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Correlation between neck pain and upper limb dysfunction in non-specific neck pain patients

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ABSTRACT

Background & Aim

Non-specific neck pain is defined as simple neck pain without any specific underlying disease that leads to pain. The aim of the present study was to find relation between neck pain and upper limb disability in nonspecific neck pain patients.

Methodology

Type of study is a cross-sectional study with purposive sampling method. 80 subjects in the age group of 18 – 40 years diagnosed with nonspecific neck pain were recruited. Subjects with cervical radiculopathy or existing upper limb pathology were excluded from the study. The Visual Analogue scale (VAS) was used to assess neck pain and Neck Disability Index (NDI) was used to measure the effect of neck pain on daily activities. The upper limb disability was measured using Disabilities of the Arm, Shoulder and Hand (DASH) questionnaire.

Results

The results showed a significant positive correlation between VAS and DASH ($r = 0.54$, $p = 0.000$). Also, a significant positive correlation was found between NDI and DASH ($r = 0.75$, $p = 0.000$).

Conclusion

These findings provide evidence that there is relation between neck pain and upper limb dysfunction in non-specific neck pain disorders.

Keywords: Non-specific neck pain, Upper limb dysfunction, Neck disability index, DASH

INTRODUCTION

The cervical spine represents most mobile and the least stable portion of the vertebral column. It is a complex region comprising of seven vertebrae connected by intervertebral discs and linked via ligamentous and muscular attachments. Neck pain is the most common musculoskeletal condition

affecting the community. It has a debilitating impact on the functional performance of an individual. It poses as a burden for both the patient and society [1]. In many cases of neck pain, there is an absence of an identifiable underlying causative factor or any abnormal anatomical structure which may be leading to the symptom. Non-specific neck pain is defined as simple neck pain without any

specific underlying cause or disease that may cause the pain. The symptoms of non-specific neck pain change with physical activity and time. The actual course of non-specific neck pain is not clear which varies from weeks of onset to months and thus can limit the performance of daily functions. There are multifactorial factors that lead to non-specific neck pain and mainly are categorized into two - mechanical and postural causes. Mechanical factors include repetitive motion leading to excessive loading of cervical structures. Whereas, postural factors include awkward posture or postural malalignment in daily occupational activities [2].

The neck, a mechanistic link, is connected to the shoulder girdle and upper limb via the skeletal and muscular structures. It helps to provide stability as well as mobility to the shoulder girdle and upper extremity and thus enhancing the human function [3]. It is evident that patients with neck pain experience upper limb dysfunction but there is no clear picture as to exactly what proportion of neck pain patients experience upper limb disability. Cervical radiculopathy is a clinical condition that manifest pain and/or sensorimotor deficit mainly caused due to the compression of a cervical nerve root. The different causes of compression of cervical nerve root can be attributed to disc herniation, spondylosis, instability, trauma or tumors. The clinical symptoms range from complaints of pain, numbness, tingling in the upper extremity and myotomal weakness in a cervical radiculopathy patient [4]. However, upper limb symptoms may also aggravate in case of non-specific neck pain. Mechanical loading is the major cause of impairment of upper limb function in neck pain [5]. A recently published study showed that patients with severe neck pain or disability report severe upper limb disability which was mediated by pain self-efficacy [6]. However, the above-mentioned study targeted only the chronic and severe neck pain population. The present study aimed to find relation between neck pain and upper limb disability in nonspecific neck pain patients.

MATERIALS AND METHODS

The study was conducted after the approval of institutional research review committee. Type of study is a cross-sectional study with purposive

sampling method. 80 subjects in the age group of 18 – 40 years diagnosed with nonspecific neck pain were recruited. Subjects with cervical radiculopathy or existing upper limb pathology were excluded from the study. Subjects were explained about the nature of the study in the language best understood by them. A duly signed written informed consent was taken from the subjects who were willing to participate in the study. The demographic information of participants, such as, age, gender and dominance were recorded.

Pain intensity was measured on a 0-10 visual analogue scale (VAS) anchored with the words ‘no pain at all’ and ‘worst pain imaginable’. The participants were asked to mark a point on the scale which described their pain intensity. The Neck Disability Index (NDI) was used to measure the effect of neck pain on daily activities [7]. The Neck Disability Index (NDI), a valid and reliable instrument, is a 10-item self-report questionnaire which is used to determine how neck pain affects a patient’s daily life and to assess the self-rated disability of patients with neck pain. [7].

Upper limb disability was measured using the Disabilities of the arm, shoulder and hand questionnaire (DASH). The DASH is a 30-item, self-report questionnaire that measures physical function relating to arm, shoulder and hand disability. The DASH has been tested for validity and responsiveness in a neck pain population [8].

Statistical analysis

All statistical analysis was done using SPSS Statistics v20.0. Normality of data was assessed which showed that the data was not normally distributed. Descriptive statistics was used to calculate mean and standard deviation. Spearman correlation test was used to find the association between neck pain, neck disability index and upper limb disability. The level of significance was set at $p < 0.01$.

RESULTS

In this study total of 80 subjects, there were total 40 males and 40 females in the age group of 18 to 40 years.

Table 1. Demographic Data

	N	Age	
		Mean	Standard deviation
Total Subjects	80	26.91	5.79

Table 2. Mean Values of VAS, NDI and DASH scores in all subjects

	Mean	Standard Deviation
VAS	5.41	1.09
NDI	19.16	8.31
DASH	14.84	7.77

Table 3. Correlation between VAS, NDI and DASH Score in all subjects

	VAS		NDI	
DASH	r = 0.54	p= 0.000*	r = 0.75	p= 0.000*

*Correlation is significant at the 0.01 level (2-tailed).

DISCUSSION

Nonspecific neck pain is the most common widespread condition. The present study demonstrated that there is a significant correlation between neck pain, neck disability index and upper limb dysfunction in non-specific neck pain patients. This association is related to the mechanistic links that exist between the neck and upper limb. The upper limb is connected to the cervical spine and the shoulder girdle via the skeletal and muscular attachments. Mechanical loading is the major causative factor of non-specific neck pain. During any upper extremity activity, the cervical spine moves as it is interconnected. The loads placed on the upper limb are then transmitted to the cervical structures via axio-scapular muscles, such as levator scapulae and upper trapezius. These loads placed stress the articular and ligamentous structures of the cervical spine leading to pain response and thus creating protective spasm. This in turn may inhibit the use of upper limb leading to upper limb dysfunction [5, 9].

The scapula acts as a connecting 'bridge' between the shoulder complex and the cervical spine. It provides both mobility and stability to the neck and shoulder region [10, 11]. The muscular attachments of levator scapula and upper trapezius act as connecting link improving the mobility and stability of the neck and shoulder girdle complex.

The function of levator spine depends whether the origin or insertion is moved. With the cervical spine fixed, the levator scapulae functions to elevate the scapula and downward rotate it. Whereas with the scapula in a fixed position, ipsilateral levator scapulae brings about laterally flexion and rotation of cervical spine and bilateral action assists in cervical spine extension [12]. Improper or awkward posture while performing any prolonged upper limb task as well as altered cervical and thoracic curvatures affect the scapular orientation leading to alteration in scapular alignment, reduction in shoulder muscle strength and decreased shoulder range of motion. Altered alignment of scapula commonly scapula downward rotation contributes to prolonged compressive loading of neck as a result of the transfer of the weight of the upper extremities to the cervical region through the attachments of the cervico-scapular muscles namely upper trapezius and levator scapulae. Increased length of upper trapezius muscle present in scapular downward rotation does not permit effective transfer of the weight of an upper extremity load to the sternoclavicular joint, and increased levator scapulae muscle stiffness contributes to increased compressive load and shear force on the cervical spine during an active upper limb movement. Levator scapulae action is considered as the

causative mechanism for shoulder pain of cervical origin during active shoulder movement [12, 13]. The present study is in accordance with the study done by Mclean et al which demonstrated preliminary evidence that patients with severe neck pain/disability also report severe upper limb disability. [6]

between neck pain and upper limb function in nonspecific neck pain disorders. These results suggest that it should be mandatory to routinely assess neck pain patients regarding upper limb function and also ensure that the management of non-specific neck pain is targeted towards rehabilitation of these upper limb functional limitations.

CONCLUSION

The results of the present study provide evidence that there is a significant correlation

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