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Association of upper crossed syndrome and neck pain among general population in Islamabad

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ABSTRACT

Introduction: Upper crossed syndrome is a common postural dysfunctional pattern that describes the dysfunctional tone of the musculature of the shoulder girdle / cervicothoracic region of the body.

Objective: To find association of Upper Crossed Syndrome and Neck pain among general population in Islamabad.

Material & Methods: A cross sectional survey was conducted from December 2017 to February 2018 at Rawal General and Dental Hospital Islamabad, and National Institute of Rehabilitation Sciences Islamabad after approval from Advanced Research Committee**.** Non Probability convenience sampling was used to collect data from both male and female participants having neck pain after obtaining informed consent. Janda's cervical flexion test was used to diagnose Upper crossed syndrome. The questionnaire provided for subjective assessment from the patient and an objective measure for the clinician. Data were analyzed by SPSS 20. Continuous variables were expressed as mean ± SD, and categorical variables as frequency and percentage; $p \leq 0.05$ indicated significance.

Results: The ages of 340 respondents ranged from 18 to 72 years (mean age 32.40 ±11.71 years); their weights were from 29kg to 140kg (mean weight 64.64 ± 12.56 kg). The sitting hours were from 2 hours to 16 hours (mean 8.27 ± 3.06 hours). Upper Crossed Syndrome occurred in 82 (24.1%) of 340 responding subjects. There was a strong association between neck pain and upper crossed syndrome ($p<0.001$).

Conclusion: Upper Crossed Syndrome patients with chronic neck pain had a poorer ability to perform the Janda's cervical flexion test when compared with asymptomatic subjects. The study adds to the evidence that poor ability to perform the Janda's cervical flexion test maybe a clinical evidence of an impairment that characterizes neck pain, regardless of origin.

Keywords: Upper crossed syndrome; muscle imbalances; postural abnormality; neck pain; Janda's cervical flexion test.

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INTRODUCTION

The upper crossed syndrome is defined as weak lower and middle trapezius, short upper trapezius and levator scapulae, weak deep neck flexors especially the scalene muscles, and short suboccipital muscles and sternocleidomastoid, weak serratus anterior and short pectoralis major and minor.[1] Dr. Janda named this syndrome "Upper Crossed" because when the weakened and shortened muscles are connected in the upper body they form a cross. Upper-Crossed Syndrome (UCS) is also referred to as proximal or shoulder girdle crossed syndrome.[2]

Sign and symptoms of UCS are rounded shoulder, forwarded head posture, elevation of shoulder, winging of scapulae, CO-C1 hyperextension. Differential diagnosis of UCS includes Upper thoracic outlet syndrome, Stress and anxiety, Pseudo radicular syndrome- blockage of C5/6, C6/7, T1/. Blockages - Acromioclavicular joint, 1st – 2nd ribs, Scalene syndrome.

The syndrome mainly arises as a result of muscular imbalance that usually develops between tonic and weak muscles.[3] There are two types of muscles present in our body – the postural muscles such as pectoralis major, upper trapezius, and sternocleidomastoid and other phasic muscles such as deep-neck flexors, and lower trapezius. Predominantly static or postural muscles have a tendency to tighten. In various movements, they are activated more than the muscles that are predominantly dynamic and phasic in function, which have a tendency to develop weakness.[4] Opposite group muscle imbalances in upper crossed syndrome give rise to postural disturbance.[5]

Individuals who present with upper crossed syndrome will show a forward head posture (FHP), hunching of the thoracic spine (rounded upper back), elevated and protracted shoulders, scapular winging, and decreased mobility of the thoracic spine.[6] Sometimes, manual material handling activities can cause musculoskeletal disorders,[7] for example, the workers who do their work in inappropriate position and repeating the same action throughout their workday.[8] The simultaneous occurrence of FHP and rounded shoulder is nothing but upper crossed syndrome.[9]

Musculoskeletal injuries often affect both neck and upper limbs and can occur when performing a given professional activity that is repetitive and involves still posture as well as handling considerable load.[10] FHP is caused by maintaining an abnormal or inappropriate posture for a long time.[11] Studies prove that causes of bad posture can be the occupation related; continuous working for long hours may result in postural defects and deviation.[12]

"As we grow older, our posture tends to decline: not only do the shoulders become more rounded, but the head becomes protracted forward and the thoracic spine (or upper back), more curved.[13] In time, faulty alignment and poor posture can add abnormal stress to tissues, leading to degenerative joint changes and pain. Bad posture has also been linked to poor balance, as well as to decreases in gait and functional performance. In fact, research shows that poor posture is even associated with increased mortality rates in older adults."[13] "Typically, muscles overused in a certain direction will become tighter and shorter—an effect known as adaptive shortening. Opposing muscles to repetitive movements sustain stretches during prolonged postures. As a result, these muscles will tend to become longer and weaker—an effect known as stretch weakness."[14]

Upper Crossed Syndrome can cause an abnormal kyphotic thoracic spine and altered biomechanics of the glenohumeral joint. Altered biomechanics of the cervical spine may lead to a loss of cervical curve and, if not assessed on time, degeneration of the cervical spine take place. The alterations in function of the musculature, in people with Upper Crossed Syndrome, frequently results in chronic headaches in individuals. Age-related degenerative changes have an impact on the structure of tissues and the subsequent mechanics of the cervical spine. Studies have shown a reduction in proprioception for neck movements of persons over the age of 45 years, despite of neck pain. Therefore, age-related changes may well contribute to a more forward head posture even in the absence of pain.[15]

The combined result of this posture is that the cervicocranial, glenohumeral, and tempomandibular joints are all overstressed. Joint dysfunction and trigger points naturally result from these muscle imbalances associated with headache, neck pain, shoulder blade pain, and TMJ and shoulders disorders. Each of the three muscle imbalances that contribute to the upper crossed syndrome are discussed in the context of the key movement pattern that is affected: scapulohumeral rhythm, neck flexion, and trunk lowering from a push up. Respiration, which is also affected, is discussed as well.[16]

In August 1991, Quantitative study comparing cervical flexor strength in healthy subjects and in subjects with mechanical neck pain reveals that chronic / persistent neck pain increases risk for Upper Crossed Syndrome.[17]

In September 2005, a study conducted on Performance of the Craniocervical Flexion Test in Subjects With and Without Chronic Neck Pain reveals that patient with chronic neck pain had a poorer ability to perform Janda's cervical flexion test.[18]

A research was conducted on topic "Prevalence of Upper Crossed Syndrome. Among The Medical Students of University of Lahore" in 2016.[19] According to this study 48.7% population of the students had neck pain and high prevalence of upper crossed syndrome and 66.8% of them had poor studying posture.

The purpose of study is to find association of Upper Crossed Syndrome and Neck pain among general population in Islamabad.

MATERIALS & METHODS

A cross sectional survey was conducted in Rawal General and Dental Hospital Islamabad, and National Institute of Rehabilitation Sciences Islamabad, from December 2017 to February 2018 after approval from Advanced Research Committee and after taking informed consent from subjects. The calculated sample size was 377, but 340 respondents participated in the study. Non Probability Convenience sampling was used to collect data from participants. Participants of ages 18 years and above, poor posture, and medical history consistent with diagnosis of neck pain were included in study; participants with spinal trauma, joint dysfunction, congenital defects, pain due to any systemic inflammatory diseases and who had acute spasm of paraspinal muscles of neck/ cervical or sprain of any paravertebral structure like ligaments or fascia were excluded.

The subjects were asked to assume the testing position and different tests for checking tightness and strength of the required muscles were performed. Data were collected on the basis of these tests. The Questionnaires provided for a subjective assessment from patients and an objective measure for clinicians. Data were collected for general demographics, Neck Pain Disability Index Questionnaire (NPDI-1 pain intensity), and Janda's Cervical Flexion Test. Data analysis was done by SPSS 20 for descriptive statistics. Chi-square test was performed to check the association between neck pain and upper crossed syndrome, keeping $p \leq 0.05$ significant.

In Janda's Cervical Flexion Test for evaluation of the deep cervical muscles, patient in supine position is asked to lift the head from the couch; smoothness of movement is observed throughout the procedure. Normally, lordosis will disappear, and the chin will touch the sternum. Otherwise pathological picture would show that the head is lifted with very tense sternocleidomastoids.

RESULTS

Demographic data of 340 respondents are shown in Table 1. The mean age of respondents was 32.40 ± 11.71 years (range 18-72 years). The mean height of respondents was 65.29 ± 41.05 inches (range 30-75 inches). The mean weight of respondents was 64.64 ± 12.56 kg (range 29-140 kg). The mean number of sitting hours were 8.27 ± 3.06 hours (range 2-16 hours).

Table 1: Demographics characteristics of patients (n=340).

Demographic Variables	Mean	SD
Age (years)	32.40	11.71
Height (inches)	65.29	41.05
Weight (kg)	64.64	12.56
BMI	24.34	04.98
No. of sitting hours	08.27	03.06

Of the 340 participants, there were 283(83.2%) respondents who had considerable neck pain, whereas 57(16.8%) had no neck pain. There were 86(25.3%) respondents who had mild pain, 100(29.4%) had moderate pain and 46(13.5 % had fairly severe pain, 45(13.2%) had very severe and 06(1.8%) had worst pain (Figure 1).

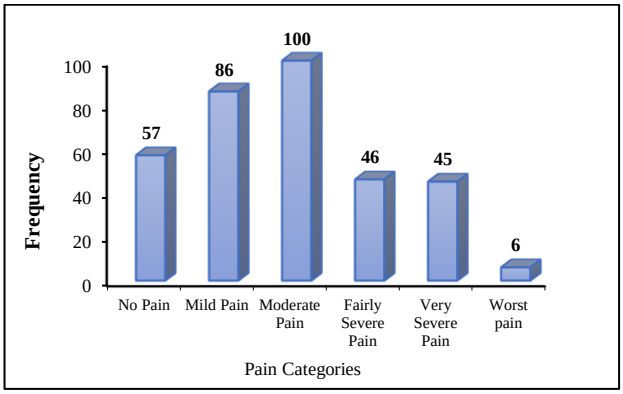

Figure 1: Neck Pain Disability Index (n=340).

Out of 340 respondents, it was found that 82(24.1%) respondents had neck pain diagnosed with Upper Crossed Syndrome, and 258(75.9%) respondents with neck pain did not have Upper Crossed Syndrome (Figure 2).

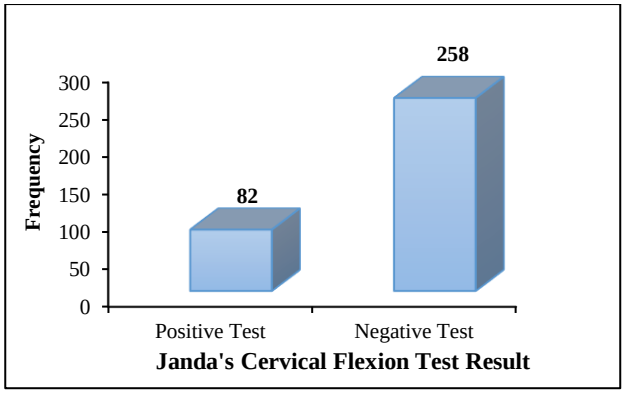

Figure 2: Janda's Cervical Flexion Test results (n=340).

Of 340 respondents, 82 participants were diagnosed with Upper Crossed Syndrome and out of these 82 participants 10(12.2%) had no neck pain, 21(25.6%) had mild neck pain, 16(19.5%) had moderate neck pain, 08(09.75%) had fairly severe neck pain, 25(30.5%) had very severe neck pain, and 02(02.44%) had worst neck pain (Table 2). When compared with the 258 respondents who were negative by Janda's Cervical Flexion Test, a strong association was found between neck pain and Upper Crossed Syndrome ($p<0.001$), as shown in Table 2.

Table 2: Association of Neck Pain with Upper Crossed Syndrome based on Janda's Cervical Flexion Test (n=340).

Janda's Cervical Flexion Test	NDPI-1 Pain Intensity Categories						Total	p value
	No Pain	Mild Pain	Moderate Pain	Fairly Severe Pain	Very Severe Pain	Worst Pain		
Positive	10	21	16	08	25	02	82	<0.001
Negative	47	65	84	38	20	04	258	
Total	57	86	100	46	45	6	340	

DISCUSSION

In the present study conducted in Islamabad, Pakistan, to find the occurrence of Upper Crossed Syndrome (UCS) in patients with neck pain or a history thereof, UCS was found in 24.1% of such patients. Moreover, a strong association was found between neck pain and Upper Crossed Syndrome ($p<0.001$), when comparisons were made between patients who tested positive and negative by Janda's Cervical Flexion Test to diagnose UCS.

In 2016, a research was conducted titled, "Prevalence and Risk Factors for the Development of Upper-Crossed Syndrome (UCS) among DPT Students of University of Lahore".[19] This survey on 244 Physical Therapy undergraduates showed that there were 86(35.2%) respondents who had considerable neck pain whereas 158(64.8%) had no neck pain. Out of 86, there were 76.6% respondents who had mild pain, 22.1% had moderate pain and 1.2% had severe pain. There were 86(35.2%) respondents who were working for 0 to 2 hours, 134(54.9%) working between 2 to 4 hours, 11(4.5%) students working for 4 to 6 hours, and 13(5.3%) students working for more than 6 hours. There were 129 (52.9%) respondents who had Rounded shoulder posture, 115 (47.1%) had Erected shoulder posture.[19]

In our study, out of 340 there were 283(83.2%) respondents who had a considerable neck pain whereas 57 (16.8%) had no neck pain. Out of 283, there were 86 (25.3%) respondents who had mild pain, 100 (29.4%) had moderate pain and 46 (13.5% had fairly severe pain, 45 (13.2%) had very severe and 6 (1.8%) had worst pain. In this study, the mean number of sitting hours were 8.3, whereas minimum hours were 2 and maximum sitting hours were 16.

In 2015 a research was conducted titled, "Prevalence and Risk Factors for the Development of Upper-Crossed Syndrome (UCS) among DPT Students of University of Lahore''.[20] It was a cross sectional study of 244 Physical Therapy undergraduates from University Institute of Physical Therapy. There were 57(23.4%) respondents who had neck pain in Passive Rotation of Motion (PROM) during Flexion and 187(76.6%) without pain in PROM. There were 60(24.6%) respondents with Thoracic pain in Active Rotation of Motion (AROM) during Flexion, while 184(65.4%) respondents had no thoracic pain in AROM during flexion. The authors state that 30 to 40 respondents having neck pain, flexed posture, rounded shoulders with considerable thoracic pain were more prone to Upper Crossed Syndrome.[20]

In our study 24% population had neck pain in flexion, and 76% did not had neck pain in flexion was diagnosed with upper crossed syndrome through Janda's cervical flexion test.

The first quantitative study by Silverman et al[17] in 1991 used a microprocessor controlled dynamometer to compare anterior cervical flexor muscles strength in healthy subjects and in subjects with mechanical neck pain; the study identified significant differences in quantitatively measured muscle strength among the two groups ($p<0.05$) and concluded that chronic / persistent neck pain increased the risk for Upper Crossed Syndrome.[17]

It has been previously documented that patients with chronic neck pain have a poorer ability to perform Janda's cervical flexion test.[18] Similarly, it was documented that of the 48.7% medical students at University of Lahore, Pakistan who had neck pain and upper crossed syndrome, 66.8% were found to have poor studying posture.[19]

In our study, out of 340 respondents, there were 82(24.1%) patients diagnosed with upper crossed syndrome and 258 (75.9%) respondents with neck pain did not have upper crossed syndrome.

André Klussman et al[21] in 2008 conducted study on musculoskeletal symptoms of the upper extremities and the neck a cross-sectional study on prevalence and symptom-predicting factors at visual display terminal (VDT) workstations. In this study it was found that only 33.1% population had normal studying posture, whereas 66.8% population had poor studying posture and out of which 43.1% studied while laying down on their stomach and 23.7% studied while having book in their lap with flexed back.[21]

In our study we found that posture had a huge effect on cause of neck pain and risk of Upper crossed syndrome. Out of 340 respondents, 143(42.06%) had a poor posture and 197(57.94%) had a good posture.

Proper scapulothoracic muscle activation is necessary for controlling scapulothoracic function and is necessary for normal upper extremity function.[22]

Treatment of UCS begins with removal of trigger points and adhesions of the primary stabilizers of the shoulder (supraspinatus, infraspinatus, teres minor and subscapularis). The next step involves active and passive stretching. Four to six sessions of myofascial release and trigger point therapy is commonly recommended before stretching. The treatment must involve all the muscles in UCS.[23] Bruegger's positioning has also become a popular exercise as it can aid in the relaxation of hyperactive muscles of the upper torso.[24]

Mobility of joints (joint play) should also be examined to determine the joint dysfunction or blockages. In the upper crossed syndrome joint dysfunction and blockages of Co-Cl, TMJ, upper cervical spine, lower cervical spine, C/T crossing, Upper thoracic spine, ribs can be detected.[25]

Range of motion (ROM) of joints can also be examined to show the joint dysfunction and restrictions coming from the shortness of muscles. In upper crossed syndrome shortness of the muscles around neck result in decreased ROM with pain of all the motions of neck and neck.[26,27]

The patient is positioned on the table in a supine lying position, with the neck in a neutral position.[28] If necessary, the therapist can place towels under the patient's head to achieve a neutral position of the neck and head.

CONCLUSION

Persistent neck pain can, over a long period of time, expose patients to Upper Crossed Syndrome, thereby having a poorer ability to perform Janda's Cervical Flexion Test compared to asymptomatic subjects. This test can be taken as clinical evidence of any impairment that characterizes neck pain, regardless of origin.

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