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Correlation of Craniovertebral Angle with Scapular Dyskinesia in Goldsmith Workers

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Abstract

Background: This study was undertaken to investigate the forward head posture and scapular dyskinesia in goldsmith workers due to their precision work. To keep the small cut diamond in proper mould and polish the gold requires precision and continuous forward bending of the neck. This poster requires high work demand of the neck musculature which leads to continuous upper back curved and neck in flexion and this position is maintained for long working hours.

Aim and objective: To find correlation of craniovertebral angle with scapular dyskinesia in goldsmith workers.

Methods: Eighty-three participants were selected according to the inclusion and exclusion criteria. Goldsmith workers with neck pain were selected using Numeric pain rating scale. Markus-Bader software was used to measure the craniovertebral angle and scapular dyskinesia was assessed using scapular slide test. Karl Pearson's correlation coefficient test was done to determine correlation. Statistical analysis was done using Microsoft Excel.

Result: There is a significant correlation between the decreased craniovertebral angle and scapular dyskinesia.

Conclusion: It has been concluded that there is a significant relation between neck pain and altered postion of scapula on the dominant side of the goldsmith workers.

Keywords: Neck pain, scapular dyskinesia, craniovertebral angle, Goldsmith workers

1. Introduction

Gold smithing, or precious metal working, is a centuries-old craft that works gold and other precious metals. One of the most widespread small-scale industries in India is the gold ornament making industries. Goldsmiths make and design gold jewellery including jewellery with precious and semi precious stones. Their work involves diamond cutting, blending and casting gold, hammering, filing, turning and spinning gold or other metals. This is a creative and more detail oriented metal working job which requires skill, precision and continuous neck bending[1].There is an increase stress and demand on the muscles, ligaments, tendons and other soft tissues of the musculoskeletal system due to sustained static posture during the working hours[2]. Anterior positioning of the cervical spine is forward head posture and is also known as "text neck", "scholar neck", "ihunch", "reading neck".[3] Forward head posture is poorly habituated neck posture which is adapted by the goldsmith workers during prolonged working hours.

There is an effect of gravity on the muscles due to continuous slouching and poor ergonomic alignment at the work stations and home. This poor posture is maintained by the workers due to job demands such as neck bending to do precise work while placing a small diamond on the ring or polishing small earrings which might cause neck discomfort and pain. Studies have revealed that neck pain in goldsmiths is found to be prevalent (80%), low back (75%), wrist (45%), shoulder (20%) and also eye problems like irritation (30%) and burning sensation (70%)[3]. The forward head posture causes increased compression of the fascet joint and posterior vertebral bodies and shortening of the posterior neck musculature and stretching of the anterior neck musculature eventually compensation occurs at other joints as the muscles are interlinked and two joint which leads to forward shoulder posture[4,5]. The forward head and round shoulder posture can cause increased activity of the muscles surrounding the shoulder joint, pain and discomfort and altered scapular kinematics consequently increasing the stress on the shoulder and thus subsequently the neck[6].This imbalance caused in the muscles leads to alteration in the orientation of the scapular and glenohumeral kinematics[7].

From these previous literature reviews, we can conclude that there is high prevalence of neck pain and forward head in goldsmith workers. In India, there are none of the studies investigating the correlation of forward head posture with scapular dyskinesia among goldsmith workers. So, the present study was undertaken.

2. Materials and methodology

This was a cross-sectional study where 83 participants were selected according to convenient smapling. The inclusion criteria to select the study population were males willing to participate in the age group of 35-45 years with moderate intensity of neck pain on the numeric pain rating scale and subjects working for more than 10 hours. The exclusion criteria were any cervical pathology such as herniated disc, cervical spondylosis, cervical spondylolisthesis or upper limb injuries in the last 6 months without recovery, brachial cleft cyst, radial ray dysplasia, Shoulder impingement, Rotator cuff injuries, Glenoid labrum injuries, clavicle fracture and non-cooperative subjects. Materials used in the study included consent form, demographic data performa, numeric pain rating scale, camera and tripod, measuring tape, reflective markers (bindi), Markus-Bader software.

3. Procedure

A written consent was taken from all participants who were willing to participate. Participants were selected according to the inclusion and exclusion criteria. The purpose of the study were explained to all the participants prior to the study. Demographic data was filled in. Pain was noted using numeric pain rating scale and the subjects were selected according to the intensity of pain. Cranio-vertebral angle was measured using MB Ruller software and scapular dyskinesia was assessed using scapular slide test.

Clinical test: Measurement of scapular dyskinesia

Description of the test: Performed with positioning the arms at 0,45 and 90 degree. The side to side distance between the inferior angle of the scapula and corresponding vertebrae is noted.

4. Statistical analysis:

Data was collected on an assessment sheet and encoded for computerized analysis. Table and graphs were made using Microsoft Excel. Statistical analysis was done using Microsoft Excel. Karl pearson's

correlation coefficient test was done to determine correlation between the craniovertebral angle and impaired scapular mechanics leading to scapular dyskinesia.

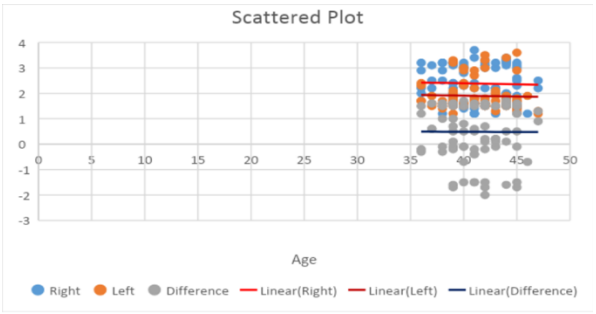
5. Results:

A total of 83 participants were included in the study all were males in the age group of 35-45 years.

Karl Pearson correlation:

Variable X	Variable Y	r-value	p-value
Craniovertebral angle	Right 0 Degree	-0.369	0.001
	Left 0 Degree	-0.515	0.001
	Difference 0 Degree	0.056	0.618

Table 1:Represents scapular slide test at 0 degree



Graph 1:Correlation of both at 0 degree

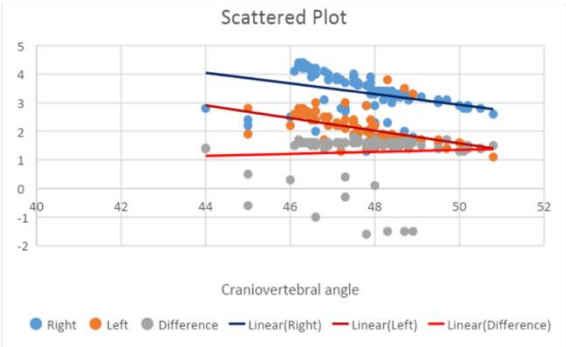
Correlation coefficient r-value for Craniovertebral angle and Right 0 Degree has been recorded as -0.369 which is statistically significant at 5% level with non-linear association.

Correlation coefficient r-value for Craniovertebral angle and Left 0 Degree has been recorded as -0.515 which is statistically significant at 5% level with non-linear association.

Correlation coefficient r-value for Craniovertebral angle and Difference 0 Degree has been recorded as 0.056 which is statistically non-significant at 5% level with linear association.

Variable X	Variable Y	r-value	p-value
Craniovertebral angle	Right 45 Degree	-0.385	0.001
	Left 45 Degree	0.062	0.576
	Difference 45 Degree	-0.280	0.010

Table 2. Illustrates Scapular slide test at 45 degree



Graph 2:Correlation of both at 45 degree

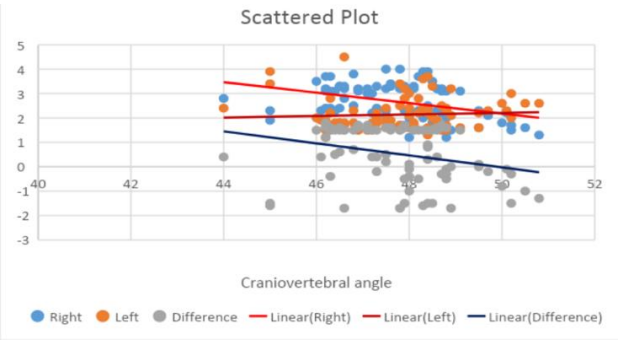
Correlation coefficient r-value for Craniovertebral angle and Right 45 Degree has been recorded as -0.385 which is statistically significant at 5% level with non-linear association.

Correlation coefficient r-value for Craniovertebral angle and Left 45 Degree has been recorded as 0.062 which is statistically non-significant at 5% level with linear association.

Correlation coefficient r-value for Craniovertebral angle and Difference 45 Degree has been recorded as -0.280 which is statistically significant at 5% level with non-linear association.

Variable X	Variable Y	r-value	p-value
Craniovertebral angle	Right 90 Degree	-0.392	0.001
	Left 90 Degree	-0.101	0.365
	Difference 90 Degree	-0.203	0.066

Table 3: Scapular slide test at 90 degree



Graph 3: Correlation of booth at 90 degree

Correlation coefficient r-value for Craniovertebral angle and Right 90 Degree has been recorded as -0.392 which is statistically significant at 5% level with non-linear association.
Correlation coefficient r-value for Craniovertebral angle and Left 90 Degree has been recorded as -0.101 which is statistically non-significant at 5% level with non-linear association.
Correlation coefficient r-value for Craniovertebral angle and Difference 90 Degree has been recorded as -0.203 which is statistically non-significant at 5% level with non-linear association.

Variable X	Variable Y	r-value	p-value	Result
Age	**Craniovertebral angle**	-0.183	0.097	Non-Significant at 5% Non-Linear association

Table 4: Illustrates correlation of age with CV angle.

Correlation coefficient r-value for age and Craniovertebral angle has been recorded as -0.183 which is statistically non-significant at 5% level with non-linear association.

6. Discussion

The objective of this study was to assess forward head posture and scapular dyskinesia in goldsmith workers. A correlation study was carried out for a period of 18 months. The study consisted of 83 male goldsmith workers which met the inclusion and exclusion criteria. However, the mean age was 41 years. 17% participants were left handed by dominance and 83% were right handed by dominance. Out of all participants, 79% are between the age of 39-45 years. Whereas, only 17% participants were between 35-38 years. A subjective assessment was done and the outcome measures were analysed using scapular slide test, Craniovertebral angle (MB Ruler Software) and neck pain (NRS) of the participants.
Results from the current study found that there is a linear association of dominance with scapular slide test at left 0, 45, 90 degree. Whereas, there is a significantly positive correlation between cranio-vertebral angle and scapular slide test found in goldsmith workers, Similar to this study conducted by Ashiyat k. akodu et al[8], " A correlation among smartphone addiction, cranio-vertebral angle, scapular dyskinesia and selected anthropometric variables in physiotherapy graduates" And the study concluded that smartphone addiction reduces the cranio-vertebral angle and causes forward head in individuals and increases the risk of scapular dyskinesia as the musculature is in connectivity from the neck towards the

shoulders and their is alteration in the structures which also caused rounded shoulder and improper posture of the individuals which was similar to the results found in the current study.

In contrast to our study conducted by F. Khosravi et al[9].“A correlation of craniovertebral angle and scapular dyskinesia in adults” and it states that the neck posture may affect scapular winging due to the shared muscle attachments of neck and scapula. With the increase of the craniovertebral angle, the scapular winging increased, indicating that head and neck posture is correlated with the scapular winging in the dynamic position. But found no significant relationship between scapular winging and static position and the cranio-vertebral angle and the distance between the fourth thoracic vertebra and the inferior angle of the scapula which contrasts this taken study as it is affected in static position as well.

Shamaila Yaqub et al[10], conducted a study on “prevalence of scapular dyskinesia in bankers" study concluded that bad postural habits somehow had an impact on the musculoskeletal conditions of workers in office sitting which might lead to scapular dyskinesia. And both the genders that work for more than 6 hours were at a risk of getting dyskinesia rather than those working for less than 6 hours. Hence, work environment and working hours plays a crucial role on the musculoskeletal system. A similar kind of study was undertaken by Depreli O et al[11], “scapular dyskinesia and work related pain in office workers”. They found out that the incidence of scapular dyskinesia in Cypriot office workers was particularly high. The musculoskeletal complaints about upper extremity among these workers are known to be associated with both work related and psychosocial factors. The adapted posture has shown to change the normal plane orientation of the scapula, leading to weakness in the posterior rotator cuff muscles and parascapular muscle imbalance causing the change in the position of the scapula. They found out a relation between the work posture, poor working ergonomics, and sitting in the same position for a longer time led to this outcome.

Kejal Manoj Pardeshi et al[12], demonstrated a study to find out “Effect of Smartphone Addiction on Craniovertebral Angle and Muscle Fatigue of Cervical Erector Spinae and Upper Trapezius”. There was a clear relation in between the addiction level and the decrease in the cranio-vertebral angle and with this the fatigue starts to set in the upper trapezius with the neck held at 50 degree of flexion but the deeper placed muscle i.e cervical erector spinae had no fatigue. Improving the posture while using the smartphone might not lead to fatigue in the muscle.

7. Conclusion

It concludes that there was a positive correlation between forward head posture and scapular dyskinesia (scapular slide test) in the goldsmith workers.

8. Clinical Implications

Ergonomic advice for goldsmith workers for the work station with slight modifications along with strengthening protocol can be implemented to maintain the integrity of the musculoskeletal system and this will also serve long term benefits.

9. Limitations

In this study, subjects with the age group of 35-45 years were targated, moderate intensity pain was considered for selection of subjects. The study was conducted in a metropolitan city and other epidemiological factors such as obesity and ergonomics were not considered.

10. Acknowledgement

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