Innovations

Correlation of Rounded Shoulder with Cardio-Respiratory Fitness and Psychosocial Health Status Among Adolescents- An Observational Study

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Abstract

Background –*Body posture breakdown in and adolescents composes one of the most popular yet underestimated health problem. The alteration in cardiorespiratory fitness (CRF), lower vital capacity of the lungs, and low back pains, as well as the movement of the internal organs are just some of the results of untreated incorrect body posture. In adolescents with overweight generally seem to have prevalence of incorrect body posture.* ***Method*** *– A cross-sectional study was conducted among college going adolescents. Participants were included in the study who have aged between 11-19 years of age and both males and females were taken in consideration. A total sample of 380 adolescents was taken from NIMS College of Physiotherapy. To assess rounded shoulder we have used Pectoralis minor index method, for cardiorespiratory assessment we have used 6 Minute walk test, and for psychosocial health we have used psychosocial health status questionnaire.* ***Result*** *- Results shows that rounded shoulder and psychosocial health status is negatively correlated with cardiorespiratory fitness.* ***Conclusion****- Present study concludes that rounded shoulder, cardiorespiratory fitness, psychosocial health status are correlated with each other. Rounded shoulder and altered psychological status affects the respiratory muscles which will eventually lead to poorer cardiorespiratory health.*

Keywords- *Rounded shoulders, pectoralis minor index, cardiorespiratory fitness, 6 Minute walk test, psychosocial health status questionnaire, college going adolescents, cross sectional study.*

Background of the study- Posture has been described because the association of the frame segments at a selected time is an important fitness index. There is no good or bad posture. Faulty posture is generally seen as a result of poor interrelations between different parts of the body and these inexact interrelations cause muscle tension, improper shortening and lengthening, which makes applicable joint movements more difficult to achieve and causes pain and sometimes may cause disability. [1]

Body posture breakdown in and adolescents composes one of the most popular yet underestimated health problem. The alteration in cardiorespiratory fitness (CRF), lower vital capacity of the lungs, and low back pains, as well as the movement of the internal organs are just some of the results of untreated incorrect body posture [2]. In adolescents with overweight generally seem to have prevalence of incorrect body posture.

CRF assessment gives autonomous and additive morbidity and mortality data that, when favor with traditional risk factors, significantly improves cardio vascular disease (CVD) risk indicator. It is a potentially stronger indicator of mortality than established risk factors such as, hypertension, smoking, high cholesterol and type2 diabetes. [3] These positions can hamper the breathing mechanism and transform the diaphragm mobility. The effect of sitting, lying, and standing postures on respiratory function is examined in so many studies, there has been no study that examines the effect of shoulder posture on respiratory muscles power in healthy young subjects with no prior deformity or disease. [4]

The aim of this study is to assess body posture failure in adolescents because it is one of the most common yet most underestimated health problem. The untreated faulty body shoulder posture and hampered cardiorespiratory fitness may result to the reduction of cardiorespiratory efficiency and decreased vital capacity of the lungs.

College going adolescents bearing heavy school bag on their back and using different modern technologies like mobile phones and laptops may also leads to various postural complications and they may even lead to serious health issues. Due to heavy weight on back it will give ill temporarily or chronic postural problems. So, to study posture and cardiorespiratory assessment will help in study of growth of children (adolescents aged between 10-19 years). [5,6,7]

The most common associative factors for faulty posture among children and adolescents are reported to be age, gender, psychosocial factors, and posture. It is evident that psychosocial factors, especially depression, mental distress, and psychosomatic complaints, have an influence on the development of upper quadrant musculoskeletal pain in children and adolescents. Because of limited studies on the influence of sitting posture, it was difficult to conclude whether seated postural alignment has any effect on upper quadrant musculoskeletal pain, although the duration of static sitting was found to be significantly associated with musculoskeletal pain. Pain as an outcome measure and there is a need to further explore the relationship between static sitting posture and psychosocial health status.[8,9,10]

This study shows that rounded shoulder may affect pulmonary function and with increasing rounded shoulder degree; a distinct decrease was seen in respiratory values. Rounded shoulder may affect pulmonary function by various mechanisms. Chang et al showed that an increase in energy expenditure due to hypertonic respiratory muscles may reduce ventilatory capacities. Shortening of respiratory muscles such as the serratus anterior, pectoralis minor and intercostals may increase energy expenditure and reduce respiratory values. [11, 12, 13, 14]

Need of the study

It would be remarkable to know how altered shoulder postures would affect several breathing parameters and psychosocial health status [5]. There has been no study which has studies the correlation between rounded shoulder with cardiorespiratory fitness and psychosocial health status. Therefore, we aim to study the correlation between rounded shoulder, cardio-respiratory fitness and psychosocial health status among adolescents. [6]

Objectives-

Primary:

•To evaluate the correlation between rounded shoulder with cardiorespiratory fitness and psychosocial health status in adolescents

Secondary:

•To evaluate the psychosocial health status.

Null hypothesis- There is no correlation between rounded shoulder, cardio respiratory fitness and psychosocial health status.

Alternate hypothesis- There is a significant correlation between rounded shoulder, cardio respiratory fitness and psychosocial health status.

Sampling- Convenient Sampling

Study design- It will be a single center observational cross-sectional study.

Materials and Methods

Subjects- 380 adolescents will be taken from Physiotherapy department, Nims university hospital for this study. Sample size was calculated using RAOSOFT software application and the result was 380 participants.

Selection Criteria

Participants were included in the study who have aged between 11-19 years of age and both males and females were taken in consideration. Participants who have any kind of history of trauma, Overuse of muscles deformity, Myopathy, Radiculopathy, Congenital spinal deformity and mental illness, and Obesity were excluded from the study

Informed consent will be taken from all the participants on the basis of inclusion and exclusion criteria for the study. The assessment for rounded shoulder, CRF and psychosocial health status will be done after reviewing previous studies. Participants with any prior trauma, mental illness will be excluded from the study. Subjects

will be obtained from Nims University campus. Ethical approval will be taken from the department and hospital. All the history and demographic details will be taken on the first day of the study.

Methodology:

Participants will be briefed about the study and benefits of posture and its effects on cardiac respiratory health will be explained to all the participants along with how to use electronic hand-held devices in a proper manner so as to avoid postural deviations. All participants will be assessed for rounded shoulder by measuring length of pectoralis minor muscle index and for CRF we will be using 6-minute walk test.

Outcome Measures

Pectoralis Minor Index

6- Minute Walk Test

Psychosocial health status Questionnaire

Result

The data was analyzed through SPSS software, spearman's correlation formula was used to find the correlation between rounded shoulder, cardiorespiratory fitness and psychosocial health status which showed a negative significance between these variables.

6MWT Female

	Frequency	Percent	Valid percentage	Cumulative percentage
Affected	192	99.0	99.0	99.0
Unaffected	2	1.0	1.0	100.0
Total	194	100.0	100.0	

PMI Female

	Frequency	Percent	Valid percentage	Cumulative percentage
Affected	192	99.0	99.0	99.0
Unaffected	2	1.0	1.0	100.0
Total	194	100.0	100.0	

PHS Female

	Frequency	Percent	Valid percentage	Cumulative percentage
Moderate	193	99.5	99.5	99.5
Severe	1	.5	.5	100.0
Total	194	100.0	100.0	

Age Female

	Frequency	Percent	Valid Percent	Cumulative Percent
11	25	12.9	12.9	12.9
12	20	10.3	10.3	23.2
13	19	9.8	9.8	33.0
14	18	9.3	9.3	42.3
15	16	8.2	8.2	50.5
16	15	7.7	7.7	58.2
17	24	12.4	12.4	70.6
18	24	12.4	12.4	83.0
19	33	17.0	17.0	100.0
Total	194	100.0	100.0	

6MWT Male

	Frequency	Percent	Valid percentage	Cumulative percentage
Affected	182	93.8	93.8	93.8
Unaffected	12	6.2	6.2	100.0
Total	194	100.0	100.0	

PMI Male

	Frequency	Percent	Valid percentage	Cumulative percentage
Affected	191	98.5	98.5	98.5
Unaffected	3	1.5	1.5	100.0
Total	194	100.0	100.0	

Age Male

	Frequency	Percent	Valid Percent	Cumulative Percent
11	25	12.9	12.9	12.9
12	8	4.1	4.1	17.0
13	14	7.2	7.2	24.2
14	23	11.9	11.9	36.1
15	24	12.4	12.4	48.5
16	25	12.9	12.9	61.3
17	13	6.7	6.7	68.0
18	38	19.6	19.6	87.6
19	24	12.4	2.4	100.0
Total	194	100.0	100.0	

Correlations by Spearman's rho

		6MWT Male	PMI Male	PHS Male	6MWT Female	PMI Female	PHS Female
6MWT Male	Correlation coefficient	1.000	-0.32	280	-0.26	186	018
	Sig. (2-tailed	-	656	.000	.717	010	795
	N	194	194	194	194	194	194
PMI Male	Correlation coefficient	-0.32	1.000	.009	-0.13	--013	009
	Sig. (2-tailed	656	-	.901	859	859	901
	N	194	194	194	194	194	194
PHS Male	Correlation coefficient	280	.009	1.000	-007	-.007	005
	Sig. (2-tailed	000	901	-	919	919	.943
	N	194	194	194	194	194	194
6MWT Female	Correlation coefficient	-0.26	-0.13	-.007	1.000	.-0.10	.007
	Sig. (2-tailed	717	859	919	-	885	919
	N	194	194	194	194	194	194
PMI Female	Correlation coefficient	186	-0.13	-.007	-0.10	1.000	-007
	Sig. (2-tailed	0.10	859	919	885	-	.919
	N	194	194	194	194	194	194
PHS Female	Correlation coefficient	.018	009	.005	.007	0.07	1.000
	Sig. (2-tailed	798	.901	943	-919	919	-
	N	194	194	194	194	194	194

Discussion

The aim of our study was to find the effect of rounded posture on cardiorespiratory fitness and psychosocial health status. There was a significant negative correlation was found between the variables. This correlation of rounded shoulder, cardiorespiratory fitness and psychosocial health status seems important clinically because it provides evidence that those patients with increased rounded shoulder have negative impact on cardiorespiratory fitness and psychosocial health status in both males and females. Based on the strength of the correlation found in this study, we recommend further data collection on a larger sample to provide more accurate estimation of the true relationship between these two variables.

Mi-Kyoung Kim et al, concluded in their study that rounded shoulder posture involves a forward positioning of the shoulders in the horizontal plane, can indeed have implications for various aspects of musculoskeletal and respiratory functions. Shoulder stabilization and trunk stabilization exercises, could induce more significant improvements in respiratory function, abdominal muscle endurance, and movement efficiency. [16]

Ghanbari et al, according to their findings, there's a significant correlation between rounded shoulder and respiratory values in women. Their conclusion suggests that as the degrees of rounded shoulder increase, there is a corresponding decrease in respiratory values. This indicates a potential inverse relationship between FSP and respiratory function in women, as interpreted from their study results. [13]

Kendall et al. emphasized the importance of balanced musculature for efficient energy expenditure. They concluded in their study that issues such as tightness, weakness, or paralysis can negatively impact the volumes and pressures that the muscles can achieve and maintain. Specifically, weakness in the upper back erector spine, middle and lower trapezius muscles may interfere with the ability to straighten the upper back. This limitation can, in turn, affect the capacity to raise and expand the chest, potentially reducing lung capacity. Kendall et al. suggest that weakness in respiratory muscles may lead to ventilator failure. This underscores the critical role of muscle balance and strength in supporting optimal respiratory function. [17]

Ramezanzade et al. the study explored the correlation between rounded shoulders and self-esteem in students. The findings indicate a moderate negative correlation between psychosocial health status and rounded shoulders. This suggests that when rounded shoulder is low, there tends to be a higher prevalence of psychosocial health status. The conclusion drawn from this correlation affirms a connection between psychological well-being and body posture. In other words, the study suggests that a lower psychosocial health status is associated with an increased likelihood of rounded shoulder posture, highlighting the interplay between psychological factors and body posture in adolescents. [18]

Social and research benefits

Prior safety measures can be taken to improve posture before making them an entity. Apropos, the study will result in creation of awareness amongst the youth populace with respect to the use of hand-held devices in an ergonomical pattern.

Conclusion

Present study concludes that rounded shoulder, cardiorespiratory fitness, psychosocial health status are negatively correlated with each other which means people with rounded shoulders and poor psychosocial health status will have poorer cardiorespiratory fitness because rounded shoulders and altered psychological status affects the respiratory muscles mainly diaphragm which will eventually lead to poorer cardiorespiratory health.

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