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Effectiveness Of Spencer Technique And Blackburn Exercise In Patients With Shoulder Impingement Syndrome

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. **ABSTRACT**

Background: Shoulder impingement syndrome (SIS) is one of the most common disorder that affecting the shoulder joint. Approximately 21.4% of general population are affected by shoulder pain due to impingement syndrome. It affects the structures passing through the sub acromial space that leads to pain, reduction of ROM, and rotator cuff muscle strength.

Aim: The aim of the study is to find the effectiveness of Spencer technique and Blackburn exercise in patients with Shoulder impingement syndrome.

Method: The Quasi experimental study included 30 participants with Shoulder impingement syndrome. Based on selection criteria the participants were divided into two group. **Group A:** consists of 15 participants who received Spencer technique. **Group B:** consists of 15 participants who received Blackburn exercise. Intervention for each group was given for 5 days per week for 4 weeks. Numerical pain rating scale, Shoulder pain and disability index and Universal goniometer were taken as outcome measures.

Results: There was considerable difference in pre and post score of Numerical pain rating scale, shoulder pain and disability index and goniometer in both the groups.

Conclusion: Study concludes that the Spencer technique is more effective that the Blackburn exercise in reducing pain and improving the function and range of motion in patients with shoulder impingement syndrome.

Keyword: Shoulder impingement syndrome, Spencer technique, Blackburn exercise, NPRS, SPADI, Universal goniometer.

INTRODUCTION:

The shoulder joint is a synovial joint of ball and socket variety. The joint is formed by articulation of the glenoid cavity of the scapula and the head of the humerus. Therefore, it is also known as the glenohumeral articulation. Structurally, it is a weak joint because the glenoid cavity is too small and shallow to hold the head of the humerus in place. Stability of the joint is maintained by the coracoacromial arch or secondary socket for the head of the humerus, the musculotendinous cuff of the shoulder, the glenoid labrum that helps in deepening the glenoid fossa. The shoulder joint enjoys great freedom of mobility at the cost of stability. This wide range of mobility is due to laxity of its fibrous capsule and the four times larger size of the head of the humerus as compared with the shallow glenoid cavity. However, this large range of motion makes glenohumeral joint more susceptible to dislocation, instability, degenerative changes and other painful conditions specially in individuals who perform repetitive overhead motions [(24)].

The **coracoacromial** or (**suprahumeral**) arch is formed by the coracoid process, the acromial under surface, the coracoacromial ligament, and the inferior surface of the acromioclavicular joint. The coracoacromial arch forms and osteoligamentous vault over the humeral head and the region between the arch and the humeral head is called the **subacromial space**. The subacromial space is also referred to as the suprahumeral space or supraspinatous outlet, has been quantified by measuring the superior- to- inferior acromiohumeral interval on radiographs. This interval averages 10mm in healthy subjects with the arm adducted at the side and decreases to about 5mm during elevation of the arm. The functions of the coracoacromial arch is to protect the subacromial bursa, the rotator cuff tendons and the tendon of the long head of biceps brachii from direct trauma. The arch also acts as a physical barrier to superiorly translatory forces acting on the humeral head, preventing it from dislocating superiorly [(25)].

Shoulder impingement syndrome is a condition where the subacromial space (area directly below the acromion process and above humeral head) has narrowed which causes compression of the structures during arm elevation. [(5)] Approximately 21.4% of general population are affected by shoulder pain due to impingement syndrome. [(1)]

This condition was introduced in 1972 by Neer, who divided it into three stages: Stage 1: Edema and haemorrhage, Stage 2: Fibrosis and tendinitis, Stage 3: Tears of the rotator cuff, biceps tendon and bony changes. The etiology of the shoulder impingement syndrome is classified into mechanical (extrinsic) – anatomical factors, scapular and humeral kinematics, influence of posture and soft tissue tightness, and degenerative (intrinsic) – alteration in biology, aging, diminished blood supply, tensile/shear overload, overuse or trauma. The tests specific to SIS include Hawkins Kennedy test, Neer test, Jobe test and painful arc sign.

Spencer technique is developed by Spencer, D.O. in 1916. This technique is also known as the seven stages of the Spencer. Spencer technique is an articulatory technique with seven different procedures used to treat shoulder restriction caused by shoulder pathologic conditions leading to pain and motion loss. In this technique passive, smooth, rhythmic motion is designed to stretch contracted muscles, ligaments, capsules and bursa. This technique improves shoulder mechanics, improve joint range of motion, improve strength of weak muscles, improving lymphatic flow, circulation and improving musculoskeletal function. [(4)]

The Blackburn exercise is a scapular stabilization exercise that helps to improve the strength of the scapulothoracic and rotator cuff muscles (upper, middle, and lower trapezius, serratus anterior, rhomboid, deltoid, infraspinatus, teres major and minor) and also helps to reduce the excessive superior translation of humeral head in glenoid fossa during elevation and increases upward rotation of scapula and posterior tipping on thorax which in turns prevents the impingement of structures in subacromial space [(5)].

OBJECTIVE OF THE STUDY:

1. To evaluate the effect of Spencer technique on pain, range of motion and disability in patients with Shoulder impingement syndrome.
2. To evaluate the effect of Blackburn exercise on pain, range of motion and disability in patients with Shoulder impingement syndrome.
3. To compare the effectiveness of Spencer technique and Blackburn exercise on pain, range of motion and disability in patients with Shoulder impingement syndrome.

REVIEW OF LITERATURE:

Dr. Jayvant Gohil, et.al, 2023 conducted a study on shoulder impingement syndrome and concluded that the Spencer technique combined with the conventional physiotherapy can be significantly effective in reduction of pain and functional disability in patients with shoulder impingement syndrome.

Vaishnavi Raut, et.al, 2023 concludes that the Blackburn exercise is effective in reducing the pain and improving shoulder range of motion and functional disability in construction workers.

Dr. Pooja Yadhav, et.al, 2023 conducted a study on overhead recreational sports player and proved spencer technique is effective in improving shoulder range of motion in shoulder impingement.

Rasika Panse, et.al, 2018 conducted a study on rock climbers and concluded that the Blackburn exercise is an effective way of treating patient of Shoulder impingement.

Janine E. Curcio et.al, 2016 conducted a study on use of the spencer technique on collegiate Baseball players and this study support the use of spencer technique in counteracting the potentially negative effects of repeated throwing on internal rotation.

STUDY DESIGN:

This study was designed as a quasi experimental study conducted in the Physiotherapy Outpatient Department of Adhiparasakthi College of Physiotherapy located in Melmaruvathur. A convenient sampling method was employed to select participants. The data collection was carried over a period of four weeks with five sessions per week.

INCLUSION CRITERIA:

Individuals aged between 18 to 50 years, including both males and females, At least 2 of the following test should be positive Neer's impingement test, Hawkins Kennedy test, painful arc sign, History of shoulder pain for 4 weeks, Pain localizes on anterolateral aspect of shoulder joint, NPRS score should be in moderate range (4-7), Neer's stage 2 : Fibrosis and tendinitis.

EXCLUSION CRITERIA:

Patients with Previous history of shoulder dislocation and fracture, History of any shoulder surgery (last 1 year), cervical disc pathology, Complete tear of rotator cuff muscle, frozen shoulder.

METHODOLOGY:

30 patients have been selected on the basis of inclusion and exclusion criteria and divided into two groups. Group A consists of 15 patients who receive spencer technique and Group B consists of 15 patients who receive Blackburn exercise. Numerical pain rating scale (NPRS), Shoulder pain and disability index (SPADI), Range of motion were taken as outcome measure.

TREATMENT TECHNIQUE:

Group A: Spencer technique

Group B: Blackburn exercise

GROUP A: SPENCER TECHNIQUE

The patient lies in the lateral recumbent position with shoulder to be treated facing towards the ceiling. The patient's back is perpendicular to the table, with the lower knee and hip flexed to prevent any forward roll, and pillow is placed under the patient's head to keep it in midline position and therapist stands facing the patient.

- Stage 1: Shoulder extension with elbow flexion
- Stage 2: Shoulder flexion with elbow extension
- Stage 3: Circumduction with compression
- Stage 4: Circumduction with distraction

- Stage 5: Shoulder abduction and external rotation with elbow flexion

Stage A: Shoulder abduction

Stage B: Shoulder adduction and external rotation

- Stage 6: Shoulder internal rotation with elbow flexion
- Stage 7: Distraction in abduction

GROUP B: BLACKBURN EXERCISES

Patient position: Prone lying

Place a towel roll on the forehead to relax the neck muscles. Blackburn exercise has 6 steps – 3sets of 10 repetition with 3-6 seconds hold for 5 days for 4 weeks.

- Prone horizontal abduction (neutral)
- Prone horizontal abduction(full ER)
- Prone horizontal scaption (Neutral)
- Prone horizontal scaption (full ER)
- Prone horizontal external rotation
- Prone horizontal extension

OUTCOME MEASURE:

In this study, the primary outcome measures included **Numerical pain rating scale:** It is a subjective measure in which the individuals rate their pain on an eleven-point numerical scale. The scale is composed of 0 (no pain) to (worst imaginable pain).**Shoulder pain and disability index:** It is a self-administered questionnaire that consists of two dimensions, one for pain and the other for functional activities. The pain dimension consists of five questions regarding the severity of an individual's pain. Functional activities are assessed with eight questions designed to measure the degree of difficulty an individual has with various activities of daily living that require upper extremity use. The SPADI takes 5-10 minutes for a patient to complete and is the only reliable and valid region specific measure for the shoulder. **Universal goniometer:** The Universal goniometer (or international standard goniometer) is the most commonly used tool for measuring range of motion at larger joints such as shoulder.

RESULT:

Data analysis was performed using statistical software SPSS v26.0 applying paired sample t-tests to compare pre- and post-intervention outcomes within both groups. In Group A (Spencer technique), the Numerical pain rating scale (NPRS) showed a significant reduction in pain levels, with a pre-test mean of 5.400 decreasing to 1.933 post-test ($t = 26.000$, $p = .000$), indicating a statistically significant improvement. Similarly, Shoulder Pain and disability Index (SPADI) improved markedly from a mean of 42.133 pre-test to 22.600 post-test ($t = 51.912$, $p = .000$), showing a substantial decrease in functional disability. The Goniometer showed that the shoulder flexion range increased from a mean of 114.800 pre-test to 162.533 post-test ($t = 35.91$, $p = .000$), and abduction range from a mean of 109.600 pre-test to 152.000 post-test ($t = 29.62$, $p = .000$) thus improving the range of motion. In Group B (Blackburn exercise) NPRS scores also demonstrated statistically significant reduction from 5.200 to 2.800 ($t = 18.330$, $p = .000$), SPADI from 40.466 to 21.400 ($t = 46.748$, $p = .000$), while flexion range from 121.666 to 157.333 ($t = 33.83$, $p = .000$) and abduction range from 112.2000 to 144.2667 ($t = 17.83$, $p = .000$). Although both interventions produced statistically significant reduction in pain and functional disability and improvement in range of motion. Group A exhibited greater post-test improvements in NPRS, SPADI and ROM, suggesting that Spencer technique is more effective than Blackburn exercise for patients with Shoulder impingement syndrome.

DISCUSSION:

30 shoulder impingement syndrome patients were included in this study to find out the effectiveness of Spencer technique and Blackburn exercise to reduce pain and improve function and range of motion in them. The purpose of this study is to analyse the effects of Spencer technique and Blackburn exercise to reduce the pain and improve function and range of motion in shoulder impingement syndrome patients for a treatment duration of 4 weeks. 30 samples were divided into 2 groups and each consists of 15 participants. Group A Spencer technique (15) and Group B Blackburn exercise (15). These two techniques give good result in controlling the shoulder pain. The independent variables in this study are

Spencer technique and Blackburn exercise. The dependent variables in the study are NPRS, SPADI and Goniometer.

The experimental group who are supervised to attend all the sessions were shown in difference in reduction of pain and improvement in function. The graphical data shows that there was significant difference in both groups in the dependent variables NPRS, SPADI and range of motion. But there was more difference in Group A.

According to this study, the Spencer technique reduce the pain by stimulation of the low threshold mechanoreceptors on centrally mediated pain inhibitory mechanism and on neuronal populations in the dorsal horn with possible gating effect Blackburn exercise will reduce the excessive superior translation of humeral head in glenoid fossa during elevation and increases upward rotation and posterior tipping on thorax which in turn prevents the impingement of structures in subacromial space.[5][18]

Based on the statistical analysis, both groups showed better means values statistically in numerical pain rating scale, shoulder pain and disability index and range of motion when comparing the pre- test and post- test values.

CONCLUSION:

The statistical analysis shows significant effect in reducing pain and disability and improving range of motion for both groups. Thus both the spencer technique and Blackburn exercise are effective in treatment of shoulder impingement syndrome. When comparing the mean values of Group A and Group B of NPRS, SPADI and ROM along with the data analysis shows more significant effect on reducing pain, improve function and range of motion in Group A than Group B in patients with shoulder impingement syndrome. Both Spencer technique and Blackburn exercise is effective in treatment of Shoulder Impingement Syndrome but Spencer technique is more effective than Blackburn exercise in 4 week intervention.

LIMITATIONS:

The study was conducted on a small sample size. Duration of the study was less. The results may not be generalized to other populations (e.g. Older patients).

SUGGESTIONS:

Long term follow up is needed to evaluate whether there occurs any sustained or carry over effect after treatment. To establish greater efficacy of the treatment, the study should be undertaken in large scale. Studies can be conducted on both acute and chronic cases. For more reliability and validity, long term study must be carried out.

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