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Risk Factors Associated with Neck Pain among Subjects with Upper Cross Syndrome: A Cross-Sectional Study

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Abstract

Background: Maintaining a bad posture during long-time use of mobiles, laptops, and desktops can lead to Upper cross syndrome. It is a postural dysfunction which can lead to various problems like neck pain, loss of neck range of motion and functional restrictions. If left untreated, it can lead to secondary complications. The study aimed to identify the risk factors for neck pain in Upper cross syndrome.

Methods: The study was conducted on 400 subjects having upper cross syndrome. Risk factors for neck pain (Age, Gender, BMI and profession, working hours) were examined by univariate and multivariate analysis.

Results: Neck pain occurred in 246 out of 400 subjects. Univariate and multivariate analysis suggested that occupation ($p<0.027$) and long working hours ($p=0.000$) were the independent risk factors for neck pain in upper cross syndrome.

Conclusion: Profession and long working hours can be the risk factors for neck pain in upper cross syndrome.

Introduction:

A sedentary lifestyle has raised the number of cases from 17 to 35 in the Indian population (1). Upper cross syndrome is one of the work-related neck/shoulder disorders resulting from a sedentary lifestyle (2). A muscular imbalance in the neck and shoulder region causes upper cross syndrome. In this syndrome, the tonic muscles are tight, and the phasic muscles are weak (3). There is tightness of the pectorals and upper trapezius muscles, weakness of deep neck flexors, middle lower trapezius, and serratus anterior muscles (4). Early identification of risk factors will help the clinician predict and plan upper cross syndrome treatment strategies. This syndrome may not always lead to pain, but maintaining a faulty posture for a long duration while using mobile phones, laptops, desktops, etc., can lead to neck pain (5). Moreover, other musculoskeletal symptoms may include headaches, chest pain, upper back pain, tingling in upper arms, and reduced range of motion in the neck or shoulders (6).

To our knowledge, only a few studies have identified the risk factors associated with neck pain in

upper cross syndrome (7,8). Neck pain has become one of the most common problems among individuals. It can impact daily life activities along with absenteeism from work, which can further add to economic losses at the community level (9,10). The study's primary objective was to identify risk factors associated with neck pain in upper cross syndrome. This study will help prevent and plan treatment strategies for Upper Cross syndrome and provide a better understanding of risk factors associated with neck pain in Upper Cross syndrome. The existing literature primarily includes studies that evaluate the predictive value of specific factors. To serve as a risk stratification model, the indicators should be merged into a single model that combines key self-reported and performance-based variables from each International Classification of Functioning, Disability and Health (ICF) category. As a result, our study aimed to develop a therapeutically effective risk factor model by combining literature-based components with relevant facts.

Materials and Method:

This study was a cross-sectional study. The samples were collected by conducting various camps in Delhi and NCR regions from October 2023 to April 2024. Ethical approval was obtained from the Institute Ethics Committee, Amity University Noida (AUUP/IEC/JUN/2022/6). The study was conducted in accordance with Helinski's declaration. Each patient's privacy was maintained, and informed consent was obtained before data collection. The trial's CTRI registration number is (CTRI/2022/10/046611). The sample size of 400 was calculated considering the prevalence rate, which varies from 11-60%. The inclusion criteria were both male and female in the age group 20-50 years having upper cross syndrome based on three criteria of having a craniovertebral angle less than<48degree, kyphotic angle more than >42 degrees and shoulder angle greater than >52 degrees (11). Exclusion criteria include any congenital deformities/scoliosis/fractures/surgeries in pregnancy patients with vertebral basilar insufficiency (12). The sampling technique was convenient sampling till the desired sample was obtained. Previous research with relevant self-reported and performance-based variables from each ICF domain obtained information about risk factors. Individuals with upper cross syndrome were divided into two groups, one with neck pain and one without neck pain. We collected the following predictor variables: age (20-50 years), gender, body mass index (BMI) (less than 25 kg/m2, 25-30 kg/m2, or 30 kg/m2 or greater), occupation and working hours in different professions. The risk factors were compared between the two groups.

Data analysis

Data was analysed using SPSS version 21. Microsoft Excel was used to compile the data. The statistical tool which was applied was mean and percentage to describe the descriptive data. The chi-square test was used to analyse the association between the factors, and $p \leq 0.05$ was considered as significant value. Logistic regression analysis was used to identify the risk factors, odds ratio (OR), and 95% confidence interval (13).

Result

The result showed that neck pain was absent in 47.7 per cent, and 52.3 per cent had neck pain with upper cross syndrome. Demographic characteristics and association with different factors have been shown in Figure 1. A direct association was found between neck pain and age, profession, and working hours. However, no significant association was found between gender and BMI in neck pain with upper cross syndrome.

Table:1 Association of different determinants with neck pain in upper cross syndrome

Determinants	UCS (Neck pain Absent)	UCS (Neck pain Present)	Total	Chi-Square value	P value
	224 (47.7)	246 (52.3)	400		
Age				6.15	0.046
20-30	111	94			
30-40	51	70			
40-50	62	82			
Gender				.034	0.854
Male	123	133			
Female	101	113			
Profession				22.74	0.007
Housewives	51	57			
Computer workers	36	41			
Students	55	39			
Labourers	29	21			
Drivers	13	18			
Teachers	22	31			
Health care workers	12	30			
Sweepers	3	4			
Others	3	5			
BMI				4.22	0.239
<18.5	7	3			
18.5-24.9	93	91			
25.0-29.9	94	108			
≥30	30	44			
Working hours				46.84	0.000
< 3 hours	57	18			
3-6 hours	70	88			
7-10 hours	65	90			
>10 hours	32	50			

Table: 2 Multivariable logistic regression analysis of factors associated with neck pain in Upper cross syndrome

	Odds ratio	95% confidence interval	p-value
Age	1.398	0.834-2.342	0.203
Profession			
Housewives	2.165	1.156-4.246	0.034
Computer workers	2.138	1.092-4.185	0.027
Students	2.735	1.509-4.956	0.001
Labourers	1.290	0.750-2.219	0.357
Drivers	2.857	1.678-4.987	0.013
Teachers	2.724	1.487-4.934	0.001
Health care workers	2.674	1.305-4.106	0.012
Sweepers	0.671	0.347-1.295	0.234
Working hours			
< 3 hours	0.541	0.136-21.55	0.383
3-6 hours	2.884	0.253-32.814	0.393
7-10 hours	9.586	5.838-15.742	0.000
>10 hours	12.045	7.798-18.604	0.000

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In multivariate analysis, two determinants, profession and long working hours in different professions, were significantly associated with neck pain in upper cross syndrome. Multivariable logistic regression yielded a primary prediction model with two determinants.

Discussion

The study's primary objective was to find risk factors for neck pain in Upper cross syndrome. The risk factors were identified based on a literature review and other performance-based tests. We found that profession and long working hours are important risk factors that can lead to neck pain in upper cross syndrome.

Earlier studies have been done to identify the risk factors associated with Upper Cross syndrome. However, only the female population was considered, and the sample population taken in the study was having pain as one of the important inclusion criteria (7).In this study, both male and female, including symptomatic as well as asymptomatic patients, were taken. Many times, upper cross syndrome remains asymptomatic, and the patients report it when there is pain or loss of mobility at the neck (14).

In our study, we found that occupation is one of the risk factors for neck pain in upper cross syndrome; working in a flexed posture on a mobile or laptop for a long duration of time can lead to postural imbalance. Previous studies have also reported that office workers who work long hours have an increased risk of developing upper cross syndrome (7,15). Our study found that various professionals like Computer workers, students, drivers, teachers, housewives are at higher risk of developing neck

pain.

This study is in line with the previous study that proves that reasons of bad posture might be occupation-related; continuous working for extended hours may result in postural faults and deviation (16). Our study showed no significant effect of body weight on upper cross syndrome. In one of the studies done on children, the researcher found a relationship between body weight and asymmetry of the shoulder and scapula, as well as the asymmetry of scalene muscles. However, the study was conducted on school children and not the adult population (17,18).

A study done by Mubashir has shown that females are more likely to develop neck pain along with upper cross syndrome.This might be due to poor posture and weak musculature (19). However, our study did not show any significant effect of gender on neck pain associated with upper cross syndrome.

One of the study's limitations is the small sample size and the fact that the psychosocial factors of different occupations were not considered. Future studies can be done by analysing those factors for various occupations. It will form the basis for risk stratification strategies and further research. Additionally, subjects from different Geographical conditions can add to the evidence level.

Conclusion: Maintaining good posture and a healthy lifestyle can prevent postural imbalance. A daily routine of strengthening and stretching exercises along with appropriate workplace modifications, can effectively reduce the risk of neck pain and upper cross syndrome. Early identification of risk factors and ergonomic interventions are crucial in preventing many secondary complications, ultimately enhancing work performance and overall quality of life.

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