

# Prevalence of Long Term Effects on Neck Muscles in IT Professionals Using Smartphones for Prolonged Hours

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**Abstract: Background:** People of all ages have started using smartphones for a variety of daily tasks, making them an indispensable item in daily life. Smartphones are an important source of information and pleasure in addition to being a tool for communication. The world is getting more and more reliant on smartphones, which may contribute to a number of musculoskeletal issues. Forward head posture is caused due to prolonged time spent in using smartphones thus causing neck disabilities as a long term complication. Continuously checking and/or using smartphone apps for extended amounts of time is linked to stress, withdrawal, anxiety, disturbed sleep, less physical activity, worse academic performance, and a decline in wellbeing. **Method:** Based on a random sampling method the subjects were allocated. Participants were chosen following informed consent. A sample size of 40 individuals was taken. Subjects were chosen according to the inclusion and exclusion criteria. The prevalence was checked using the outcome measures – Smartphone Addiction Scale –Short Version, Neck Disability Index and Visual Analogue Scale. **Result:** The statistical analysis was done using Instat app and Microsoft excel. Significance for each outcome measure was calculated separately (SAS-SV, VAS, NDI). The SAS- SV had a mean value of 31.2, NDI had a mean value of 19.1 and the mean value of VAS at rest and on activity was 2.575 and 6.35 respectively. **Conclusion:** The results of the study thus prove that prolonged smartphone usage can cause long term effects in the body of an individual. Neck disability Index was seen moderately in individuals using smartphones for prolonged hours.

**Keywords:** long term effects, smartphone, IT professional.

## 1. Introduction

People of all ages have started using smartphones for a variety of daily tasks, making them an indispensable item in daily life. Smartphones are an important source of information and pleasure in addition to being a tool for communication. The world is getting more and more reliant on smartphones, which may contribute to a number of musculoskeletal issues.

Continuously checking and/or using smartphone apps for extended amounts of time is linked to stress, withdrawal, anxiety, disturbed sleep, less physical activity, worse academic performance, and a decline in wellbeing. Numerous studies have linked the frequency of smartphone use to the severity of musculoskeletal problems. Additionally, research has shown

that smartphones negatively affect the function of the neck and upper extremities: the neck gets more strained due to cervical muscular weakening brought on by excessive smartphone use. According to statistics, smartphone users have a lifetime prevalence of neck pain of 55.8 percent and a prevalence between 17.3 and 67.8 percent [1].

The definition of posture is a position adopted by the body either with support during muscular inactivity or co-ordinated action of many muscles attempting to form or maintain stability. A good posture is defined as, keeping one's ears aligned with the shoulders and having the shoulder blades retracted. Person attaining ideal posture put least stress on spinal structures. The commonest posture adapted by smartphone users is they bend their neck and stare at the mobile screen [2].

People with mild neck pain who frequently bend their necks more than people in good health may experience musculoskeletal difficulties as a result of using smartphones for an extended period of time. Recent studies have shown that people with cervical pain exhibit a delay in deep neck flexor (DNF) activation when using their upper extremities for certain tasks, which indicates a severe impairment in the neck's DNF muscles, which are responsible for controlling the cervical spine.

A bad posture that is frequently adopted after prolonged smartphone use is the forward head position or the poking chin posture. Six percent of the total body weight is taken up by the head, which is related to all other joints, the cervical spine, and other bones. Lots of people tend to maintain their neck flexed head positioned forward to place a smartphone on the lap or close to the waist while sitting, which causes neck and back fatigue arms and shoulders. Typical stance is where the line of gravity is defined as (LOG) travels via the external meatus of the ear, proximal to the thoracic vertebrae and the acromion spine. But keeping the head tilted forward reduces the cervical lordosis of the lower cervical vertebrae, which induces a posterior curve in the upper thoracic vertebrae to keep the body balanced.

In the sagittal plane, the neck also moves in protraction and

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retraction in addition to flexion and extension.

Protraction movement is caused by the upper cervical spine extended and the lower cervical spine flexed, whereas retraction movement is caused by the upper cervical spine flexion and the lower cervical spine extension. It can cause changes in head posture that result in poor posture known as forward head posture (FHP), which is believed to be harmful if the cervical spine is held in a protracted position for an extended period of time.

The cervical spine is typically a lordotic nature. Recent research found that the amount of cervical lordosis correlates with the degree of thoracic kyphosis. Despite the fact that the thoracic spine is less mobile and more stable than the cervical region, increased cervical lordosis can lead to exaggerated thoracic kyphosis. Inability of the head to align with the body's vertical axis may result in more alignment issues, including rounded shoulders increasing thoracic kyphosis and shoulder make up for the change in the location of the LOG, resulting in further limitations. Combining each of these postural errors is referred to as "slouched posture." [3]

There is a limited awareness of postural problems among individuals. These problems in the long-term can cause some serious problems. The natural lordotic curvature of the cervical spine is lost. As a result, there is a compression of the cartilages and the nerves. Severe cases can also result in bulging or herniation of the discs. The rounded shoulders can also cause muscle stiffness that later leads to frequent muscle spasms. There are chances that the respiratory functions of the individual may reduce as there is compression of the thoracic cavity. Reduced activity in the postural musculature (as a result of maintaining an improper posture) may cause mobilizer muscles to be overused, which will result in pain, stiffness, and discomfort. People who use their smartphones for extended periods of time while adopting a protruding chin position have reportedly experienced pain and weariness [4]. Long-term effects also include low back pain, headache and lack of concentration.

## 2. Aims and Objectives

### A. Aim

To study and find the long-term effects on neck muscles on IT professionals using smartphones for prolonged hours.

### B. Objective

To determine the long-term effects of smartphone on neck muscles due to alteration of posture.

## 3. Procedure

Based on a random sampling method the subjects were allocated. Participants were chosen following informed consent. A sample size of 40 individuals was taken. Subjects were chosen according to the inclusion and exclusion criteria. Subjects included were supposed to be in the IT profession, uses smartphone for more than 4 hours, having complaint of neck pain. Individuals who had undergone any surgical- or medical procedures of upper back, neck, shoulders and hands were

excluded from the study.

All the subjects were asked questions regarding their usage of smartphone with the help of Smartphone Addiction Scale-Short Version (SAS-SV). This is the short version of the scale developed by Kwon et al; This is 10-item self-report instrument with 6 points Likert scale. SAS-SV address the following areas, daily life disturbance, withdrawal, cyberspace-oriented relationship, overuse, and tolerance. It has good validity and reliability for the assessment of smartphone addiction. It takes approximately 5-10 minutes to complete the questionnaire. As suggested by Kwon et al, for males a cut off value of 31 and for females cut off value of 33 was taken.

The pain was measured on a visual analogue scale. A Visual Analogue Scale (VAS) is a measurement instrument that tries to measure a characteristic that is cannot easily be directly measured. For example, the amount of pain that a patient feels ranges across a continuum from no pain to an unimaginable amount of pain. The pain can be categorized as no pain, mild, moderate and severe pain. The pain experienced by the individuals were assessed with the help of Visual Analogue Scale in which the individual marks on the line the point that they feel represents their perception of their current state. The VAS score is determined by measuring in millimetres from the left hand end of the line to the point that the patient marks. VAS is measured as 0 (no pain) and 10 (unimaginable pain).

A Neck Disability Index scale was also used to determine the pain in the neck. The Neck Disability Index (NDI) is a ten-item questionnaire that assesses disability associated with neck pain and whiplash. The four items that determine the symptoms are (pain intensity, headache, concentration, sleeping) and six items that relate to activities of daily living (lifting, work, driving, recreation, personal care, reading). Participants select from one of the six items from no disability (0) to total disability (5). The ten items are calculated to gain the total score thus ranging from 0 (no disability) to 50 (maximum disability). A score of less than 4 indicates no disability, 5-14 mild disability, 15-24 moderate disability, 25-34 severe disability, and scores greater than 35 -complete disability.

This study included both male and female individuals. The study population was based in Karad. The sample size of this study was determined by the formula  $n = z^2pq/l^2$ . Results were recorded using the Microsoft excel.

## 4. Results

### A. Statistical Analysis

The statistical analysis was done using InStat app and Microsoft excel. Significance for each outcome measure was calculated separately (i.SAS-SV, VAS, NDI).

### B. Data Presentation

Table 1

Tests	Mean	Interpretation
SAS-SV	31.2	-
NDI	19.1	Moderate
VAS (AT REST)	2.575	-
VAS (ON ACTIVITY)	6.35	-

## 5. Discussion

Smartphones have become a necessity for everyone. Smartphone are used basically for both communication and entertainment purposes such as; messages, music, media, internet access, photos and games. While using a smartphone, individuals usually flex their neck downwards to look at the smartphone and maintain the head in a forward position for long periods of time, which may cause musculoskeletal disorders. Forward head posture (FHP) is caused due to prolonged time spent in using smartphones. This leads to extension at atlanto – occipital (C1 to C2) joints with flexion of lower cervical spine (C4 to C7) and flattening of mid cervical lordosis which causes joint dysfunction, abnormal afferent information affecting the tonic neck reflex and encourages the gradual adaptation of FHP. Extensive use of smartphones has shown to be associated with physical health–related problems, such as pain in the wrists and neck, and it also exposes hands to intense stresses that may lead to pain and musculoskeletal disorders of the hand and thumb. Previous studies involving adolescents, short term effects of prolonged smartphone usage, effect of smartphones on posture and grip and visual problems have been conducted.

This study focuses on the long term effects of smartphone that hampers the functions of the body. Effects of anxiety, depression, lack of motivation, weariness, lack of concentration, muscle spasm, muscle pain, headache are seen in people using mobile phone for prolonged duration. The prevalence study was done in IT professionals who continuously use mobile phone for various purposes. It has shown tremendous effects in the mental wellbeing of the individuals. The study was done using Visual Analogue Scale, Neck Disability Index and Smartphone Addiction Scale -Short

Version as the outcome measures.

## 6. Conclusion

The results of the study thus prove that prolonged smartphone usage can cause long term effects in the body of an individual. Neck disability Index was seen moderately in individuals using smartphones for prolonged hours.

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