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Comparison of Body Mass Index with Various Respiratory Parameters

Ankita Saxena*1, Dr Amit Saraf², Dr Jaspreet Singh Vij³

^{1*}Ph.D Scholar, Department of Physiotherapy, Teerthanker Mahaveer University, Moradabad

² Professor and Head, Department of Orthopaedics, Teerthanker Mahaveer University, Moradabad

³Associate Professor, Department of Physiotherapy, Baba Farid University of Health Sciences, Faridkot

Corresponding Author: Ankita Saxena,

Ph.D Scholar, Department of Physiotherapy, Teerthanker Mahaveer University, Moradabad

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KEYWORDS	ABSTRACT:			
Forward head posture, BMI, FEV1, FVC	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 respiratory parameters (FEV1, FVC, FEV1/FVC) according to their BMI. There is a scarcity of literature evaluating the need for thorough respiratory 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 spirometry was performed and their comparison with BMI was calculated.			
	Results: The association of all the categories of BMI groups was found out through ANOVA and the result was statistically significant for comparison of BMI with FEV1, FVC and FEV1/FVC.			
	Conclusion: There is limited literature related to comparison of BMI with FEV1, FVC and FEV1/FVC and this study proved that the comparison is statistically significant for all the variables. Therefore, there is a future scope of through assessment of BMI in comparison to their respiratory outcomes so that the effectiveness of their treatment 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.

Another domain which has not been clearly examined and there is a scarcity of evidence that Forward head posture has a huge effect on respiratory biomechanics which leads to breathing difficulties as well. In a study it has been proved that Forward head posture greatly impacts the cervical musculature which further leads to labored breathing therefore respiratory function is compromised.⁽¹⁾ In another study, it has been shown that continuous protrusion of neck leads to adaptation in the thoracic vertebrae, which results in ribcage modification . ⁽²⁾ These changes affect the inter-costal muscles which includes diaphragm leading to breathing alterations. ⁽²⁻³⁾ In the case of breathing with FHP, the ribcage is expected to be raised forward and outward, while the upper thorax is mechanically placed more forward, resulting in a higher activity of the upper inter-costal www.jchr.org

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muscles to effectively assist in ventilation which further leads to fatigue. ^(2,4) Various studies have reported the association of respiratory dysfunction in patients with forward head posture. (5-8) Patients with Forward head posture have disturbed respiratory biomechanics⁽⁶⁾ and also present with decreased Forced vital capacity and more usage of sternocleidomastoid and scalene muscles .⁽⁶⁾ According to Masahiro Itoh et al, all these respiratory parameters such as FVC,ERV, IRV and FEV1 are low in subjects with Forward head posture. They concluded that FHP leads to upper thoracic expansion and lower thoracic contraction which led to decreased respiratory function ⁽²⁾ Zacharias Dimitriadis, et al in a study concluded that patients with neck pain have reduced VC, FVC, ERV, and MVV. Respiratory function also positively correlated is with kinesiophobia, neck muscle strength and pain intensity. It is found that pulmonary function is affected in neck pain patients. Also, muscles of cervical spine do not function properly. (7) A study done by RT Okuro et al concluded that degree of FHP is directly correlated with effect on chest expansion and respiratory muscle activities which if increases, reduces the alveolar ventilation.⁽⁹⁾ All these studies explain the importance

of Forward head posture and its association with respiratory biomechanics.

Although there is limited evidence which proves that there is a change in respiratory parameters of FHP patients according to their BMI.⁽¹⁰⁾ Therefore, there is a need to highlight the respiratory issues which are purely caused by changes in BMI. This will lead to better assessment and outcome in the future.

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.⁽¹¹⁾ and then spirometry was done and the data was calculated for FEV1, FVC and FEV1/FVC.

Results:

The result was calculated with the help of SPSS software and the comparison of BMI with respiratory parameters (FEV1, FVC and FEV1/FVC) was calculated through ANOVA.

Variables	BMI	Mean	SD	P-value	Result
	Underweight	2.467	0.501		
FEV1 (L)	Normal	2.233	0.425	0.001	
	Overweight	2.392	0.490		Significant
FVC (L)	Underweight	3.975	0.930		
	Normal	3.492	0.778	0.000	
	Overweight	3.767	0.950		Significant
FEV1/FVC (%)	Underweight	64.200	3.297		
	Normal	66.175	3.026		
	Overweight	65.258	2.284	0.000	
	Normal	81.850	11.348		
	Overweight	89.250	8.815	1	Significant

Table 1 shows the comparison of BMI with various categories of respiratory parameters (FEV1, FVC and FEV1/FVC)

There was statistically significant comparison of BMI groups with FEV1, FVC and FEV1/FVC with P<0.05.

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Conclusion:

The present study demonstrated the comparison of all the categories of BMI (Underweight, Normal and Overweight) with respiratory variables (FEV1, FVC and FEV1/FVC)

This study proved that there is a significant comparison of BMI with all the respiratory parameters. 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 by altering their chest biomechanics. Therefore, BMI and spirometry should be included as a part of routine assessment of FHP and individual exercise protocol should be designed.

Discussion:

Spirometry 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 respiratory variables such as FEV1, FVC and FEV1/FVC therefore this study was done and the result was also significant for all the variables.

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), FVC (Forced Vital Capacity), ERV (Expiratory Reserve Volume), IRV (Inspiratory Reserve Volume), FEV1 (Forced Expiratory Volume in 1 Minute), BMI (Body Mass Index)

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