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ORIGINAL ARTICLE

EFFECT OF EXERCISE ON POSTURE AND RESPIRATORY FUNCTION AMONG SMARTPHONE USERS

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ABSTRACT

Background: In recent years, the number of smart phone users has progressively increased worldwide. Using smart phone for prolonged time will cause faulty posture or poor posture such as forward head posture and rounded shoulders.The structural problems caused by faulty posture can also lead to respiratory dysfunction. The objective of the study was to determine the effect of exercise on posture and respiratory function among smart phone users. **Methods**: This study was an experimental with conventional type. The study was carried out in faculty of physiotherapy at A.C.S Medical College And Hospital. 100 samples were taken and assessed posture and respiratory function. Subjects with poor posture and respiratory dysfunction were trained with exercise for 4 weeks. Both male and female aged between 18 -25 years using smart phone more than 4 hours were included in the study. Individuals with any cervical deformity were excluded in the study. Craniovertebral angle, Scapular index and PEFR were the outcome measures used in this study. **Results**: On comparing the mean values of Pre Test & Post Test on Craniovertebral Angle, it shows significant difference between Pretest (28.28) & Posttest (35.05) at $P \leq 0.001$. On comparing the Pre Test & Post Test on Scapular Index, it shows significant mean difference between Pretest (70.60) & Posttest (74.91) at $P \leq 0.001$. On comparing the Pre Test & Post Test on Peak Expiratory Flow Rate(PEFR), it shows significant mean difference between Pretest (191.42) & Posttest (248.57) at $P \leq 0.001$. **Conclusion**: The study concluded that stretching and breathing exercise has considerable effects in improving the posture and respiratory function among Smartphone users.

Keywords: Smartphone, PEFR, Posture, Goniometer, Stretching exercise , Breathing exercise

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INTRODUCTION

In the past decade, there has been a rapid increase in the use of mobile devices, particularly Smartphone for communication, gaming and internet browsing. A mobile phone is no longer just a telephone and has become an integral part of modern living for many people. Mobile phone production rise from 450 million per year in 2011 to 984 million per year in 2013 and more than 50% population in many western countries, as well as in Taiwan, own mobile phones [1,2].

Smartphone have become the essential mobile devices in our daily living and people demonstrate different posture while using Smartphone. Smartphone have become not only an example of modern high-tech equipment, but also a daily necessity. Smartphone, unlike computer features a small screen that is likely to induce a more slouched posture toward a line of sight below eye level [3].

If people have used a smart for a long time, a video terminal such as a Smartphone might therefore induce an improper posture or slouched posture or rounder shoulders. Forward head posture is defined as a posture that adopts upper cervical extension and lower cervical flexion [4, 5].

Forward neck posture is become increasingly common, as it is becoming leaning forward posture, particularly with popularization of smart phones. Forward head posture is one of the most common deviation from normal cervical posture and may lead to a n increase in gravitational load and mechanical stress to cervical facet joints, altered neck extensors muscles activity and length of cervical muscles[6].

In recent years, the number of smart phone users has progressively increased worldwide. Using smart phone for prolonged time will cause faulty posture or poor posture such as forward head posture and rounded shoulders.The structural problems caused by faulty posture can also lead to respiratory dysfunction. The objective of the study was to determine the effect of exercise on posture and respiratory function among smart phone users.

METHODOLOGY

This study was an experimental with conventional type. The study was carried out in faculty of physiotherapy at A.C.S Medical College And Hospital. 100 samples were taken and assessed posture and respiratory function. Subjects with poor posture and respiratory dysfunction were trained with exercise for 4 weeks. Both male and female aged between 18 -25 years using smart phone more than 4 hours were included in the study. Individuals with any cervical deformity were excluded in the study. Craniovertebral angle, Scapular index and PEFR were the outcome measures used in this study.

Procedure: Subjects using smart phones for more than 4 hours were selected based on inclusion and the exclusion criteria. They were assessed for forward head posture and respiratory dysfunction by using craniovertebral angle and peak flow meter.

The subjects were asked to sit comfortable on back supported arm less chair with both feet flat on floor, hip and knees positioned at 90 degree angle and buttock positioned against the back chair. The subjects were asked to rest their hands on their lap and to keep their shoulder against the back of the chair.

Adequate exposure of neck up to shoulder level to clearly define anatomical landmark was done. The most prominent spinous process at the base of the cervical spine was palpated. Skin over the anatomical landmark was wiped with cotton soaked in spirit to remove skin secretions for proper fixation of adhesive markers. Anatomical landmarks were marked with marker pen, thereafter adhesive markers were fixed over the anatomical landmark. Then the craniovertebral angle was measured by angle between midpoint of the adhesive marker at the tragus of right ear and midpoint of the reflective marker at C7.

After the subjects were assessed for Scapular index by using inch tape. The resting position the scapula was determined by measuring the distance from the midpoint of the sternal notch to the medial aspect of the coracoids process (the length of the chest side) and the horizontal distance from the posterolateral angle of the acromion to the thoracic spine (the length of the back side).

Then the subjects were assessed for respiratory functions by peak flow meter. By blowing hard through a mouth piece on one end the peak flow meter can measures force air in liters per minute and gives the reading on a built in numbered scale.

EXERCISE INTERVENTION

1. For posture deviation:

Forward head posture:

Chin tuck exercise: Ask the subject sit upright, gently tuck the chin and to feel a gentle lengthening sensation at the back of the neck. Make sure that the eyes and jaw stay level and move the head horizontally backwards and hold for 5 seconds with 30 repetitions.

2. For Rounded shoulder:

Stretching exercises:

Pectoralis stretch: Ask the subject to stand in the middle of a door way with one foot in front of the other and bend the elbow to 90-degree angle and place the forearms on each side of the doorways. And shift weight on to the front leg, leaning forward, until feel a stretch in the chest muscles.

Upper trapezius stretch: Ask the subject to sit upright, tuck the chin in to your chest and look down. Place the palm of the hand on the back of the head and press downward. Hold for 30 seconds. Then rotate the right ear down slightly, maintaining the download pressure with the hands, to stretch the left side. Hold for 30 seconds. Then rotate the left ear down, maintaining download pressure to stretch the right side. Hold for 30 seconds. Repeat the sequence for three times.

3. For Respiratory Dysfunction:

Breathing exercise:

Diaphragmatic breathing: Ask the subject to sit comfortably, with the knees bent and the shoulders, head and neck relaxed. Breathe in slowly through the nose.so that the stomach moves out against the hand. The hand on the chest should remain as still as possible. Place one hand on the upper chest and the other just below your rib cage. This will allow to feel the diaphragm while breathing. Tighten stomach muscles, letting them fall inward while exhale through pursed lips. The hand on the upper chest must remain as still as possible.

Pursed lip breathing: ask the subject to sit comfortably, and to relax the neck and shoulder muscles and breath in for 2 seconds through the nose, by keeping the mouth closed

and then instructed to breath out twice through pursed lips.

Data Analysis : The collected data were tabulated and analyzed using both descriptive and inferential statistics. All the parameters were assessed using statistical package for social science (SPSS) version 24. Paired t-test wasadopted to find the statistical difference within the group.

CV ANGLE	PRE TEST		POST TEST	
	MEAN	S.D	MEAN	S.D
MEAN	28.28	4.74	35.05	4.88
Standard error	.824		.801	
95% C.I(Lower)	6.314			
95% C.I(Upper)	7.228			
Df	34			
t-test	30.11			
significance				

*GROUP - EXPERIMENTAL

Table-1. Comparison of craniovertebral angle between pre test and post test

SCAPULAR INDEX	PRE TEST		POST TEST	
	MEAN	S.D	MEAN	S.D
MEAN	74.91	3.37	70.60	3.33
Standard error	0.570		0.563	
95% C.I(Lower)	3.809			
95% C.I(Upper)	4.819			
Df	34			
t-test	17.35			
Significance				

*GROUP – EXPERIMENTAL

Table-2. Comparison of scapular index between pre test and post test

PEFR	PRE TEST		POST TEST	
	MEAN	S.D	MEAN	S.D
MEAN	191.42	49.23	248.57	50.70
Standard error	8.32		8.57	
95% C.I(Lower)	-63.24			
95% C.I(Upper)	-51.04			
Df	34			
t-test	-19.04			
Significance	0.000***			

*GROUP - EXPERIMENTAL

Table-3. Comparison of peak expiratory flow rate(PEFR) between pre test and post test

RESULTS

On comparing the Mean values of Pre Test & Post Test on Craniovertebral Angle, it shows highly significant Mean differences between Pretest (28.28) & Posttest (35.05) at P ≤ 0.001.

On comparing the Mean values of Pre Test & Post Test on Scapular Index, it shows highly significant Mean differences between Pretest (70.60) & Posttest (74.91) at P ≤ 0.001.

On comparing the Mean values of Pre Test & Post Test on Peak Expiratory Flow Rate(PEFR), it shows significant Mean difference between Pretest (191.42) & Posttest (248.57) at P ≤ 0.001.

DISCUSSION

The present study was conducted to find out the effect of exercise on posture and respiratory function among smartphone users. The study measured CVA, SI and PEFR as parameters to demonstrate the effect of prolonged smartphone use on change in posture and respiratory function.

Previous study performed in other context and population, support our results FHP and rounded shoulder after an training protocol[7,8].

Studies have reported decreased PSs in elite swimmers after an 8 week intervention including stretching of anterior musculature and strengthening of scapula stabilizers [9, 10].

This study indicates that a targeted exercises program, can result in the improvement of posture and respiratory functions. The mean values of CVA, SI and PEFR were analyzed [11,12].

The pre-test mean value of CVA was 28.28 and the post-test mean value was 35.05.The pre-test mean value of SI was 74.91 and the post-test mean value was 70.60.The pre-test mean value of PEFR was 191.42 and the post-test mean value was 248.57.

The result showed that statistically highly significant difference in the values of CVA, SI and PEFR.

Limitation of the study: Small sample size was analysed in this study. The duration of the study was short. Long term follow up of the subject was not possible.

Ethical Clearance: Ethical clearance has obtained from Faculty of Physiotherapy, DR. MGR Educational and Reasearch Institute, Chennai to conduct this study with reference number: IV B/ PHSIO/ IRB/ 2017-2018 dated 08/01/2018.

Conflict of interest: There was no conflict of interest to conduct this study.

Fund for the study: It was a self financed study.

CONCLUSION

The study concluded that stretching and breathing exercise has considerable effects in improving the posture and respiratory function among Smartphone users.

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