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Prevalence of Rounded Shoulders and Its Association with Craniovertebral Angle among Freelancers

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KEYWORDS

Craniovertebral angle
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DECLARATIONS

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ABSTRACT

Background: In today's digital age, prolonged use of computers and laptops, especially among office workers and freelancers, has led to a rise in postural issues. Poor ergonomic habits can contribute to musculoskeletal imbalances, particularly affecting the neck and shoulders. Rounded shoulder posture and changes in craniovertebral angle are common among individuals with sedentary work routines. Understanding the prevalence and correlation of these conditions is essential for promoting workplace ergonomics and preventive health strategies. **Objective:** To find the prevalence of rounded shoulders and its association with craniovertebral angle among freelancers. **Methodology:** The cross-sectional study on the prevalence of rounded shoulders among freelancers and its association with craniovertebral angle on prolonged laptop use posture. This study included 323 participants who work in software houses as freelancers in Faisalabad. Using a convenience sampling technique, with the inclusion criteria of age between 18-50 years, both genders were included, and the estimated working hours were 8. The exclusion criteria were participants with any muscular deformity, paralysis, infection, or trauma from the last three months. Participants with rounded shoulders and a Craniovertebral angle were assessed. A universal goniometer was used to assess the craniovertebral angle, a vernier calliper for the assessment of rounded shoulders and a neck pain rating scale to check the neck pain and the neck disability index for the neck disability. Statistical analyzes was performed using SPSS version 26 with frequency distribution and chi-square test to analyse any correlation between rounded shoulder and craniovertebral angle and neck disability index. The significance level was set as $p \leq 0.05$. **Results:** A chi-square was conducted on 323 participants, and the results conclude that there is a significant correlation between rounded shoulders and craniovertebral angle. Using a computer and a laptop in poor posture for a long period causes an impact on the neck and shoulder ergonomics and neck and other symptoms. **Conclusion:** This study concluded that there is a significant association between rounded shoulders and craniovertebral angle, and using a laptop in poor posture for a long period of time can have a bad impact on neck and shoulder ergonomics.

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INTRODUCTION

Rounded shoulder is a shoulder abnormality in which the shoulders can protrude anteriorly. In a Rounded shoulder, the shoulder blade moves anteriorly from the frontal plane.¹ It is not only causing impact on the shoulder, but it can also cause impact on the muscle covering the cervical spine. It can be the reason for neck pain. Rounded shoulder is an abnormality and can cause further cervical deformities like forward head posture.¹ Rounded shoulder is mainly caused by the faulty posture while working, like using computers, smartphones, and small portable devices, and their prolonged use can cause the rounded shoulder.² While using these devices, most people avoid good posture. Due to this bad posture, our shoulder and neck ergonomics can be disturbed.² Our sedentary behaviour and sedentary lifestyle lead to the disruption of ergonomics.

Today is the modern era, and the use of technology is increasing day by day.³ As we are now completely dependent on these electrical and small portable devices that make our life easier but they also cause many bad impacts on our body posture and further be the reason for musculoskeletal problems.³ Neck Pain is quite common in those with shoulder deformities like rounded shoulders in both males and females, and all age groups.⁴ These shoulder and neck deformities not only cause neck pain but can disturb their body ergonomics and surrounding muscles like trapezius, pectorals, etc., ultimately, due to these problems in the upper extremity, can lead to decreased work loading and altered motor functions.⁴ Many risk factors of the Rounded shoulder, like poor posture, and there is a change in the biomechanics of the cervical spine, can lead to neck pain. These changes in the spine can further cause a muscular imbalance, and ultimately, muscle loss can start.⁵ The excessive use of portable devices like computers, laptops and smartphones etc. can be a risk factor for rounded shoulders and further disrupt normal body ergonomics.⁵

The main symptoms of rounded shoulders are neck pain, neck and shoulder discomfort, and muscle stiffness that can further cause disruption in work activities.⁶ These problems can be caused by due change in the biomechanics of the neck and shoulder. These changes in the biomechanics of the neck and shoulder can further impact our

normal posture.⁶ Treatment of rounded shoulders is important as it can cause problems in doing of activity of daily life and poor changes in the body ergonomics.⁷ Changing the poor body alignments and maintaining the good and ideal can help in treating the rounded shoulder. Strengthening or stretching or affected area can also cause improvements in the body's disturbed ergonomics.⁷

Freelancers are independent workers, and as we know that they spend most of their time in front of the computer and laptops, etc., in a sustained position for a long period of time.⁸ Due to which our normal body biomechanics can be disturbed, and it also causes an impact on our normal body alignment and posture, and ultimately causes any kind of abnormality.⁸ Forward head posture is an abnormality in which there is a forward bending of the head can take place.⁹ This neck abnormality not only involves the cervical spine, but it can also involve the musculoskeletal balance. As the head moves forward from its normal alignment, it also causes an impact on the musculoskeletal imbalance, due to which it can apply faulty pressure on the body.⁹

Our sedentary lifestyle, like prolonged sitting in a bad posture or faulty can easily affect the body ergonomics. People in the office can work in front of the computers and laptops for a long period of time can cause such conditions.¹⁰ Insufficient sleep and bad eating habits can also cause the forward head posture.¹⁰ Craniovertebral angle is a postural assessment method to assess the Forward Head Posture.¹¹ This method is used to check the level of head movement anteriorly in Forward Head posture. There are many methods to access the forward head posture, but this is the most valid method. Craniovertebral angle can also be used to check the abnormalities and to provide better treatment.¹¹

Forward head posture can cause many symptoms like neck pain, muscle stiffness, pain in the upper segment of the body, fatigue, and teeth clenching is also a common sign in forward head posture.¹² Nerve impingement is also quite important and it can further cause numbness and tingling, and many other symptoms that can restrict the normal range of motion, especially at the cervical level.¹² Forward head posture can be treated in many ways, like stabilisation exercises or neck and shoulder provide stability to the shoulder and the

neck.¹³ Not only stabilisation exercise, but many different kinds of manual therapy can also take part in the correction of Forward head posture, strengthening and stretching of deep muscle, can help in the lengthening of shortened and tight muscle.¹³ Physiotherapy can also play a vital role in the improvement of the forward head posture.¹⁴ Improving the posture and quality can also bring good improvements in the forward head posture. Quality of life can be improved by adopting a healthy lifestyle and by changing the neck functions, which ultimately reduces neck pain.¹⁴ The purpose of the study was to find the prevalence of rounded shoulders and its association with craniovertebral angle among freelancers.

METHODOLOGY

The cross-sectional study on the prevalence of rounded shoulders among freelancers and its association with craniovertebral angle on prolonged laptop use posture. This study included 323 participants who work in software houses as freelancers in Faisalabad. Using a convenience sampling technique, with the inclusion criteria of age between 18-50 years, both genders were included, and the estimated working hours were 8. The exclusion criteria were participants with any muscular deformity, paralysis, infection, or trauma from the last 3 months. Participants with Rounded shoulders and Craniovertebral angle were assessed. A universal goniometer was used to assess the craniovertebral angle, a vernier calliper for the assessment of rounded shoulders and a neck pain rating scale to check the neck pain and the neck disability index for the neck disability. Statistical analysis was performed using SPSS version 26 with frequency distribution and chi-square for the association. The significance level was set as $p \leq 0.05$.

RESULTS

Table 1 shows the description of the age of the participants, which shows that 253 participants were lie in between 18-28 years old, while 66 participants were lie in between 29-39 years old and 4 participants were lie in between 40-50 years old, respectively. The mean and SD are 25.69 ± 3.17 . It also shows the data of the rounded shoulder among the participants; out of 323 participants, 160 (50.5%) had normal shoulders and 163 (49.5%) participants with rounded shoulders. It shows the data of the craniovertebral

angle among the participants; 125 participants had a normal craniovertebral angle, while 94 participants had a mild decrease in craniovertebral angle, and 104 participants had a severe craniovertebral angle, respectively. In 323 participants, 163 had rounded shoulders, out of which 44 had a normal craniovertebral angle, 42 had a mild craniovertebral angle, and 77 had a severe craniovertebral angle. 160 participants had normal shoulders, of which 81 had normal craniovertebral angle, 52 had mild, and 27 had severe craniovertebral angle.

Table 4 shows that a chi-square test of association was conducted between rounded shoulder and craniovertebral angle to find the association. There is a significant association between rounded shoulders and craniovertebral, p-value 0.00, which is 0.05. Table 6 shows the cross-tabulation of working hours and Rounded shoulder. This table shows that there were a total of 323 participants, 119 participants working hours less than 8 out of which 57 had Rounded shoulders and 62 had normal shoulders. 204 participants worked more than 8 out, of which 106 had Rounded shoulders and 98 had normal shoulders.

Table 3 shows the Pearson chi-square was conducted between working hours and Rounded shoulder to find the association. There was a significant association between working hours and Rounded shoulder, p-value .481, which is greater than 0.05, indicating no statistically. Significance between working hours and Rounded

Table 1: Demographics

		Frequency	Percent
Age (years)	18-28	253	78.3
	29-39	66	20.4
	40-50	4	1.2
Rounded shoulders	Yes	163	50.5
	No	160	49.5
Cranio-vertebral angle	Normal (48-50)	125	38.7
	Mild (40-47)	94	29.1
	Severe (less than 40)	104	32.2

Table 2: Cross tabulation of working hours and rounded shoulder

		Participants with rounded shoulders		Total
		Yes	No	
Working hours of participants	less than 8	57	62	119
	more than 8	106	98	204
Total		163	160	323

Table 3: Chi-Square test of working hours and rounded shoulder

Chi-Square Test					
	Value	df	Asymptotic Significance (2-sided)	Exact Sig. (2-sided)	Exact Sig. (1-sided)
Pearson Chi-Square	.496 ^a	1	.481		
Continuity Correction	.347	1	.556		
Likelihood Ratio	.496	1	.481		
Fisher's Exact Test				.491	.278

Table 4: Cross tabulation of working hours and craniovertebral angle

		Participants with craniovertebral angle			Total
		Normal (48-50)	Mild (40-47)	Severe (less than 40)	
Working hours of participants	less than 8	51	34	34	119
	more than 8	74	60	70	204
Total		125	94	104	323

Table 5: Chi-square test of working hours and craniovertebral angle

Chi-Square Tests			
	Value	df	Asymptotic Significance (2-sided)
Pearson Chi-Square	1.629 ^a	2	.443
Likelihood Ratio	1.631	2	.442
Linear-by-Linear Association	1.615	1	.204

shoulders. Table 5 shows the cross-tabulation between working hours and craniovertebral angle. This table shows that there was a total 323 population, 119 participants had less than eight working hours, out of which 51 had a normal craniovertebral angle, 34 had a mild craniovertebral angle, and 34 had a severe craniovertebral angle. 204 participants had more

than 8 working hours, out of which 74 participants had normal craniovertebral angle, 60 participants had mild craniovertebral angle, and 70 participants had severe craniovertebral angle. A Pearson chi-square test of association was conducted between working hours and craniovertebral angle to find the association. There was a weak association between working

hours and craniovertebral angle.

DISCUSSION

The purpose of this cross-sectional study was to appraise the prevalence of rounded shoulders among freelancers from different software houses and check if there is any correlation between rounded shoulders and the craniovertebral angle of these freelancers. The overall no of participants after gaining their consent was 323, the description of ages was done demonstrating no of participants in each age group from 18 to 25 years, the participants in each software house, no of sitting hours, the rounded shoulder and the relation between all these. A pie chart, cross tabulation and chi-square test were performed to check for the association.

Rounded shoulder was evaluated with the help of a vernier calliper, a tool that is used for measuring the extent of rounded shoulder, and NPRS, a tool used for the evaluation of the pain in the cervical region and a goniometer to assess the ROM in the cervical region. The results after the evaluation indicated that out of 323 participants, 160 participants had normal shoulders and 163 participants had rounded shoulders, 125 participants had normal craniovertebral angle, 94 participants had mild craniovertebral angle, and 104 had severe craniovertebral angle. Eun-Kyun Kim performed a study to rule out the Correlation between rounded shoulder posture, neck disability indices, and degree of forward head posture among college students from age groups 19-24 in both genders.

To measure craniovertebral angle a thread with pendulum and neck disability index used to access the neck pain, and the results show that the Forward head posture did not cause the Rounded shoulder, but in our study a Pearson chi-square was conducted between craniovertebral angle and Rounded shoulder which shows a significant association between craniovertebral angle and Rounded shoulder, there is also significant association between working hours and Rounded shoulder, which indicate that duration of working hours can also cause huge impact on the posture.

A study by Surabhi S Shinde¹⁵ conducted a study to determine the Correlation of Craniovertebral angle with neck pain in undergraduates, with a sample size of 133, including both genders. Craniovertebral angle was accessed by using the

Surgimap and pain with the NPRS. Spearman's correlation was conducted, which shows a weak correlation between craniovertebral angle and neck pain, but according to our study, a chi-square was conducted between craniovertebral angle and working and another association is conducted between neck disability index and working hours and showed a significant correlation which indicate that the working craniovertebral angle is caused due to the poor posture.

A study was conducted by Kadrya H. Battecha¹⁶ to determine the correlation of head and shoulder with nonspecific neck pain. A total of 100 females range between 18-25 years old. Craniovertebral angle and shoulder angle can be passed through the camera, and the NPRS is used to assess the neck pain. And the results showed a significant correlation between forward head posture and neck pain. Similarly, chi-square was conducted to assess the correlation of rounded shoulder and craniovertebral angle and also the association between working hours and neck pain, which shows a significant correlation that indicates that faulty posture has a poor impact on our body ergonomics.

A study was conducted to determine the prevalence of rounded shoulders in computer users with a sample size of 377, including both genders. Goniometer and stand wall test used to assess the rounded shoulder, and the results concluded that 62.6% participants with the rounded shoulder. And also conclude that the use of computers for a long time with faulty posture can cause rounded shoulders. Similarly, in our study, the sample size is 323 among both genders, and the prevalence of rounded shoulders in freelancers and assessment of rounded shoulders was done by using a vernier calliper, and the results concluded that out of 323, 163 participants had rounded shoulders due to prolonged laptop use in the wrong posture.

The correlation between the degree of forward head posture and rounded shoulder posture in physical therapy students was evaluated, with a sample size of 114 in both males and females. Photogrammetry was used to assess the craniovertebral angle and Rounded shoulder, and the results show that there is no impact on the Rounded shoulder of a severe degree of Craniovertebral angle. According to our study, a chi-square test was conducted on 323 participants between rounded shoulder and craniovertebral

angle, and it shows a significant correlation between them.

CONCLUSION

The conclusion of our study and the obtained data is that there is a prevalence of rounded shoulder among freelancers, which is from 323 participants, 163 participants having Rounded shoulder (50.46%) and craniovertebral angle normal, mild and severe, which are 125,94 and 104, respectively. Chi-square is conducted to assess the correlation between rounded shoulder and craniovertebral angle, and it shows a significant correlation between Rounded shoulder and craniovertebral angle, which 0.00, which is less than 0.05. So collectively it is concluded that prolonged use of bad posture may have an impact on the shoulder and neck, which ultimately causes Rounded shoulders and craniovertebral angle.

DECLARATIONS

Consent to participate: Written consent had been obtained from patients. All methods were performed following the relevant guidelines and regulations.

Availability of Data and Materials: Data will be made available upon request. The corresponding author will submit all dataset files.

Competing interests: None

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CONSORT Guidelines: All methods were performed following the relevant guidelines.

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