EFFICACY OF AN ECCENTRIC TRAINING ON ROTATOR CUFF TENDINOSIS AMONG DIABETES PATIENT

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ABSTRACT

PURPOSE: This study was aimed to evaluate the efficacy of Eccentric training on Rotator cuff tendinosis among Diabetes patients. The objective of this study was to find the difference between the pre-test and post-test values of NPRS and DASH Score. Sample size: Total of 30 subjects in two groups (group A-15 and group B-15) are selected using convenient sampling technique based on inclusion and exclusion criteria.

METHOD: The study is explained to the patients and written consent was obtained from the subject. Experimental group (A) and control group (B), experimental Group(A) treated with eccentric training along with conventional therapy and control Group (B) treated with conventional therapy like isometric shoulder exercises. Pain was quantified with Numeric Pain Rating Scale (NPRS) and the functional disability was measured by the Disabilities of the Arm, Shoulder and Hand (DASH) Score.

RESULTS: Statistical Analysis of post test for NPRS for pain and DASH for functional performance revealed that there was high statically significant difference seen between group A and group B.

CONCLUSION: From the result, it has been concluded that eccentric exercises along with shoulder isometric exercise (Group A) is more effective than shoulder isometric exercises (Group B) in reducing pain and improving functional performance among subjects with rotator cuff tendinosis among diabetes mellitus.

Keywords: NPRS, DASH score Rotator Cuff Tendinosis, Eccentric training, Shoulder isometric exercise

I. INTRODUCTION

Rotator Cuff Tendinosis, according to Lewis et al, "refers to pain and weakness, most commonly experienced with movements of shoulder external rotation and elevation, as a consequence of excessive load on the rotator cuff tissues". The patho-etiology of rotator cuff tendinosis is multifactorial and can be attributed to extrinsic and intrinsic mechanisms, as well as to environmental factors. Rotator cuff tendinosis is not a homogenous entity because of the diverse nature of the factors involved and hence, different treatment interventions are required, which take these specific mechanisms/factors into account.1

Shoulder pain is the third most common musculoskeletal complaint. Some commonly diagnosed shoulder problems include impingement of the rotator cuff tendons or subdeltoid bursa, bicipital tendonitis, frozen shoulder, and glenohumeral (GH), and acromioclavicular (AC) arthritis. With the unknown incidence of partial rotator cuff tears (PRCTs), defined as tears involving less than 50% of the muscle, the clinician needs to fully understand the condition in order to best address the patient's problem. Authors have shown that full thickness tears are usually due to chronic degeneration.2-10

Research supports strengthening the scapular stabilizers and RC muscles, addressing flexibility of the posterior shoulder structures, pectoralis minor muscle, the thoracic spine (with postural education), and activity modifications designed to reduce pain and disability from RC tendinopathy. There is a bias seen with exercise programs to target outlet impingement, which is an extrinsic mechanism. Limited evidence exists to support therapeutic exercise and manual therapy for the treatment of RC tendinopathy.2-4

Musculoskeletal disease is one of the most common complications in patients with diabetes, and yet it is receives relatively little attention. The severity and the risks of musculoskeletal complications might not be well recognized as cardiovascular complications.20-25 However, the associated ailments certainly inflict both physical and psychological harm on people with diabetes.5
Among the various musculoskeletal diseases, shoulder pain is one of the most common complaints. In general, it is characterized by pain and limited range of motion of one or both shoulders. Shoulder pain not only causes decreased quality of life, but also leads to disability in daily activities, and might interfere directly or indirectly with control of metabolic processes. Previous reports showed that there is a higher prevalence rate (27.5%) of shoulder disorders in patients with diabetes as compared with the rate of 5.0% found in general medical patients. Two of the most common shoulder disorders are frozen shoulder, also known as „adhesive capsulitis” and rotator cuff disease.5-9

The eccentric training consists of the contraction of a muscle for controlling or decelerating a load while the muscle and the tendon are stretching or remain stretched.10-15 This technique has been advocated as a treatment of tendinopathy, such as chronic Achilles, patellar, lateral humeral epicondylalgia and rotator cuff tendinopathies.15-20 Good clinical results were already demonstrated although some controversies of this success also appears in the literature.18-20 More evidence is necessary to support those results. Currently, the eccentric training is included in algorithms of treatment and has been considered a guiding principal of the rehabilitation.10

The use of eccentric training in rehabilitation has increasingly gained attention in the literature as a specific training modality. The eccentric exercise is an overall lengthening of a muscle as it develops tension and contracts to control motion. This kind of training differs from conventional training regimen because the tension in muscle fibers when lengthening is considerably greater than when muscle fibers are shortening.10

Few studies were done evaluating the effectiveness of eccentric training in subjects with this condition. Furthermore, most rotator cuff pathologies can be treated with reasonable success using conservative therapy despite the lack of high quality evidence.1 The purpose of this paper is to review the studies that used eccentric training program in the treatment of rotator cuff tendinosis as well as the tendon structure, the healing process and the possible mechanisms for why eccentric exercises can be effective in treating tendinosis.

Strengthening of rotator cuff muscles to heal tendon injuries, relieve pain, and stretching exercise for greater flexibility is important in rotator cuff tendinosis.

So, this study was undertaken to determine the efficacy of eccentric training in subjects with rotator cuff tendinosis among diabetes patients.

II. METHODS

Study design: The systemic review was conducted based on Quasi-experimental study

III. ELIGIBILITY CRITERIA

Selection of studies: The databases used for searching articles were PubMedCentral, PEDro, ResearchGate,PMC free article and SAGE journals.

IV. INCLUSION CRITERIA & EXCLUSION CRITERIA

Diabetes Mellitus patients with positive Hawkin’s test & pain with isometric resisted movements with positive jobe’s empty can test within age group between (45-64) have been included, patients with a history of shoulder fracture or dislocation, glenohumeral joint degeneration, inflammatory arthropathy & previous shoulder surgery have been excluded. Material Required: Theraband, wands & dumbbells, treatment couch and pillow were used in this study. Numerical Pain Rating Scale (NPRS) were used to represent the patient’s level of pain Disability of the Arm, Shoulder & Hand (DASH) SCORE were used as an indicator of the impact on the level and type of disability

V. PROCEDURE

30 individuals with Rotator Cuff Tendinosis will be selected based on inclusion and exclusion criteria. Detailed procedure was explained to the patients. Subjects where allocated in two groups (group A-15 and group B-15). Experimental group (A) and Control group (B) by random sampling method. Experimental group (A) treated with eccentric training along with conventional therapy and control group (B) treated with conventional therapy like isometric shoulder exercises. Pain quantified with Numeric Pain Rating Scale (NPRS) and the functional disability measured by the Disabilities of the Arm, Shoulder and Hand (DASH) Score. Group A treated with Eccentric training with conventional physiotherapy. Group B treated with Isometric exercise.

VI. RESULT

From statistical analysis made with the quantitative data revealed statistically significant difference between the Group A and Group B and also within the group. The posttest mean value of Numerical pain rating scale (NPRS) in Group A was 5.27 SD (1.33) and in group B was 6.93 SD (0.96). This shows that Numerical pain rating scale scores in group A were comparatively lesser than group B, P 0.0005.

The Posttest mean value of DASH questionnaire scores in group A was 57.23 SD (7.035) and in group B was 65.29 SD (5.462). This shows that DASH questionnaire scores in Group B were comparatively lesser than Group A.

Statistical Analysis of posttest for pain and functional performance revealed that there was high statically significant difference seen between group A and group B data has been tabulated, analyzed using descriptive and inferential statistics.
Hence, to the parameters mean and standard deviation where it was used for paired t-test to analyze significant changes between pretest and posttest measurement. The collected data was tabulated and analyzed using descriptive and inferential statistics. To all parameters mean and standard deviation (SD) was used. Paired t-test was used to analyze the significant changes between pre-test and post-test measurements. Unpaired t-test was used to analyze significant changes between two groups.

### Table 1: Comparison of post test between group A and B

<table>
<thead>
<tr>
<th>Parameter</th>
<th>Post Test Values</th>
<th>‘t’ test</th>
<th>Significance</th>
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<tbody>
<tr>
<td></td>
<td>Mean</td>
<td>Standard deviation</td>
<td>Mean</td>
</tr>
<tr>
<td>NPRS</td>
<td>5.27</td>
<td>1.33</td>
<td>6.93</td>
</tr>
<tr>
<td>DASH</td>
<td>57.233</td>
<td>7.035</td>
<td>65.299</td>
</tr>
</tbody>
</table>

Graph 1: Comparison of post test between group A and B

### VII. CONCLUSION

From the result, it has been concluded that eccentric exercises along with shoulder isometric exercise (Group A) is more effective than shoulder isometric exercises (Group B) in reducing pain and improving functional performance among subjects with rotator cuff tendinosis among diabetes mellitus.

### VIII. DISCUSSION

This study to as certain whether a combination of shoulder eccentric exercises and shoulder isometric exercises for eight weeks period for subjects with rotator cuff tendinosis would indicate any effects on reducing pain and improving functional performance of the shoulder.

ImperioLombardi JR et al, concluded that patients who underwent progressive resistance training exhibited improvements regarding pain and function (evaluated by the DASH) in comparison with the control group. There was marked improvement regarding total work in the extension movement as well as physical function, emotional role limitation and mental health.

Khan K et al, concluded that the eccentric training consists of the contraction of a muscle for controlling or decelerating a load while the muscle and the tendon are stretching or remain stretched. This technique has been advocated as a treatment of tendinopathy, such as chronic Achilles, patellar, lateral humeral epicondylagia and rotator cuff tendinopathies.

Yelvington CJ et al, reported that, currently the eccentric training is included in algorithms of treatment and has been considered a guiding principal of the rehabilitation.Stanish WD et al, It has been suggested that eccentric exercises expose the tendon to a greater load than concentric exercises. So, the prescription of an eccentric exercise program could be the best mechanism for strengthening the tendon.
Nevertheless, Rees et al, reported that peak tendon forces in eccentric loading are of the same magnitude as those seen in concentric loading suggesting that the tendon force magnitude alone cannot be responsible for the therapeutic benefit seen in eccentric loading. Thus, another possible mechanism that might explain the efficacy of eccentric loading is the high-frequency oscillations in tendon force produced by eccentric contractions. It was proposed that these fluctuations in force may provide an important stimulus for the remodelling of the tendon.

Abate M, et al, The association between rotator cuff disease and diabetes has yielded inconsistent results. To investigate the effect of diabetes on the occurrence of rotator cuff disorder, findings confirmed that patients with diabetes, regardless of insulin use, had a higher risk of developing rotator cuff diseases. Our findings are in accord with previous imaging studies showing that degenerative changes of rotator cuff tendon were more commonly observed by sonography in patients with diabetes than in controls.

In group A pre intervention mean of VAS was 7.53(1.06) and DASH(Score) was 84.498 (10.01) after the training with Eccentric exercises, the mean value of NPRS and DASH improved to 5.27(1.33) NPRS and 57.233 (7.035) DASH(Score), which shows Extremely statistical significant difference within the group. In group B preintervention mean of NPRS was 8.00 (0.93) and DASH(Score) was 85.4993(11.0483)after the training the subject with Isometrics the mean value of NPRS and DASH improved to 6.93(0.96) NPRS and 65.293(5.462) DASH(Score), which shows Extremely statistical significant difference within the group.

After eight weeks of the treatment all the above parameters showed significant improvement in both Experimental (EG) and Control (CG) group, with a more marked improvement in EG group.

Further research is required to examine whether the use of certain anti-diabetic agents and/or improved glycemic control could prevent or prolong the progression of rotator cuff disease and frozen shoulder in patients with diabetes.

**LIMITATIONS&RECOMMENDATIONS**

The sample size is less and the study duration was minimal, the study can be done in larger sample size & can be done in different age groups.

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**CONFLICT OF INTEREST**

The authors declare no conflict of interest.
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