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Correlation Between Neck Disability Index, Grip Strength, And Scapular Position Among Subacromial Impingement

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Abstract

Background: Subacromial impingement syndrome (SIS) is a common shoulder disorder often associated with altered scapular mechanics, reduced upper limb strength, and cervical spine dysfunction. Neck-related impairments may influence upper extremity function and contribute to persistent shoulder symptoms.

Objective: To determine the correlation among the Neck Disability Index (NDI), grip strength, and scapular position in individuals with subacromial impingement syndrome.

Methods: A cross-sectional analytical study was conducted on individuals diagnosed with SIS. Neck disability was assessed using the Neck Disability Index. Grip strength was measured using a hand-held dynamometer, and scapular position was evaluated using a standardized clinical assessment method. Correlation analysis was performed to examine the relationship among NDI scores, grip strength, and scapular position.

Results: A significant positive correlation was observed between NDI scores and altered scapular position, indicating increased neck disability with greater scapular malalignment. A significant negative correlation was found between NDI scores and grip strength, suggesting reduced hand strength with higher neck disability. Additionally, altered scapular position demonstrated a significant association with decreased grip strength.

Conclusion: The findings suggest that neck disability, grip strength, and scapular position are interrelated in individuals with subacromial impingement syndrome. These results highlight the importance of comprehensive assessment and integrated rehabilitation approaches addressing cervical spine function, scapular control, and upper limb strength in the management of SIS.

Keywords: Subacromial impingement syndrome, Neck Disability Index, grip strength, scapular position.

INTRODUCTION

Shoulder pain is one of the most common musculoskeletal pains that are referred to a physiotherapist. Rotator cuff syndrome is the main source of shoulder pain. This disorder presents with pain, loss of mobility, and consequent disability, which can considerably restrict work and leisure activities. neck pain is a common complaint in industrialized countries and a major socioeconomic problem, similar to shoulder pain.Huisstede et al[3] and McLean et al[4] have confirmed that individuals who report severe neck problems also report severe upper-limb disability. Date and Gray[5] found that 63.6% of patients with a shoulder impingement had silent cervical radiculopathy signs, suggesting a relationship between symptomatology in the cervical spine in individuals diagnosed with partial rotator cuff injury. The presence of upper-limb disorders and muscular weakness is associated with neck problems and may influence the progression or management of these problems. Overactivity of the upper trapezius is the Cause of neck disability in shoulder pain. similarly upper trapezius overactivity is seen in the subacromial impingement syndrome and frozen shoulder Patients with SIS show upper and lower trapezius muscle imbalances and abnormal scapula movement and severe contracture in the glenohumeral joint is rare.The effects of skeletal function relationships, both shoulder and neck pain are influenced by psychosocial factors such as pain catastrophizing) Therefore, psycho social factors should be evaluated along with shoulder function to determine its impact on concomitant neck disability in shoulder disorders.

The correlation between the Neck Disability Index (NDI), scapular position, and hand grip strength in individuals with scapular acromial impingement is a crucial area of study in understanding the functional limitations and musculoskeletal impairments associated with this condition. By examining how neck disability, scapular positioning, and grip strength are interrelated, researchers aim to identify potential patterns or relationships that could inform treatment approaches and rehabilitation strategies tailored to improve outcomes for individuals with scapular acromial impingement.

Materials and methods

Participants

The cross-sectional observational study was conducted at the Ishari Velan Mission Hospital at thalmbur. The study participants were patients who presented with shoulder joint complains to the outpatient department of our hospital. inclusion criteria for SIS: age, 40 years or older; positive test in at least two of the three SIS tests (Neer test, Hawkins-Kennedy test, and Painful-arc test); disease duration, 1 month or longer; absence of a full-thickness rotator cuff tear confirmed by magnetic resonance imaging. The following exclusion criteria were applied: positive test in either or both of two special tests for cervical radiculopathy (Spurling test and/or Arm Squeeze test), traumatic onset, and history of shoulder fracture or neck fracture or surgery.This study was approved by departmental ethical committee of School of physiotherapy,vistas.

OUTCOME MEASURE:

LSST (Lateral Scapular Slide Test):

Posterior aspect of the acromion and plinth for the tightness of pectoralis minor mascle. Medial border of scapula to fourth thoracic spinous process. Lateral scapular slide test: Position 1 Inferior angle of scapula to adjacent thoracic spinous process when arms relaxed at the sides of the body. Position 2: Inferior angle of scapula to adjacent thoracic spinous process with arms 45 abducted resting on ipsilateral hip. Position 3: Inferior angle of scapula to adjacent thoracic spinous process with arms 90 abducted and internally rotated. 4 & 5 :subjects was asked to keep their upper limbs at 90° of scaption with internal rotation of shoulder with 1, 2 kg weights again examiner will measure the linear distance. 6: the subjects was asked to keep their trunk fixed and move up their arms upto 180 degree without having weight in hand.

NDI (Neck Disability Index):

This questionnaire has been designed to give us information as to how your neck pain has affected your ability to manage in everyday life. Please answer every section and mark in each section only the one box that applies to you. We realise you may consider that two or more statements in any one section relate to you, but please just mark the box that most closely describes your problem.

0 to 4 – no disability
5 to 14 – mild
15 to 24 – moderate
25 to 34 – severe
Above 34 complete

HAND GRIP STRENGHT:

Grip strength was measured with the patient in a sitting position and with the arm in a neutral position with 90 elbow flexion. The patient is asked to squeeze as hard as he/she can and then to relax for about 30s before taking the next measurement to allow sufficient recovery time between contraction and to avoid muscle fatique. The measures were taken three times. The average score was taken.

TOOLS USED:

1. Dynamometer
2. Inch tape

Procedure:

In this study, 20 samples were selected based on the inclusion and exclusion criteria.

- Patients will be briefed about the study objectives and procedures, and informed consent will be obtained.
- Demographic information (age, gender) and clinical history will be recorded.
- NDI questionnaire will be administered to assess neck disability.
- Grip strength will be measured bilaterally using a hand-held dynamometer, with participants seated and elbow flexed at 90 degrees.
- Scapular position will be assessed visually and quantitatively using a goniometer during shoulder movements (e.g., abduction, flexion).

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Fig 1: scapular position at 0 degree

fig 2 : scapular position at 45 degree

Fig 3 :Scapular position at 180 degree

STATISTICAL ANALYSIS:

1. METHODOLOGY:

1.1 Descriptive statistics

Mean and standard deviation for continuous variables such as Handgrip strength, Scapular position.

Hypotheses:

Null Hypothesis, $H_0: \mu_d = 0$

There is no significant effect in terms of measures of Handgrip strength, Scapular position.

Alternate hypothesis, $H_1: \mu_d > 0$ (Right-tailed test)

There is significant effect in terms of measures of Handgrip strength, Range of motion, Scapular position.

CORRELATION BETWEEN SCAPULAR POSITION AND GRIP STRENGTH

Group	r value	Sig.(2tailed)
SP 1 GS	0.916	0.00
SP2 GS	0.749	0.01
SP3 GS	0.901	0.00
SP4 GS	0.925	0.00
SP5 GS	0.891	0.00
SP6 GS	0.852	0.00

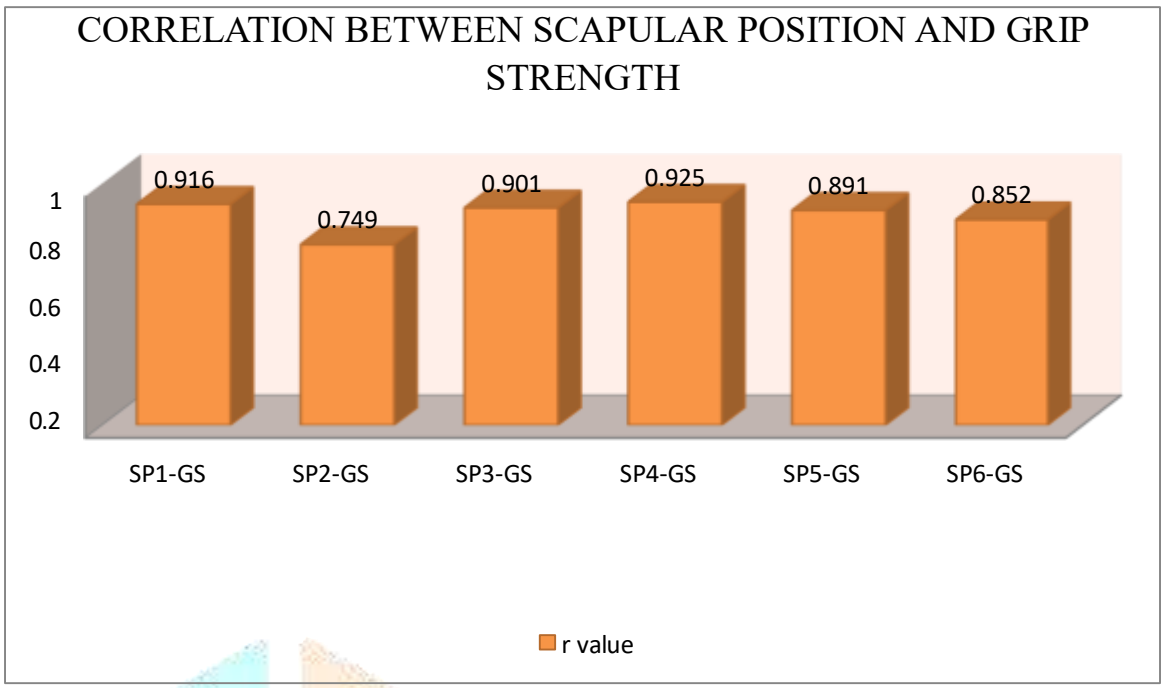

Figure 4: CORRELATION BETWEEN SCAPULAR POSITION AND GRIP STRENGTH

RESULT:

Based on the above table and chart. All the scapular positions and grip strength has the positive correlation .The scapular position 4 and Grip strength has highest positive correlation to the other 5 scapular position.

CORRELATION BETWEEN SCAPULAR POSITION AND NECK DISABILITY INDEX

Group	r value	Sig.(2tailed)
SP 1 NDI	0.806	0.00
SP2 NDI	0.727	0.02
SP3 NDI	0.798	0.00
SP4 NDI	0.748	0.00
SP5 NDI	0.763	0.00
SP6 NDI	0.781	0.00

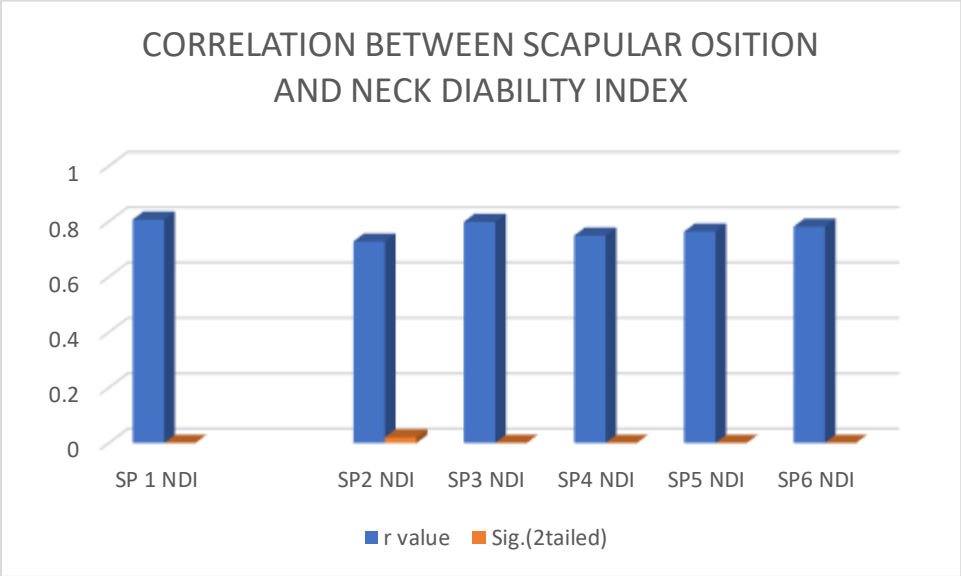

Figure 5: CORRELATION BETWEEN SCAPULAR POSITION AND NECK DISABILTY INDEX

RESULT:

Based on the above table and chart. All the scapular position and Neck disability index have a positive correlation. The scapular position 1 and neck disability index has highest positive correlation among the other 5 scapular position

DISCUSSION

This study aims to investigate the intricate relationships between these variables to elucidate their combined impact on the functional limitations experienced by individuals with subacromial impingement syndrome. Specifically, this research will explore how cervical spine dysfunction, quantified by the Neck Disability Index, influences both distal upper extremity strength, such as grip strength, and the kinematic stability of the scapula, a critical component in glenohumeral rhythm . Understanding these correlations is crucial for developing comprehensive and integrated rehabilitation protocols that extend beyond localized shoulder interventions to address broader upper extremity and cervical spine contributions to subacromial pain syndrome . While current literature has separately explored aspects of scapular dyskinesis and cervical involvement in subacromial impingement, a holistic assessment integrating these factors with functional measures like grip strength remains underexplored . Furthermore, the impact of deep cervical flexor endurance on overall neck function and its potential association with subacromial impingement syndrome also warrants further investigation . .

This integrated approach could provide a more nuanced understanding of the multifaceted nature of subacromial impingement and inform more effective, patient-specific interventions. For instance, cervical stabilization exercises have been proposed as a therapeutic modality for subacromial impingement syndrome, although further research is needed to evaluate their comprehensive impact, particularly on extensor endurance . This necessitates a detailed examination of how improved cervical proprioception and motor control might indirectly enhance scapular stability and, consequently, optimize glenohumeral mechanics during functional tasks 2. Such an investigation could reveal whether improvements in neck disability correlate with measurable changes in grip strength and scapular positioning, thereby supporting a more integrated approach to treatment . Moreover, postural problems like forward head posture and rounded shoulders, often linked to decreased deep cervical muscle strength, can significantly alter scapular mechanics and contribute to impingement .

CONCLUSION:

The current Study shows that there is a positive correlation between Scapular position & Grip Strength and positive Correlation between Scapular position & Neck Disability Index.The findings suggest that neck disability, grip strength, and scapular position are interrelated in individuals with subacromial impingement syndrome. These results highlight the importance of comprehensive assessment and integrated rehabilitation approaches addressing cervical spine function, scapular control, and upper limb strength in the management of SIS.

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