

Original Research Article

Correlation of scapulo-thoracic muscle strength, neck pain and the functional status of information technology professionals

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ABSTRACT

Background: The cross-sectional study was to correlate scapulo-thoracic muscle strength, neck pain and the functional status of Information Technology (IT) professionals. IT professionals have long working hours in a seated position which can lead to neck pain and decrease in the scapulo-thoracic muscle strength. This could hinder the person's capability to perform daily functional activities.

Methods: The study was conducted in an IT- company from November 2017- December 2017. FET was used to assess the scapulo-thoracic muscle strength. Neck pain and functional status of the IT professional was evaluated by the two scales-Neck Disability Index and Orebro Pain Rating Questionnaire respectively. For the statistical analysis-Spearman's correlation and SPSS software was used. All subjects, male and female, with neck pain and having worked for more than 2 years were included. Subjects with diagnosed orthopaedic condition and having a history of trauma were excluded.

Results: For the IT professionals, a moderate correlation was established between the neck pain and strength of serratus anterior muscle $R(r=0.32)$ $L(r=0.4)$ and rhomboid muscles $R(r=0.37)$ $L(r=0.4)$. Further, it was seen that the functional status was not hampered due to neck pain and scapulo-thoracic muscle strength.

Conclusions: The study shows that there is a moderate correlation between the neck pain and scapula-thoracic muscle strength of IT professionals. In addition, there is a weak correlation between neck pain, scapulo-thoracic muscle strength with respect to the functional status.

Keywords: Information technology professionals, Neck pain, Scapulo-thoracic muscle strength, Serratus anterior, Rhomboid, Middle trapezius, Lower trapezius, Functional status

INTRODUCTION

Work-related musculoskeletal disorders (WRMSD) are injuries or disorders of musculoskeletal tissues associated with workplace risk factors and are known by a variety of terms, including cumulative trauma disorders, repetitive strain injuries, and overuse injuries. For people who spend a great deal of time using computers, WRMSDs of

the neck are a common problem.^{1,2} There is emerging evidence that scapulo-thoracic muscle weakness may also be associated with neck pain although relatively few studies on this topic exist in the literature.³ Clinical guidelines have been established which describe evidence-based physical therapy practice for management of patients with musculoskeletal neck pain. They state that coordination, strength and endurance deficits may be

present in the scapula-thoracic muscles. Specifically weakness in the lower trapezius (LT), middle trapezius (MT), and serratus anterior (SA) may be present in people who fit into the specific category of neck pain with movement coordination impairments.⁴ Neck pain is a common problem in IT professionals because of long working hours in a seated position. There is a high chance of these individuals having an incorrect habitual posture which includes prolonged neck flexion as well as protracted shoulders which could hamper the daily functional activities. The objective of this study was to assess if there is any correlation between the neck pain, scapulo-thoracic muscle strength and functional status of an IT professional.

METHODS

The study received approval from the Institutional Ethical committee. The study design was a cross-sectional. The study was conducted in an IT-company from November 2017–December 2017. There were total of 30 IT professionals out of which 19 were males and 11 were females with an age range from 24–45 years. All subjects were asked to fill up the consent form prior to the examination. The participants were provided with neck disability index (first letters to be capital of NDI).

Inclusion criteria

Inclusion criteria were professionals working for 2 years, males and females, age group 24-45 and individuals with bilateral neck pain.

Exclusion criteria

Exclusion criteria were previous spine surgeries, spinal deformities and diagnosed spinal orthopaedic conditions.

Procedure

Screening for the inclusion criteria was performed by a physiotherapist. Prior to the scapulo-thoracic muscle strength examinations the subject had to fill in the Neck Disability index as well as the Orebro pain screening questionnaire. For strength testing a microFET2 digital hand held dynamometer was used to assess the strength of SA, RHOMB, MT and LT. Handheld dynamometry has been shown to be highly reliable for both inter-rater and intra-rater testing and has been determined a valid method for strength assessment.⁵⁻⁸

Strength of each muscle was tested in the standard manual muscle test position as described by Kendall.⁹ For testing of the LT, participants' were positioned prone with a towel roll under their forehead. The extremity being tested was positioned diagonally overhead, in line with the muscle fibers and the scapula was passively positioned in an adducted and depressed position. All participants' were able to attain the start position of the test. The examiner provided manual fixation just inferior

to the contralateral scapula. Participants' were asked to maintain the arm position. The examiner provided pressure with the dynamometer in a downward direction over the distal third of the radial forearm until the participants' maximal effort was overcome. For testing of the MT, participants' were positioned in prone with their shoulder in 90 degrees of shoulder abduction, with the shoulder in lateral rotation. The scapula was positioned into adduction. The examiner provided manual fixation just inferior to the contralateral scapula to prevent trunk rotation during testing. Participants' were asked to maintain their arm position as the examiner applied a downward force with the dynamometer over the distal third of the radial forearm until the participants' maximal effort was overcome. Middle trapezius muscle test position. For testing of the SA, participants' were seated in a standard chair with their feet flat on the floor and back supported by the back rest. Their arm was positioned with scapular abduction and the shoulder flexed to 125 degrees. Participants' were asked to maintain the upper extremity position as the examiner provided a downward force with the dynamometer just proximal the elbow. The strength measurement was collected at the point the break occurred during the test. The three muscles mentioned above have been tested using the same method as provided by Peterson.¹⁰

The strength of the RHOMB muscles was evaluated by positioning the participants' in prone with a towel roll under their forehead. The extremity being tested was positioned in 90 degree and the shoulder was passively positioned in an abduction and medial rotation. Further the examiner provided pressure with the dynamometer in a downward direction over the distal third of the radial forearm until the participants' maximal effort was overcome.

Statistical analysis

Spearman's correlation and SPSS software was used.

RESULTS

In our study, we established there was a moderate correlation between the neck pain and strength of the RHOMB and SA muscles.

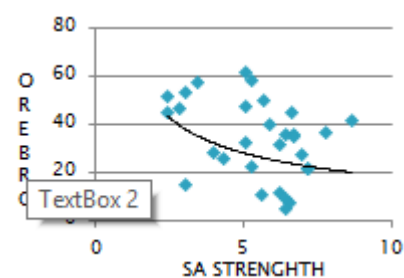


Figure 1: Neck pain and SA muscle strength.

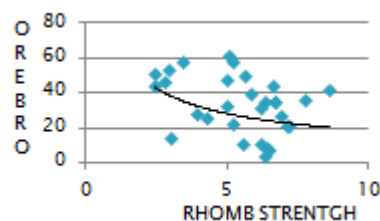


Figure 2: Neck pain and rhomboid muscle strength.

Table 1: Correlation of muscle strength and neck pain.

Muscles	Right side		Left side	
	p	r	p	r
Serratus anterior	0.08	-0.32	0.03	-0.4
Rhomboids	0.04	-0.37	0.2	-0.4

Table 2: Correlation of muscle strength and neck pain.

Muscles	Right side		Left side	
	p	r	p	r
Middle trapezius	0.19	-0.24	0.03	-0.3
Lower trapezius	0.10	-0.30	0.5	-0.1

There was a weak correlation established between the neck pain and strength of the middle trapezius and lower trapezius muscle.

A weak correlation was observed between the Neck pain and Functional status of the individuals. The value of $p=0.43$ and the value of $r=-0.14$.

DISCUSSION

Findings of this study suggest moderate correlation between the strength of the scapulo-thoracic muscles i.e. RHOMB, SA and neck pain. Also this study suggests there is a weak effect on the functional status of the IT professional in correlation to the neck pain and scapulo-thoracic muscle strength.

The potential reasons for the affected strength of SA, RHOMB in comparison to the MT and LT muscles could be due to the incorrect habitual posture, causing protracted shoulders leading to stretching, weakness of the SA and RHOMB muscle since their action involves the same. The weakness of the muscles could have been a factor which prevented the individuals from exerting their full effort upon strength testing.

In our study it was discovered that there was a weak correlation between the neck pain and the LT and MT muscles which was not in coherence with the findings of Petersen.¹⁰ This inconsistency may be because these

muscles would not be greatly affected by the incorrect posture generally assumed by an IT professional.

The functional status of the IT professional was not affected in correlation to the neck pain and scapulo-thoracic muscle strength. This finding may be suggestive of a low Orebro pain scale score.

This study has some limitations that may impact the application of results. The sample size was small and was conducted only at one point in time due to which the progression of the neck pain along with the strength could not be evaluated. Also, the strength values of scapulo-thoracic muscles of healthy individuals were not assessed in this study.

CONCLUSION

The study proved that bad habitual posture leading to neck pain affects the specific scapulo-thoracic muscles to moderate extent. Further investigation is required to assess whether improvement in neck pain corresponds with improvement in the scapulo-thoracic muscle strength.

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Conflict of interest: None declared

Ethical approval: The study was approved by the institutional ethics committee

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