



Dysfunctional Breathing Among Smartphone-Using College Students

Kalpana AP^{1*} and Kannabiran B²

¹Professor, KMCH College of Physiotherapy affiliated to the Tamil Nadu, Dr.MGR Medical University, India

²Professor, RVS College of Physiotherapy affiliated to the Tamil Nadu, Dr.MGR Medical University, India

***Corresponding Author:** Kalpana AP, Professor, KMCH College of Physiotherapy affiliated to the Tamil Nadu, Dr.MGR Medical University, India.

DOI: 10.31080/ASNE.2024.07.0724

Received: February 06, 2024

Published: March 20, 2024

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Abstract

Background: The Internet has been an integral part of the college students. Nowadays kids are starting to use smartphones. The duration of use of smartphones significantly impacts the physical and mental well-being of an individual. Biomechanical and physiological factors affect the pattern of breathing in smartphone users.

Purpose: The purpose of the study was to find the presence of dysfunctional breathing among smartphone-using college students.

Methodology: The study design was observational study design. 100 college students who have been using smartphones for not less than a year were recruited randomly and were given the Nijmegen questionnaire and self-evaluation of the breathing questionnaire.

Result: 44% of male students and 55% of female students with an average age of 23 years participated in the study. The average years of smartphone use by respondents were 7 years and 2 months and 4 hours 40 minutes per day. 30% of them had mild neck pain. NQ: The average score of the Nijmegen questionnaire was 11 out of 64 and 10% had symptoms often and very often. SEBQ: The average score of the Self-evaluation of breathing questionnaire was 0.99 and 6% had symptoms occasionally 4% had symptoms frequently.

Conclusion: Dysfunctional breathing is not significantly present among smartphone-using college students though few respondents reported symptoms of dysfunctional breathing.

Keywords: COVID-19; Internet; Breathing

Background

The whole world has become a global village as it is connected by the internet. Smartphones are part of life, especially among college students. India has 1200 million mobile phone users and 600 million smartphone users. 53% of users are at the age of 18-24 years and 32.7% are at the age of 25-34 [1]. College students spend minimum 3.5 hours per day for texting, and browsing on their mobile phones [2]. Young people use smartphones to make

calls, communicate with friends and family, learn, use various apps, and explore information. During the COVID-19 pandemic period, smartphones are the teaching tool for digital India making all age groups use various apps to pay to insist on cashless transactions. There are several benefits of smartphones while on the other hand, there are several adverse effects too. Though musculoskeletal complications such as neck pain, and back pain remain the most known identified complication, the effects spread across various

systems of the body. Eye strain, headache, lack of physical activity leading to obesity, lack of social behavior, stress, anxiety, reduced memory, concentration, and attention may occur due to the usage of smartphones. Emotional abuse and neglect were directly and indirectly related to problematic smartphone use through depression, and social anxiety [3]. A study done by Kaya., *et al.* concluded that usage of smart phone affects quality of sleep and causes depression among college students [4].

Addiction to smartphones caused lower Cranio vertebral angle and lung function results [5]. The chest wall movement during respiration could be reduced in smart phone users [6]. Prolonged computer use, handheld mobile device use, and even mouth breathing have all been associated with forward head posture [7]. Physiological changes during mobile phone usage was measured and found that “people tended to stabilize their breath or shallow breaths once they entered data and/or studied the liquid crystal display screen” [8]. The position adopted during smartphone usage leads to decreased respiratory function. Thoracic breathing could have an acute decrease in carbon dioxide which increases pH of the blood, and respiratory alkalosis results. Respiratory alkalosis produces changes in the body’s system that may affect fitness level and the musculoskeletal system [9]. Continuous forward neck flexion could affect pulmonary function and respiratory muscle strength.

Chenivesse., *et al.* describes “dysfunctional breathing as a condition that describes a broad spectrum of abnormal breathing patterns. It may cause dyspnea and affect quality of life” [10]. Watson., *et al.* stated that “dysfunctional breathing could arise from alterations in the biomechanical, psychological, and physiological aspects of breathing [11].

Respiratory diseases and chest wall deformities can contribute to the abnormal breathing pattern [12]. Hyperventilation is a common dysfunctional breathing which is associated with anxiety [13]. Widely accepted diagnostic methods of dysfunctional breathing are Nijmegen Questionnaire and the self-evaluation of breathing questionnaire (SEBQ) [14]. As these questionnaires are subjective, respondents may not report accurately. But subjective is an advantage as it concentrates on psychological perception of breathing. It consists is set of questions which assess how often subject experiences symptoms of hyperventilation. The Nijmegen

questionnaire has 95% specificity and 91% sensitivity in detecting hyperventilation [15]. The intra class coefficient of self-evaluation of the breathing questionnaire is 0.89 and internal consistency is 0.93 [14]. The present study aims to know the presence of dysfunctional breathing among smartphone using college students.

Methodology

Students between the ages of 19-25 who have been using smartphones for more than a year were included in the study. Those with diagnosed cardiac problems, pulmonary problems, and psychological problems were excluded from the study. A hundred college students were selected randomly using a computer and they were asked to fill out the Google form which contains their information such as age, how long he or she uses a smartphone, time spent on the smartphone per day, history of neck pain, Nijmegen questionnaire and Self-evaluation of breathing questionnaire. Anonymity was maintained during data collection.

Results

The percentage of male students who participated in the study was 44% and female students participated 55%. The age group that participated in the study is 19 – 25 and the average age is 23 years. The average years of smartphone use by respondents are 7 years and 2 months. The average duration of smartphone usage is 4 hours 40 minutes. 30% of them had neck pain sometimes which is mild neck pain.

- **NQ:** The average score of the Nijmegen questionnaire was 11 out of 64 and 10% had symptoms often and very often.
- **SEBQ:** The average score of the Self-evaluation of breathing questionnaire was 0.99 and 6% had symptoms occasionally/ or bit true 4% had symptoms frequently/mostly true.

Discussion

Youngsters use smartphones for many things in day-to-day life. The duration spent on smartphones gradually increases. This study was conducted with a hundred students to know the presence of dysfunctional breathing among smartphones using young adults. The average score of the Nijmegen questionnaire was 11 out of 64. 23 out of 64 is considered to be a diagnosis of hyperventilation. The average score of the Self-evaluation of breathing questionnaire was 0.99. Though the average scores indicate there is no difficulty

in breathing, 10% presented with the symptoms in the Nijmegen questionnaire and 6% with the symptoms in the Self-evaluation of Breathing questionnaire. 30% of respondents complained about mild neck pain.

Breathing is a close kinematic movement that involves joints of the vertebral column, sternum, and ribs. Smartphone users adopt a forward flexion posture which affects the pattern of breathing. Forward head posture reduces lower chest mobility during respiration. This increases the upper chest movement which in turn decrease the respiratory function [16]. Forward head posture may induce shoulder pain, mobility impairment of the upper thorax and muscles originating from the thorax, decreased vital capacity, and Obstructive sleep apnea.

It is has been found that stress levels were high in smart phone users [17]. Sympathetic system is stimulated by Stress and anxiety, which may constrict airways, and they may cause breathing dysfunction [18]. Dyspnea and tachypnea may occur due to the stress .Cortisol secreted by endocrine system activates response to stress [19]. So Smartphones affect breathing through musculoskeletal changes, biomechanical changes as well as psychological means

The youngsters spend an average of 4 hours 40 minutes as per the result of this study. The average age group is 23 years. The result of the study showed that dysfunctional breathing was not found among the respondents, but the detailed analysis of the result 6-10% of the respondents had symptoms of dysfunctional breathing. Great care has to be given to address this issue as the number of smartphone users is increasing day by day. The time spent on a smartphone is also increasing gradually among all age groups. The kids started to use the phones at every stage. The study conducted by Pew Research center showed 9-11 years old children spend time with a smartphone (67%) and child of 5-8 years -59% or age 2 or younger 49%and 62% of children of 3 to 4 years uses smartphone. As smart phone is introduced in very early years, the adverse effects may increase widely. Awareness about dysfunctional breathing should be started among the global population.

The limitation of the study is classification of dysfunctional breathing was not considered. Future studies can be conducted

with an assessment of subjective and objective measurements such as breath hold time, manual assessment of respiratory motion, and pulmonary function test.

Conclusion

The present study concluded that dysfunctional breathing is not significantly present among smartphone-using college students. But few symptoms of dysfunctional breathing have been noticed among the respondents which may be due to the physical and psychological changes induced by smart phones. Future studies with large number of participants and including objective assessment is recommended.

Special Note

This work is done as a part of the Ph.D. thesis at the Tamil Nadu Dr.M.G.R. Medical University, Chennai, India.

Funding

This research received no external funding.

Conflict of Interest

We declare that there is no conflict of Interest.

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