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ORIGINAL ARTICLE

RISK FACTORS ASSOCIATED WITH UPPER CROSSED SYNDROME IN FEMALES OF AGE 25-50 YEARS: A POPULATION-BASED CASE CONTROL STUDY

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ABSTRACT

OBJECTIVE: To assess the risk factors associated with upper crossed syndrome (UCS) in females of age 25-50 years.

METHODS: This population based case controlled study was conducted from May to August 2019. Total of 210 females including 105 cases (participants who had upper neck pain for at least one month) and 105 controls (participants who didn't had upper neck pain), aging 25-50 years were selected through non-probability convenient sampling technique from the population of Gujrat, Punjab Pakistan. Data was collected through a pre-tested questionnaire and analyzed through SPSS software (version 21.0). Universal goniometer used to assess cervical ranges. Neck disability index (NDI) was used for functional disability and visual analog scale (VAS) was applied to assess the degree of pain.

RESULTS: Majority (n=88; 41.90%) of females were in age group of 25-30 years and were housewives (n=147; 70 %). Females who used handheld devices, unsupported back chairs, read, worked, travelled for more than 3 hours had 63.91, 9.127, 3.568, 3.301, 2.068 folds risk of developing UCS respectively as compared to those who did the same for less than 3 hours. Similarly, females who were fetal sleeper had 2.032 times more risk of than front sleeper. All risk factors were statistically significant ($p < 0.005$).

CONCLUSION: Usage of handheld devices while reading, working, and travelling for >3 hours, sleeping with curved spine and in fetal position and unsupported back chair increase the risk of UCS.

KEY WORDS: Upper crossed syndrome (Non-MeSH); Neck Pain (MeSH); Musculoskeletal abnormalities (Non-MeSH); Neck disability index (Non-MeSH); Female (MeSH); Visual Analog Scale (MeSH).

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INTRODUCTION

Upper crossed syndrome (UCS) is a frequently observed pattern of dysfunction of posture that defines the abnormal manner of the muscles of the cervicothoracic region and shoulder girdle of the body. There are some weak muscles, which involve the middle and lower trapezius, rhomboids, and serratus anterior, also there are some overactive/spastic muscles, involving levator scapulae, pectoralis major, upper trapezius and this position can lead to some abnormalities of posture.[1]

The forward posture of head gives rise to some postural pattern of forward shoulders, increases the kyphotic pattern, forward posture of head, and the loss of lordotic curve of cervical spine. These abnormal patterns give rise to overall postural deviations in the upper part of the body. Even though this posture is not essentially supposed to cause pain, but when the patterns are sustained for longer intervals, patients do suffer from neck and upper back pain often. The other common condition accompanying this posture involves headache which can affect the quality of life and posture that outstrips other chronic disorders (e.g., hypertension, osteoarthritis, and diabetes).[2]

Approximately 30% of the population in university staff is facing the problem of chronic neck pain. Due to the prolonged working hours and heavy workload, musculoskeletal problems occurs. The rate of shoulder and neck pain increased with the increase in the numbers of the working hours. During seating position, due to bad posture all the load is shifted on the neck and causes abnormality in curvature of spine and can leads to the lordosis.[4]

Forward head posture is the main cause of pain in the neck and shoulder region. Due to the shifting of the neck angle anteriorly the muscles of the neck in the back side will always in the stretched position and the soreness and tightening of the muscles and their pain is also radiated to the back, shoulder, and the arms.[5]

Weightlifting and the disturbed environment can be the main cause of the shoulder and neck pain. Heavy lifting and imbalanced posture during seating and standing effect the muscles of the neck and shoulder. Bad posture during reading writing or any other activity commonly effect the muscles and cause muscles soreness.[6]

In the musculoskeletal system proper posture and muscle equilibrium are compulsory for general ergonomics. There is strong connection in neck and shoulder problems and postural deformity, muscle imbalances and abnormal movement patterns. Muscle imbalance is a condition in which some muscles become shorten and tighten and other muscles become weaken.[7]

Poor posture is a very serious health

TABLE I: DEMOGRAPHIC CHARACTERISTICS OF PARTICIPANTS

Variable	Groups	Frequency (%) (N=210)
Age (years)	25-30	88 (41.90)
	31-35	37 (17.60)
	36-40	27 (12.90)
	41-45	25 (11.90)
	46-50	33 (15.70)
Marital status	Married	36 (17.1)
	Unmarried	174 (82.9)
Occupation	Student	30 (14.3)
	Housewife	147 (70.0)
	Teacher	24 (11.4)
	Tailor	1 (0.5)
	Office worker	8 (3.8)

issue which is a cause of more age-related musculoskeletal issues. Youngsters may develop the habit of forward posture of neck at a very early stage due to studying in numerous odd body positions. Imprecise furniture of school, house and office and different physiques and needs of children respectively these points play an important role in children keeping the neck in odd positions. Appraisals have shown spinal deviations of posture in grownups with high occurrence with posture of head and protraction of shoulders these are the commonest deviations of posture.[7]

Up to current knowledge, insufficient data are available on risk factors of UCS in female of age 25-50 years. Prevalence of UCS is increasing day by day in both genders, but females were selected in this study because high risk of disease was shown in them as compared to males.[8] This study was conducted with the aim to explore the risk factors that are increasing the burden of UCS in females. During clinical practice more females reported neck pain as compared to males which lead the researchers for exploration of risk factor for development of neck pain among females.

METHODS

This population-based case control study was conducted from May 2019 to August 2019 at Gujrat, Punjab, Pakistan.

Females of age 25-50 years that reported at least one month neck pain were selected as target population. Participants with visual analog scale (VAS) >4 out of 10, Neck disability index (NDI) score >14 out of 50, compromised ranges of cervical spine; flexion <80°, extension <70°, lateral flexion <20° and rotation <90° measured by universal goniometer were selected as case in the study.

Those females who had same exposure but without upper crossed syndrome were included in control group.

Female with malignancy related to soft tissues and joints, congenital shoulder deformity, at most 3-month history of fracture and surgery to related joints were excluded.

Sample size was calculated as 210.[9] Total of 210 females aging 25-50 years, including equal number of cases (n=105) and controls (n=105) were selected through non-probability convenient sampling technique from the population of Gujrat, Punjab Pakistan. Written informed consent was obtained from all participants.

The data were analyzed using statistical software SPSS (version 21.0). Numerical data were described in mean and standard deviation (SD). Frequencies and percentages used to display the qualitative data. Chi Square test was applied to find the association between factor and disease through cross tab and value of chi square helped the research for determining the association $\alpha = 0.05$. Chi square was applied & $p \leq 0.05$ was considered as significant value. Unadjusted odd ratio at 95% confidence interval calculated. Adjusted odd ratio calculated through logistic regression technique.

RESULTS

The majority (n=88; 41.90) of study participants were in 25-30 years age group, followed by 31-35 years age group (n=37; 17.60). Seventy percent of females were housewives and 14.3% were students (Table 1).

In table II, interpretation of neck disability index score in which the females whose NDI score lies between 5-35 and >35 had 3.255 (OR) times higher risk of having UCS than in the female whose NDI score is between 0-4. Usage of handheld devices in which females who use handheld devices for 3-8 hours had 63.91 (OR) times higher risk of having UCS than in the female who used handheld devices < 3 hours. Traveling hours in which females who travel for 3-8 hours had 2.068 (OR) times higher risk of having UCS than those who travel only for < 3 hours. Reading hours in which females who read for 3-8 hours had 3.568 (OR) times higher risk of having UCS than those who read for < 3 hours. Type of chair use in which females who use chair with back unsupported had 9.127 (OR) times higher risk of having UCS than in females who use back supported. Duration of working hours in which females who work for 3-8 hours had 3.301 (OR) times higher risk of having UCS than those who work for < 3 hours. Sleeping posture in which females who are back sleeper, side sleeper and fetal sleeper had 2.032 (OR) times higher risk of having UCS than those who are front sleeper. Duration of computer use in which females who use computer for 3-8 hours had 0.252 (OR) times higher risk of having UCS than those who use computer for < 3 hours.

DISCUSSION

Prevalence of UCS is increasing day by day in both genders, but females were selected in this study because high risk of disease was shown in them as compared to males. This study was started with this aim to explore the risk factors that are increasing the burden of UCS in females. Salahzadeh Z, et al. studied with her colleagues on assessment of forward head posture in females results showed that, craniovertebral angle method may discriminate the

TABLE II: DETERMINANTS ASSOCIATED WITH UPPER CROSSED SYNDROME

Variables		Cases (N= 105) n (%)	Controls (N=105) n (%)	Total (N=210) n (%)	Wald Chi Square	p-value	Odds Ratio (OR)
Interpretation of neck disability index score	0-4 (none)	0 (0.0)	105 (100)	105 (50.0)	0	0.989	1
	5-14 (mild)	24 (22.9)	0 (0.0)	24 (11.4)			3.255
	15-24 (moderate)	46 (43.8)	0 (0.0)	46 (21.9)			
	25-34 (severe)	27 (25.7)	0 (0.0)	27 (12.9)			
	>35 (complete)	8 (7.6)	0 (0.0)	8 (33.8)			
Use of handheld devices (hours)	<3	0 (0.0)	76 (32.4)	76 (36.2)	34.194	0	1
	3-4	29 (27.6)	28 (26.7)	57 (27.1)			63.91
	5-6	54 (51.4)	0 (0.0)	54 (25.7)			
	7-8	22 (21.0)	1 (1.0)	33 (11.0)			
Travelling (hours)	<3	0 (0.0)	15 (14.3)	15 (7.1)	13.149	0	1
	3-4	47 (44.8)	55 (52.4)	102 (48.6)			2.068
	5-6	47 (44.8)	27 (25.7)	74 (35.2)			
	7-8	11 (10.50)	8 (7.6)	19 (9.0)			
Reading (hours)	<3	0 (0.0)	26 (25.8)	26 (12.4)	37.951	0	1
	3-4	27 (25.7)	42 (40.0)	69 (32.9)			3.568
	5-6	50 (47.6)	31 (29.5)	81 (38.6)			
	7-8	28 (26.70)	6 (5.7)	34 (16.2)			
Type of chair use	Back supported	17 (16.20)	67 (63.8)	84 (40)	43.881	0	1
	Back unsupported	88 (83.8)	38 (36.2)	126 (60.0)			9.127
Working (hours)	<3	2 (1.9)	34 (30.4)	36 (17.1)	35.526	0	1
	3-4	38 (36.2)	41 (39.0)	79 (37.6)			3.301
	5-6	44 (41.9)	27 (25.7)	71 (33.8)			
	7-8	21 (20.0)	3 (2.9)	24 (11.4)			
Sleeping position	Front sleeper	11 (10.50)	38 (36.2)	49 (23.3)	15.192	0	1
	back sleeper	64 (61.0)	47 (44.8)	111 (52.9)			2.032
	side sleeper	13 (12.4)	17 (16.2)	30 (14.3)			
	fetal sleeper	17 (16.20)	3 (2.9)	20 (9.5)			
Computer use (hours)	<3	74 (70.5)	20 (19.0)	94 (44.8)	65.985	0	1
	3-4	23 (21.9)	3 (2.9)	26 (12.4)			0.252
	5-6	4 (3.8)	29 (27.6)	33 (15.7)			
	7-8	4 (3.8)	53 (50.5)	57 (27.1)			

females with moderate-severe and non FHP more accurate than head position angle and head tilt angle.[8] Prevalence of UCS is high in females that's why we chose females as a population.

The results showed that females who used handheld devices more than 3 hours have 63.91 times more risk of developing UCS as compared to usage of handheld devices less than 3 hours. Those females who used chair with back unsupported have 9.127 folds more risk as compared to back support chair. Reading for more than 3 hours has 3.568 times more risk to develop UCS as compared to reading for less than 3 hours. Females who work for more than 3 hours have 3.301 times more risk as compared to work for less than 3 hours. In females travelling for more than 3 hours have 2.068 folds more risk as compared to travelling for less than 3 hours. Females who are back sleeper, side sleeper, and fetal sleeper have 2.032 times more risk of having UCS as compared to females who are front sleeper. All determinants have significant value less than 0.005.

De-La-Llave-Rincón AI, et al. with his colleagues found positive relationship between scholar's neck and ranges of neck region in both groups.[10] If the range of motion is decreased the cranio-vertebral angle is also decreased. Range of motion of neck and forward head posture which is also called scholar's neck had no relationship with the age in the healthy group but not with carpel tunnel syndrome. The patients who had greater scholar's neck and decreased ranges of neck are suffered with mild to medium carpel tunnel syndrome as compared to healthy group.[10]

Study by Ma M et al., had two groups of cervical spondyloses with and without UCS. They found that patient who had cervical spondylosis with neck pain are prone to straight and with decreased extension and upper and lower cervical is flexed.[11]

The study by Saeed Bin Ayaz with his colleagues found that the female students who was in flexion posture of neck had moderate intensity of the neck pain and is more common during study time and also cause the disturbance of sleep.[12] By comparing to current study females who keep their neck in flexion more than 3 hours more suffer with UCS. The students who maintained

neck flexion posture for 2 hours or more than 2 hours had more chances to develop neck pain than those who maintained it for less than 2 hours.

Kim EK, et al., with his colleagues examined the correlation between rounded shoulder posture, neck disability index and the degree of forward head posture. It was demonstrated in the previous study that, depending on the degree of forward head posture, changes were detected in the neck disability index. Therefore, maintaining proper posture may prevent postural pain syndrome, functional disability, and postural deformity.[13] By relating to current study interpretation of neck disability index score in which the females whose NDI score lies between 5-35 and >35 had 3.255 (OR) times higher risk of having UCS than in the female whose NDI score is between 0-4.

In another study, Ming Z, et al., with his co-workers explored repetitive use of computers for an extended period and the neck and shoulder pain that can be related to and caused by computer use.[14] By recounting with current study who use computer for 3-8 hours had higher risk of having UCS than those who use computer for < 3 hours.

Nejati P, et al., with his colleagues revealed that office employees had a defective posture while working and that the improper posture was more severe in the office employees who suffered from the neck pain.[15]According to current study who work for 3-8 hours had 3.301 (OR) times higher risk of having UCS than those who work for < 3 hours.

LIMITATIONS

Small sample size and a single study center were the potential limitation in our study.

CONCLUSION

It was concluded that usage of handheld devices, reading, working and travelling for > 3 hours, sleeping in fetal position and unsupported back chair are the factors which increase the risk of UCS, and these are modifiable risk factors. We can reduce the risk of UCS by maintaining good posture and healthy lifestyle.

RECOMMENDATION

After conducting this study, it needs to work on Clinical trial study related to UCS by using different manual therapy techniques. By maintaining the good posture, healthy lifestyle, by doing daily stretching exercises and maintain proper ergonomics, we can avoid of having risk of UCS.

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AUTHOR'S CONTRIBUTION

Following authors have made substantial contributions to the manuscript as under:

AK: Conception and study design, acquisition of data, critical review, approval of the final version to be published

SY & FI: Conception and study design, critical review, approval of the final version to be published

AR: Analysis and interpretation of data, drafting the manuscript, approval of the final version to be published

AB & SJ: Acquisition of data, critical review, approval of the final version to be published

Authors agree to be accountable for all aspects of the work in ensuring that questions related to the accuracy or integrity of any part of the work are appropriately investigated and resolved.

CONFLICT OF INTEREST

Authors declared no conflict of interest

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DATA SHARING STATEMENT

The data that support the findings of this study are available from the corresponding author upon reasonable request.

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