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Evaluation of mobile phone addiction scale score and it's correlation with craniovertebral angle and neck disability in young adults - a cross- sectional analytical study

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ABSTRACT

Background
Worldwide technology and its changes play a major role in each individual's life. Mobile phone is considered as an important communication tool and became the integral part of the society, it is not only a communication device but it also a necessary social accessory. The bending moment of the head applies pressure on muscles and joints around the cervical vertebra, in addition to active myofascial trigger points of the suboccipital muscle which may induce tension type headaches, neck pain and cervical headaches, while reducing the mobility of the neck.

Aim
To evaluate mobile phone addiction scale score and it's correlation with craniovertebral angle and neck disability in young adults.

Methods
In this cross sectional study, 100 young adults were recruited from medical college. Subjects were evaluated or assessed for mobile phone addiction using mobile phone addiction scale, craniovertebral angle were measured using MB ruler software and neck disablity was assessed using neck disability index. After all measurements were taken, the correlation between mobile phone addiction scale and craniovertebral angle, mobile phone addiction scale and neck disability was carried out.

Results
Pearson's correlation coefficient test was conducted between mobile phone addiction scale score and craniovertebral angle ($r = -0.6786$, $p = < 0.0001$), mobile phone addiction scale score and neck disability index ($r = 0.6170$, $p< 0.0001$) i.e extremely significant. Hence there is a significant correlation between these variables.

Conclusion
The study demonstrated that there was a significant correlation between mobile phone addiction scale score and craniovertebral angle, mobile phone addiction scale score and neck disability index. Also we found that as highest the mobile phone addiction scale score a young adults had, they are more prone to develop forward head posture and neck pain.

Keywords: Mobile phone addiction scale, craniovertebral angle, neck disability index

INTRODUCTION

Worldwide technology and its changes play a major role in each individual's life. Mobile phone is considered as an important communication tool and became the integral part of the society, it is not only a communication device but it also a necessary social accessory. It is estimated that around 4.5 billion people use the cell phone worldwide. And it comes as no surprise that a huge chunk of this quantity consists of the youth. . According to Telecom Regulatory Authority of India, there are about 929.37 million mobile phone subscribers in India making it the world's second-largest cell phone using developing country in the month of May, 2012 (TRAI, 2012) [1]. With constant texting, calling, listening to music, playing phone games or simply fiddling with the phone being such an integral part of their lifestyles, it is little wonder that not having it around strikes them with paranoia.

The criteria used to determine media or mobile addiction include a "craving or compulsion, loss of control, and persistence in the behavior despite accruing adverse consequences" (Shaffer, Hall & Bilt, 1999). A few of these adverse effects include isolating their users from others (e.g., Kraut, et al. 1998; Bull, 2005), deleteriously effecting their users' finances, turning their users into criminals, and negatively impacting academic performance(Kubey, et al. 2001).

"A good posture is defined as, keeping one's ears aligned with the shoulders and having the angel wings or the shoulder blades, retracted". Ideal posture decreases spinal stress which happens to be the most efficient position for the spine. Long-term use of smart phones exposes individuals to cumulative trauma disorder caused by maintaining the same posture for long periods of time. The weight of the head takes up 1/7 of the body weight; therefore, maintaining a still position with the head leaning forward exerts 3.6 times more force than is required to maintain the same position with straight standing posture [2]. Forward head posture (FHP) is the structural forward positioning of the head away from the centerline of the body, where lower cervical vertebrae are bent and upper cervical vertebrae are extended, and the weight of the head supported by the neck is increased. The bending moment of the head applies pressure on muscles and joints around the cervical vertebra, in addition to active myofascial trigger points of the suboccipital muscle which may induce tension type headaches, neck pain and cervical headaches, while reducing the mobility of the neck. As a compensatory action for the postural deformity of FHP, severe extension arises between the upper cervical joint and atlanto-occipital joint, and the upper cervical vertebrae relatively protrude forward while the face directs upwards. Janda described the simultaneous occurrence of FHP and rounded shoulder as upper-crossed syndrome. Fernández-delas-Peñas and others have demonstrated that FHP induces tension headaches. Therefore, FHP that causes round shoulder and neck pain due to an imbalance between the curvature of the spine and muscles that are attached to the neck bone, is correlated with problems in the neck bone. The combination of repetitive movements, poor posture, and over-use of mobile phone for texting or playing games, without taking rest breaks, can cause injury to the nerves, muscles, and tendons in the fingers, hands, wrists, arms, elbows, shoulders, and neck, which if ignored, may lead to long-term damage [3].

Past literature by Park et al (2015), Lee et al (2016) and Jung et al (2016) and have reported the symptoms or complaints the mobile phone users experience while using their phones . They range from neck pain, muscle tightness to altered cervical ranges. As in 2007, an Indian news magazine reported that 70% youth between the ages of 18 and 30 years so thereby our aim of study is to evaluate how mobile phone addiction affects the health of youth of the India by measuring and assessing the craniovertebral angle, scapular index and neck disability index.

METHODOLOGY

- Study design: cross – sectional analytical study
- Study setting: MVP'S college of physiotherapy, Nashik
- Duration of study- 6 months
- Sample size: 100
- Sampling technique: convenient sampling technique

Method of data collection

The study was conducted at MVP'S college of physiotherapy Nashik, Maharashtra. 100 subjects were evaluated for mobile phone addiction, craniovertebral angle and neck disability. Demographic data including gender, age, qualification were recorded.

The mobile phone addiction was assessed by, Mobile Phone Addiction Scale by Dr. A. Velayudhan and Dr. S. Srividya. Greater the score on the scale represents higher the level of smartphone addiction.

Also subjects were assessed for any deviation of head posture using valid & reliable computerized photogrammetry with emphasis on craniocervical segment. The photographic records was obtained from a mobile camera (Honor 8 pro, 12 MP), positioned 3.5 m from the subject, allowing the recording of the face and upper trunk in the sagittal plane (right and left views). The subject was kept standing, looking forward in a relaxed posture. Spherical markers were placed on the following anatomical landmarks: spinous process of C7, tragus of the left and right ears. The photographs will be analyzed using MB- ruler software - the craniovertebral angle (CVA), that is the angle between the horizontal line passing through C7 and a line extending from the tragus of the ear to C7 was obtained. The literature reports high reliability of this procedure (ICC = 0.88).

Neck functional disability and the risk of shoulder was assessed using valid & reliable questionnaire 'neck disability index'.

Data Analysis

The collected data was analyzed statistically using GraphPad Instat. Correlation of Craniovertebral Angle with Mobile Phone Addiction Scale score was calculated using Pearson's Correlation coefficient, and, similarly, the correlation of mobile phone addiction scale score and neck disability index was measured using pearson's correlation coefficient.

STATISTICAL ANALYSIS

Table 1- Mobile phone addiction distribution

Addiction	Frequency
High	**12**
Moderate	**66**
Low	**22**

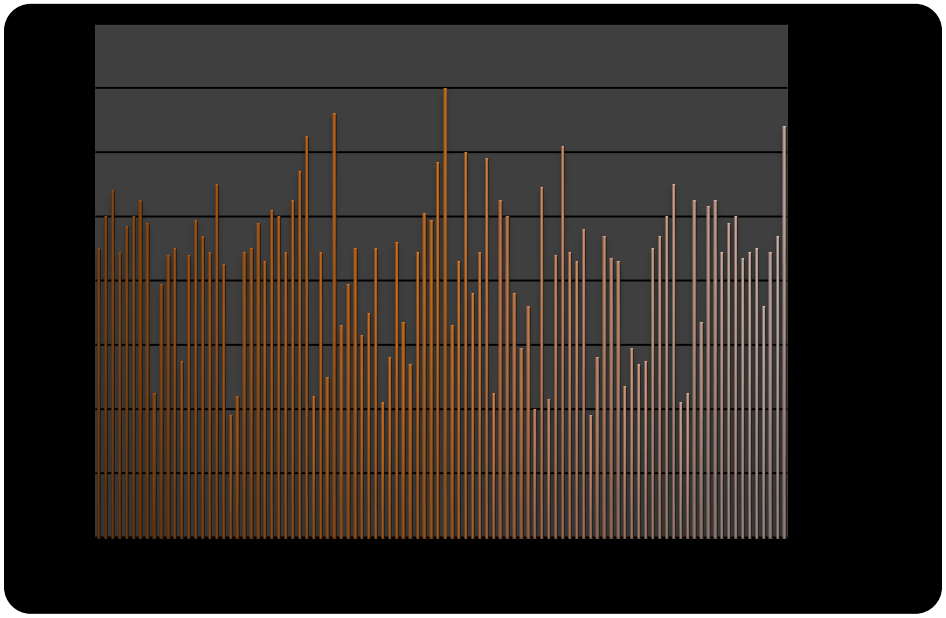


Table no -2: Correlation of Mobile Phone Addiction Scale (MPAS) score with craniovertebral angle (CVA)

MPAS Score Mean	CVA Mean	Pearson's correlation coefficient	'P' Value	Significance
84.77	48.69	-0.6786	<0.0001	Extremely Significant

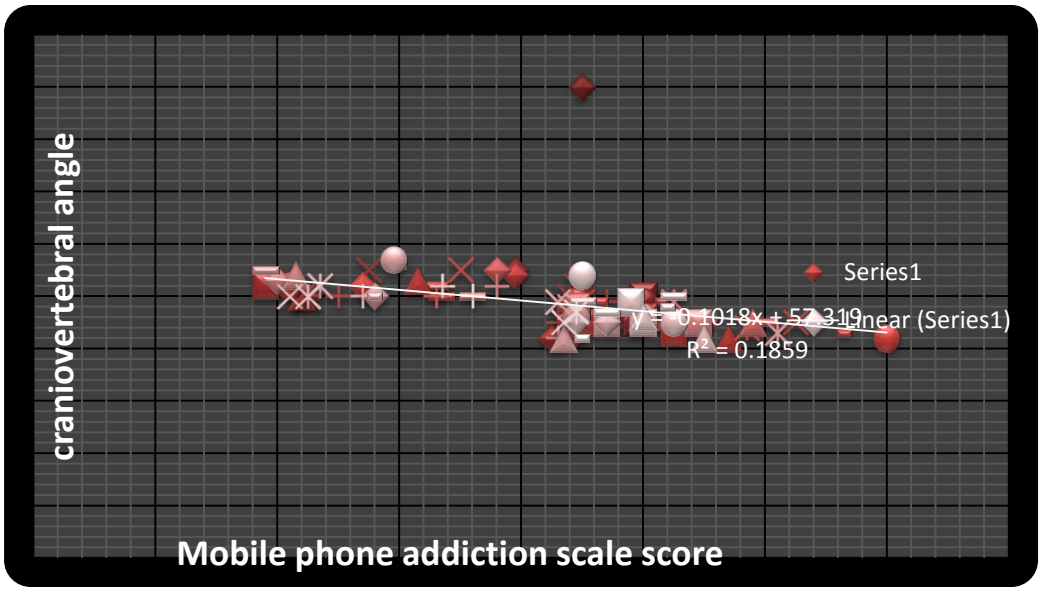
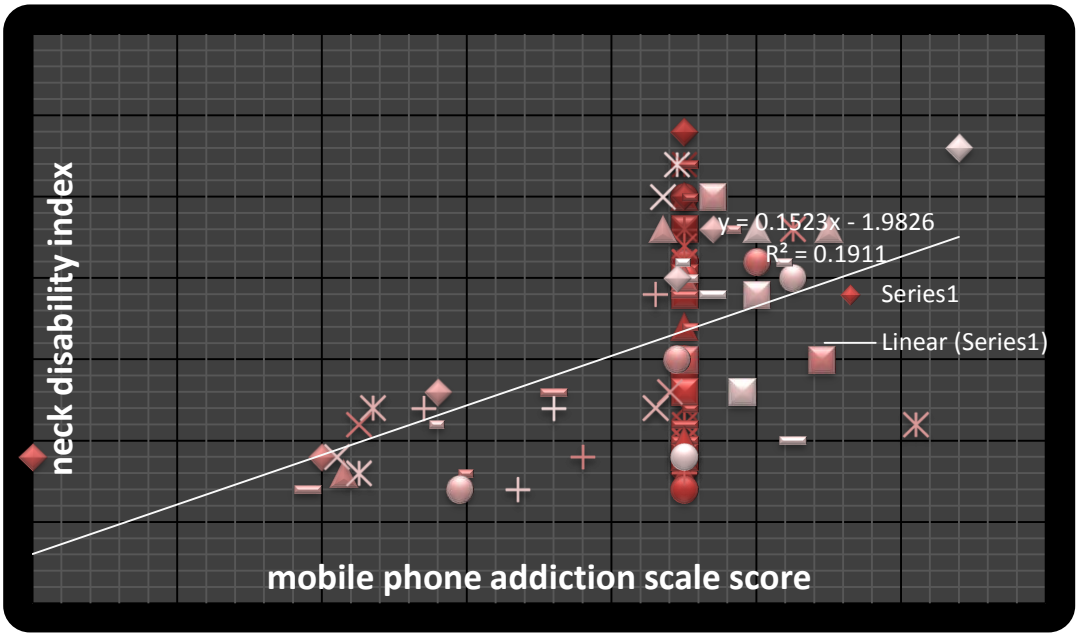


Table no 3: correlation between Mobile Phone Addiction Scale (MPAS) score with Neck Disability index(NDI)

MPAS Score Mean	NDI Mean	Pearson's correlation coefficient	'P' Value	Significance
84.77	11.03	0.6170	<0.0001	Extremely Significant



DISCUSSION

This study was conducted in Nashik on 100 young adults pursuing their graduation and post-graduation degree between the age group of 18 to 25 year.

Mobile Phone Addiction Scale (MPAS) was used to determine the level of mobile addiction in the study subjects and it was observed that 12% participants had a high level of addiction, 66% had a moderate level of addiction, whereas 22% participants had a low level of mobile addiction. The percentage of participants addicted to smartphone use was higher than those who were not, as a result of the increased demand for smartphone use. This is concordant with the results of Severin et al.Fahad et al. noted that smartphone addiction invariably results in a decrease in the craniovertebral angle in their investigation of the craniovertebral angle in Internet users. Moreover, they noted that a larger population among the subjects had a forward head posture and some degree of postural abnormality in the cervical and /or shoulder region.

The most common postural abnormality is forward head posture (FHP). On using a mobile phone in the common attitude of head flexion, there is an increase in the weight supported by the spine. This results in a loss of normal spinal curvature and hence, greater load is placed on the cervical vertebrae, leading to a forward head attitude. Moreover, according to Lee et al (2016) on using mobiles, individuals who already suffer from neck strain, tended to flex their neck slightly more than individuals without neck pain. Hence, it becomes a vicious cycle which eventually leads to discomfort and aches.

In our study, the forward head posture was determined by measuring the Craniovertebral Angle. Its correlation with Mobile Phone Addiction Scale (MPAS) was done using Pearson's correlation, which was found to be extremely significant ($r = -0.6786$, $p=<0.0001$). From this result, it can be stated that as the level of addiction increases, the craniovertebral angle decreases, which is an indication of a forward head posture.

The findings obtained for craniovertebral angle were similar to those obtained in the studies done by Park (2015) and Jung (2016) who had achieved similar results on smartphone usage. Kim et al (2013) in their study concluded that the increased cervical flexion angle was more in the prolonged smartphone user category as compared to its control group which is similar to our readings.

This study also intended to know about the association of mobile phone addiction with Neck Disability Index. The correlation of MPAS with Neck Disability Index was determined by Pearson's correlation which was found to be extremely significant. ($r = 0.6170$, $p= <0.0001$). It was noted that subjects who showed a high level of mobile phone addiction had a increased neck pain and disability. In our study, subjects who showed high mobile phone addiction, maintained shoulder and elbow in flexed position. This posture was attained in order to hold the mobile phones, which eventuated to an increased neck pain. If the alignment of the body is incorrect, the spinal stresses are increased, giving an inefficient spinal posture, which could even lead to upper quarter pain. The neck disability among smartphone users might be related to frequent neck flexion posture, which changes the natural curve of the cervical spine and increases the amount of stress on the cervical spine leading to irritation and spasm in the surrounding skeletal structures and ligaments. Excessive use of smartphone can lead to habitual repetitive and continuous movements of head and neck toward the screen throughout the day.such movements are associated with a high risk of chronic neck pain and may explain the strong association between mobile phone addiction and Neck Disability Index.

CONCLUSIONS

The study demonstrated that there was a significant correlation between mobile phone addiction scale score and craniovertebral angle, mobile phone addiction scale score and neck disability index. Also we found that as highest the mobile phone addiction scale score young adults had, they are more prone to develop forward head posture and neck pain. So it is necessary to spread awareness about maintenance of correct posture while operating a mobile phone and importance of exercises to reduce neck disability.

CLINICAL IMPLICATION

As the study demonstrated that there was a significant correlation between mobile phone addiction scale score and craniovertebral angle, mobile phone addiction scale score and neck disability index, So it is necessary to spread awareness about maintenance of correct posture while

operating a mobile phone and importance of exercises to reduce neck disability.

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