weeks. Manually fascia and muscles were approached with rolling, sliding and lifting myofascial release techniques [15]. Muscles included were upper trapezius, middle trapezius, deltoid and levator scapulae. Both groups received 12 sessions over the course of six weeks. At baseline, 2 weeks, 4 weeks, and 6 weeks, the NPRS and SPADI were used to assess treatment effects. **The inclusion criteria:** Age from 35yrs to 55yrs, Both males and females, Pain in shoulder for at least 3 months, Unilateral frozen shoulder, Limited Scapular upward rotation, Capsular pattern (more limited external rotation than abduction), Scapular mal-positioning and Inferior medial border prominence. The exclusion criteria included the conditions with history of: Shoulder surgery, Any neurological deficit i.e. winged scapula due to lesions of long thoracic nerve or spinal accessory nerve, Other shoulder pathology like Impingement syndrome, rotator cuff tear, Cervical stenosis, Cervical myelopathy, Prolapsed cervical disc.

1.Numerical Pain Rating Scale (NPRS) is segmented NPRS in which the individual chooses a whole number (0–10 integers) that best represents the severity of pain. NPRS has shown good to excellent reliability in measuring various musculoskeletal pains ICC ranged 0.85 to 0.96 [16].

2.Shoulder Pain and Disability Index (SPADI) is a

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questionnaire with two dimensions; pain and the other for functional activities. High reliability of SPADI has been reported as ICC ≥ 0.89 in a diversity of patient populations and high internal consistency is reported as Cronbach α > 0.9 [17]. SPSS-24 was used for data analysis. The statistical significance level was set at P= 0.05. Between the groups, comparison was calculated using Mixed Model ANOVA. For Within group comparison was Repeated Measure ANOVA was used.

RESULTS

Table 1 has shown the descriptive statistics of participants of the study with 16 males (47.1%) and 18 females (52.9%). Mean age of Group A was 43.12 ± 5.255. The Mean age of Group B was 43.00 and standard deviation was ± 5.958. The level of significance was set at p<0.05. The data was normally distributed as Shapiro-Wilk test value greater than 0.05 so parametric tests were used for analysis. Within group analysis of variables depicted that group A produced more significant improvement in NPRS and SPADI score as compared to group B. Across the group analysis of NPRS and SPADI depicted that there was statistically significant difference between two groups as p<0.05.

	Variables	Total	Mean	SD
Age of Participants	Group A	34	43.12	5.95
		17	43.12	5.25
		(50.0%)		
	Group B		43.00	5.95
		17		
		(50.0%)		
Gender of Participants	Male	34		
		16		
		(47.1%)		
	Female			
		18		
		(52.9%)		

Table 1: Descriptive statistics of Participants

Variables	Groups	Mean ±SD				p-value
		Baseline	Week 2	Week 4	Week 6	
NPRS	Group A	8.70 ± 0.771	6.52± 1.124	4.0±0.866	2.47±0.799	<0.05
	Group B	8.58±0.712	7.53±0.701	5.8±1.014	4.58±0.795	<0.05
SPADI	Group A	92.82 ± 6.72	76.88 ±11.65	46.29±10.01	22.11±5.01	<0.05
	Group B	89.11 ± 6.66	78.11 ±10.16	62.5 ± 12.1	42.94 ±5.26	<0.05

Table 2: Within group's analysis of NPRS and SPADI

Weeks	Scale	Mean (I-J) Diff	p-value
Baseline - Week 2	NPRS	1.70	
	SPADI	13.47	<0.05
Week 2 -Week 4	NPRS	2.02	
	SPADI	23.08	<0.05
Week 4 -Week6	NPRS	1.38	
	SPADI	21.88	<0.05
Week 6 -Baseline	NPRS	5.11	
	SPADI	58.44	<0.05

Table 3: Across the group analysis of NPRS and SPADI

Across the group analysis of NPRS and SPADI predicted that there was statistically significant difference between two groups as p-value was less than 0.05

DISCUSSION

The findings of the current study are supported by previously published literature such as; JS Tedla et al., 2019 conducted the study in which the authors found PNF techniques contract relax and hold relax performed in upper extremity patterns were effective in minimizing pain and improving ROM and function in patients of adhesive Capsulitis [18]. This study supported the current study results that PNF was more effective in treating scapular dyskinesia. Similarly, Yi –Fen Shih concluded that manual Myofascial release was effective in improving muscle activity muscular activity, kinematics and lowering the pain in adhesive capsulitis [15]. Our study showed significant results that PNF was more effective in decreasing pain and disability than Myofascial release technique. Both techniques were significant but according to mean difference of repeated measure ANOVA and mixed measure ANOVA PNF technique showed more significant results. Moreover, Derya Celik et al., (2010) reported that pain was significantly decreased in the group with scapulothoracic exercises and shoulder ranges of motion were also improved with statistical significance in the group with scapulothoracic exercises [19]. Shoulder joint involve scapular movement so PNF technique showed remarkable results in scapular dyskinesia associated with Adhesive Capsulitis. Myofascial release technique also showed decrease in pain and function but PNF was more effective in treating pain and function. Eda Akbas et al., (2015) study revealed that VAS score for pain and shoulder ranges were significantly approved in both study groups (p<0.05) [20]. While between group comparison showed that superior performance of shoulder flexion and abduction were noted in PNF group (p<0.05). Similarly pain also reduced significantly in PNF group (p<0.05). We checked long term follow up effects of Proprioceptive neuromuscular facilitation treatment technique for treatment plan of adhesive capsulitis could be effective addition for better outcomes such as to decrease pain and improve shoulder ranges on recommendation of this study. Lim WS et al., (2002) investigated the effectiveness of scapular PNF hold-relax technique of proprioceptive neuromuscular facilitation on the outcomes including ROM (flexion, abduction and external rotation via goniometer and pain (VAS) in adhesive capsulitis patients. The study was concluded with the comments that scapular PNF hold-relax technique of proprioceptive neuromuscular facilitation is effective in essential outcomes related to shoulder adhesive capsulitis. This conducted study also supports my study results that PNF was effective technique for treating pain and function in scapular dyskinesia associated with Adhesive capsulitis [21].

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CONCLUSIONS

The study results concluded that both treatment techniques Proprioceptive neuromuscular technique and Myofascial release technique were effective in improving pain and function in scapular dyskinesia associated with Adhesive capsulitis. But technique of study group A, Proprioception neuromuscular technique had shown better results for improvement in pain and function as compared to Myofascial release technique in patients of scapular dyskinesia associated with Adhesive Capsulitis.

REFERENCES

[1] Hsu JE, Anakwenze OA, Warrender WJ, Abboud JA. Current review of adhesive capsulitis. J Shoulder Elbow Surg. 2011,20(3):502-14. doi: 10.1016/j.jse.2010.08.023.

[2] Le HV, Lee SJ, Nazarian A, Rodriguez EK. Adhesive capsulitis of the shoulder: review of pathophysiology and current clinical treatments. Shoulder Elbow. 2017,9(2):75-84. doi: 10.1177/1758573216676786.

[3] Luime JJ, Koes BW, Hendriksen IJ, Burdorf A, Verhagen AP, et al. Prevalence and incidence of shoulder pain in the general population; a systematic review. Scand J Rheumatol. 2004,33(2):73-81. doi: 10.1080/03009740310004667.

[4] Thomas SJ, McDougall C, Brown ID, Jaberoo MC, Stearns A, et al. Prevalence of symptoms and signs of shoulder problems in people with diabetes mellitus. J Shoulder Elbow Surg. 2007,16(6):748-51. doi: 10.1016/j.jse.2007.02.133.

[5] Inayat F, Ali NS, Shahid H, Younus F. Prevalence and Determinants of Frozen Shoulder in Patients with Diabetes: A Single Center Experience from Pakistan. Cureus. 2017,9(8):e1544. doi: 10.7759/cureus.1544.

[6] Ryan V, Brown H, Minns Lowe CJ, Lewis JS. The pathophysiology associated with primary (idiopathic) frozen shoulder: A systematic review. BMC Musculoskelet Disord. 2016,17(1):340. doi: 10.1186/s12891-016-1190-9.

[7] Jürgel J, Rannama L, Gapeyeva H, Ereline J, Kolts I, et al. Shoulder function in patients with frozen shoulder before and after 4-week rehabilitation. Medicina (Kaunas). 2005,41(1):30-8.

[8] Cools AM, Ellenbecker TS, Michener LA. Rehabilitation of scapular dyskinesis. Disorders of the Scapula and Their Role in Shoulder Injury: Springer; 2017. p. 179-92. doi.org/10.1007/978-3-319-53584-5_16

[9] Alvado A, Pelissier J, Benaim C, Petiot S, Herisson C, editors. Physical therapy of frozen shoulder: literature review. Annales de Readaptation et de Medecine Physique: Revue Scientifique de la Societe Francaise de Reeducation Fonctionnelle de Readaptation et de Medecine Physique; 2001.

[10] Peteraitis T, Smedes F. Scapula motor control training with Proprioceptive Neuromuscular Facilitation in chronic subacromial impingement syndrome: A case report. J Bodyw Mov Ther. 2020,24(3):165-171. doi: 10.1016/j.jbmt.2020.03.005.

[11] Meneghini GO, Adamatti FS, Dhein W. Immediate effect of proprioceptive neuromuscular facilitation on scapular dyskinesia of volleyball players. Manual Therapy, Posturology & Rehabilitation Journal. 2020,18:19.doi.org/10.17784/mtprehabjournal.2020.18.791

[12] Kim Y, Hong Y, Park H-S. A soft massage tool is advantageous for compressing deep soft tissue with low muscle tension: Therapeutic evidence for self-myofascial release. Complementary therapies in medicine. 2019,43:312-8.doi.org/10.1016/j.ctim.2019.01.001

[13] Mauntel TC, Clark MA, Padua DA. Effectiveness of myofascial release therapies on physical performance measurements: A systematic review. Athletic Training & Sports Health Care. 2014,6(4):189-96. doi.org/10.3928/19425864-20140717-02

[14] Balcı NC, Yuruk ZO, Zeybek A, Gulsen M, Tekindal MA. Acute effect of scapular proprioceptive neuromuscular facilitation (PNF) techniques and classic exercises in adhesive capsulitis: a randomized controlled trial. Journal of physical therapy science. 2016,28(4):1219-27. doi.org/10.1589/jpts.28.1219

[15] Shih Y-F, Liao P-W, Lee C-S. The immediate effect of muscle release intervention on muscle activity and shoulder kinematics in patients with frozen shoulder: a cross-sectional, exploratory study. BMC musculoskeletal disorders. 2017,18(1):1-10.doi.org/10.1186/s12891-017-1867-8

[16] Alghadir AH, Anwer S, Iqbal A, Iqbal ZA. Test–retest reliability, validity, and minimum detectable change of visual analog, numerical rating, and verbal rating scales for measurement of osteoarthritic knee pain. Journal of pain research. 2018,11:851.doi.org/10.2147/JPR.S158847

[17] Roy JS, MacDermid JC, Woodhouse LJ. Measuring shoulder function: a systematic review of four questionnaires. Arthritis Care & Research: Official Journal of the American College of Rheumatology. 2009,61(5):623-32. doi.org/10.1002/art.24396

[18] Tedla JS, Sangadala DR. Proprioceptive neuromuscular facilitation techniques in adhesive capsulitis: a systematic review and meta-analysis. Journal of musculoskeletal & neuronal interactions.

DOI: https://doi.org/10.54393/pbmj.v5i4.370

2019,19(4):482.

[19] Celik D. Comparison of the outcomes of two different exercise programs on frozen shoulder. Acta orthopaedica et traumatologica turcica. 2010,44(4):285-92. doi.org/10.3944/AOTT.2010.2367

[20] Akbaş E, Güneri S, Taş S, Erdem EU, Yüksel İ. The effects of additional proprioceptive neuromuscular facilitation over conventional therapy in patients with adhesive capsulitis. Türk Fizyoterapi ve Rehabilitasyon Dergisi/Turkish Journal of Physiotherapy and Rehabilitation. 2015,26(2):1-8.doi.org/10.7603/s40680-015-0012-6

[21] Lim W-S, Shin H-S, Kim I-S, Hur S-G, Bae S-S. The effects of scapular pattern and hold-relax technique of PNF on the ROM and VAS in frozen shoulder patients. The Journal of Korean Physical Therapy. 2002,14(1):15-26.