



Association of Body Mass Index with Craniovertebral and Craniohorizontal Angles

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(Received: 04 February 2024

Revised: 11 March 2024

Accepted: 08 April 2024)

KEYWORDS

Forward head posture, BMI, CVA, CHA

ABSTRACT:

Objectives: Forward head posture is one of the most commonly reported musculoskeletal affection in general population. It has a tremendous impact on health and quality of life of the individual and on the society as a whole. These patients are primarily managed with a musculoskeletal perspective and that is the first treatment of choice and there is almost little or no emphasis to the changes observed in patient's CVA and CHA angles according to their BMI. There is a scarcity of literature evaluating the need for thorough assessment in these patients.

Methods: Total 120 patients were taken and were divided into three groups on the basis of their BMI (Underweight, Normal and Overweight). CVA and CHA angles were checked for all the subjects and their association with BMI was calculated for both the parameters.

Results: The association of all the categories of BMI groups was found out for CVA and CHA separately through F-test and the result was significant for CVA and it was insignificant for CHA.

Conclusion: There is limited literature related to association of BMI with CVA and CHA angles and this study proved that the CVA angles are affected in all the categories of BMI (Underweight, Normal and Overweight) whereas CHA has no effect on BMI of the patients. Therefore, there is a future scope of through assessment of BMI in FHP patients so that their treatment outcomes will enhance.

Introduction:

According to National Academy of Sports Medicine (NASM), FHP is defined as holding the head out, in front of its natural position over the cervical spine. A person having Forward Head Posture also typically tilts their head back to look forward. Forward head posture is one of the most reported musculoskeletal affections in general population. It has a tremendous impact on health and quality of life of the individual and on the society. In a study which examined the prevalence of Forward head posture and its efficacy on several different conditions, 66% of the general population had

abnormal

posture which was associated with the development and persistence of many disorders, including cervicogenic headache and migraine, myo-fascial pain syndrome, abnormal shoulder blade movement, abnormal respiratory mechanics, and temporo-mandibular joint disorder.⁽¹⁾

In a recent systematic review conducted in Hong Kong, the prevalence of musculoskeletal problems with mobile phone usage were high ranging from 17.3% to 67.8% for neck complaints.⁽²⁾ On using the mobile phone over long periods of time, users usually adopt



prolonged forward head posture. (3-6) A recent study done in Thailand shows that Text Neck syndrome has become a global epidemic affecting many populations of almost all ages who use mobile phones. Text neck syndrome is a growing health problem and may affect large number of populations throughout the world. (3) Various studies have reported the association of respiratory dysfunction in patients with forward head posture. (7-11)

Patients having abnormal BMI also have a negative impact on their CVA and CHA angles(12) but there is limited evidence regarding the same therefore the current study was done to find out the association of CVA and CHA angles with Body Mass Index in all the categories separately as there is no detailed literature

regarding the same.

Procedure:

Total 120 patients were enrolled in the study according to inclusion and exclusion criteria after signing the consent form. After this, the participants were divided into three groups according to their BMI (Underweight, Normal and Overweight) and the data was collected for CVA and CHA angles with the help of On-protractor application.(13)

Results:

The result was calculated with the help of SPSS software and the association of BMI with CVA and CHA was calculated through F-test.

Table 1 shows the association and comparison of CVA and CHA with various categories of BMI separately

Variable	BMI	Mean	SD	F test	P-value	Result
CVA (Degree)	Underweight	42.342	4.265	7.683	0.001	Significant
	Normal	40.650	3.725			
	Overweight	42.267	3.276			
CHA (Degree)	Underweight	27.975	2.655	1.676	0.188	Insignificant
	Normal	27.408	2.623			
	Overweight	27.883	2.436			

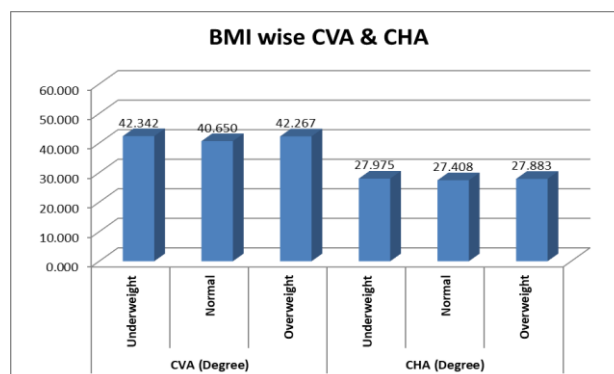
Table 1: Association Between BMI Groups (Underweight, Normal, Overweight) In CVA And Cha Parameters Of Patients.

There was statistically significant comparison of various categories of BMI groups in CVA with P<0.05 and statistically insignificant comparison of BMI groups was seen in CHA with P>0.05.

Underweight & overweight had greater mean CVA

score than normal and there was no change in score of underweight, overweight and normal BMI in CHA in this study.

Graph 1 shows the BMI wise comparison of CVA and CHA for all the categories.



Graph 1: Bmi Wise Comparison of CVA and CHA for All The Categories



Conclusion:

The present study demonstrated the association of all the categories of BMI (Underweight, Normal and Overweight) with CVA and CHA.

This study proved that there is a significant association of BMI with CVA whereas insignificant association with CHA. Thus, the findings confirm that there is a role of BMI in Forward Head Posture and it can further hamper the quality of life of patients because this parameter mostly remains unnoticed. Therefore BMI should be included as a part of routine assessment of FHP and individual exercise protocol should be designed.

Discussion:

CVA and CHA plays a major role in terms of diagnostic criteria for Forward Head

Posture but certain parameters which are ignored in daily life play a major role and get unnoticed but hamper the quality of life and effectiveness of treatment.

One of these parameters in case of FHP is BMI which is not calculated and there is almost little to no evidence available to prove its effect separately on each category of BMI therefore this study was done and the result was also significant for CVA but it was insignificant for CHA.

Therefore, this can be added in patient assessment to bring out the best results and further can enhance their treatment outcomes.

Abbreviations:

FHP (Forward Head Posture), BMI (Body Mass Index), CVA (Craniovertebral Angle), CHA (Craniohorizontal Angle)

References:

- [1] Diab, A. A.; Moustafa, I. M. The Efficacy of Forward Head Correction on Nerve Root Function and Pain in Cervical Spondylotic Radiculopathy: A Randomized Trial. *Clinical Rehabilitation* 2011, 26 (4), 351–361. <https://doi.org/10.1177/0269215511419536>.
- [2] Xie, Y.; Szeto, G.; Dai, J. Prevalence and Risk Factors Associated with Musculoskeletal Complaints among Users of Mobile Handheld Devices: A Systematic Review. *Applied Ergonomics* 2017, 59, 132–142. <https://doi.org/10.1016/j.apergo.2016.08.020>.
- [3] Vate-U-Lan P. Text Neck Epidemic: a Growing Problem for Smart Phone Users in Thailand. *Int J Computer Internet Manag. IJCM*. 2015;23(3):55.1- 55.6
- [4] Lee, J. I.; Song, H. S. The Correlation Analysis between Hours of Smartphone Use and Neck Pain in the Gachon University Students. *The Acupuncture* 2014, 31 (2), 99–109. <https://doi.org/10.13045/acupunct.2014028>.
- [5] Kim, M.-S. Influence of Neck Pain on Cervical Movement in the Sagittal Plane during Smartphone Use. *Journal of Physical Therapy Science* 2015, 27 (1), 15–17. <https://doi.org/10.1589/jpts.27.15>.
- [6] Kim, H.-J.; Kim, J.-S. The Relationship between Smartphone Use and Subjective Musculoskeletal Symptoms and University Students. *Journal of Physical Therapy Science* 2015, 27 (3), 575–579. <https://doi.org/10.1589/jpts.27.575>.
- [7] Kevin Triangto; Siti Chandra Widjanantie; Nury Nudwinuringtyas. Biomechanical Impacts of Forward Head Posture on the Respiratory Function. *Indonesian Journal of Physical Medicine & Rehabilitation* 2020, 8 (02), 50–64. <https://doi.org/10.36803/ijpmr.v8i02.249>.
- [8] Kang, J.-I.; Jeong, D.-K.; Choi, H. Correlation between Pulmonary Functions and Respiratory Muscle Activity in Patients with Forward Head Posture. *Journal of Physical Therapy Science* 2018, 30 (1), 132–135. <https://doi.org/10.1589/jpts.30.132>.
- [9] Koseki, T.; Kakizaki, F.; Hayashi, S.; Nishida, N.; Itoh, M. Effect of Forward Head Posture on Thoracic Shape and Respiratory Function. *Journal of Physical Therapy Science* 2019, 31 (1), 63–68. <https://doi.org/10.1589/jpts.31.63>.
- [10] Dimitriadis, Z.; Kapreli, E.; Strimpakos, N.; Oldham, J. Pulmonary Function of Patients with Chronic Neck Pain: A Spirometry Study. *Respiratory Care* 2013, 59 (4), 543–549. <https://doi.org/10.4187/respcare.01828>.
- [11] Sobh, E.; Awadallah, M.; Shendy, M.; Al-Shenqiti, A.; Al-Jeraisi, T.; Eweda, R. Impaired Pulmonary Function in Patients with Chronic Neck Pain. *Journal of Medical Sciences* 2021, 41 (3),

123. https://doi.org/10.4103/jmedsci.jmedsci_31_20.
- [12] Titcomb, D. A.; Melton, B. F.; Bland, H. W.; Miyashita, T. Evaluation of the Craniovertebral Angle in Standing versus Sitting Positions in Young Adults with and without Severe Forward Head Posture. *International journal of exercise science* 2024, 17 (1), 73–85.
- [13] Mamania, J. A.; Anap, D. B.; Tanksale, D. Validity and Reliability of “on Protractor” Smartphone Application for Measurement of Craniovertebral and Cranio-Horizontal Angle. *International Journal of Physiotherapy* 2017, 4 (4). <https://doi.org/10.15621/ijphy/2017/v4i4/154708>.