Original Research Article

Correlation of Chronic Neck Pain and Eye Hand Coordination in Smart Phone Users

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ABSTRACT

Introduction: Mobile phones are considered to be the most popular portable electronic device nowadays. Recent estimates showed that at least 77% of the world's population has their own mobile phone. Smartphone is one tool or media that many students and adolescents at the present moment used for learning purposes. Neck pain occurs with poor posture. It is commonly adopted while smartphone users view the visual display terminals of smartphones. Although it is clear that the neck is the commonly reported to have the highest pain among smartphone users. Hand eye coordination is the ability to use motor and visual skills to produce a coordinated movement. An activity that uses the information perceived by our eyes to control our hands. The eye is used to transmit visual information. The hand is used to perform a specific task based on visual information received from the eye.

Purpose of the study: The aim of the study is to find out the correlation of chronic neck pain and eye hand coordination in smart phone users.

Need of the study: Smart phone users often spend extended periods in neck flexion position at the present moment used for learning purposed, connected with internet services will help find information and knowledge which may lead to discomfort and pain in the neck. Eye hand coordination is the ability to perform activities requires the simultaneous use of our hands and eyes in smart phone users.

Methodology: Age criteria between younger and middle are included in the study. Individuals fulfilling inclusion criteria were selected. Every individual where chronic neck pain was more than six month and pain were measured using Visual analog scale (VAS) and neck disability index (NDI), Hand eye coordination using wall ball bounce task. (WBB)

Result: The collected data were analyzed using SPSS version 26. The data was not normally distributed. The spearman's correlation showed that there was a significant moderate negative correlation between the NDI and WBT with (r= -0.463) (p=0.000) and VAS and WBT with (r = -0.557) (p = 0.000)

Keywords: Chronic neck pain, Hand eye coordination, Wall ball bounce task, Visual analog scale

INTRODUCTION

❑ Prevalence of neck pain is about 84.6%, 70% having experienced neck pain and 5% are reported to have neck disability occurs in general population. [1,2] Mechanical and muscular loading occurring with prolonged neck flexion along with the lack of support to the arms and the repetitive movement of the fingers, especially when using one hand only. Because of various reasons, long time work, awkward postures, improper sleeping patterns, faulty use of neck and long use of smart phones. [1,2] 46% experienced wrist and finger pain while smartphone users view the visual display terminals of smartphones for extended periods. The condition is exacerbated by the use of Smartphone in the room that is not enough lighting then it can cause the eye to work extra (power accommodation) which is aggravated with a long time period will cause the eyes easily tired so it can cause pain.[2] Sustained poor posture with abnormal physiological loads in the neck compromise the pain sensitive structures and thereby alter the function of the cervical spine causing a musculoskeletal imbalance in the upper limbs. [3]

❑ An eye coordination is the ability to use motor and visual skills to produce a coordinated movement. Hand eye coordination is the ability to do activities which require the simultaneous use of hands and eyes.[3] The influence of head-neck position on the hand grip, it was also noted that highest hand grip seen when the patient head-neck rotation to left side and similarly the grip is more in rotation than in neutral head position.[2]

❑ Mobile phones are considered to be the most popular portable electronic device nowadays. Recent estimates showed that at least 77% of the world's population has their own mobile phone. The main reason mobile phone use is emergency and becoming more popular worldwide is that it is a reliable device for communication and entertainment.[4] It is providing information services quickly and accurately so smartphone is a necessary for almost people today. Smartphone is one tool or media that many students or learners and adolescents at the present moment. It can be useful for learning purposes. Smartphone connected with internet services will help find information and knowledge in academy.[2] Students who used smartphones for gaming daily(56.3%), students who used smart phone for > 6 hours per day (64.2%), students who used ≥4 hours social media daily(61%), used smartphone for reading, used smartphone for download, install and use different applications, used for daily interactions with apps, used smartphone for watching video and students who did not take break while using smartphone(57.6%)

METHODOLOGY

❑ **Study design:** Cross sectional study
❑ **Study setting:** Various peoples at different places.
❑ Sampling technique: Purposive sampling
❑ **Sample size:** 60
❑ **Sample population:** Smartphone users

Materials to be used

❑ Pen
❑ Pencil
❑ Scales: VAS [Visual analog scale]
❑ Scales: NDI [Neck disability index]
❑ Tennis ball: Wall ball bounce task
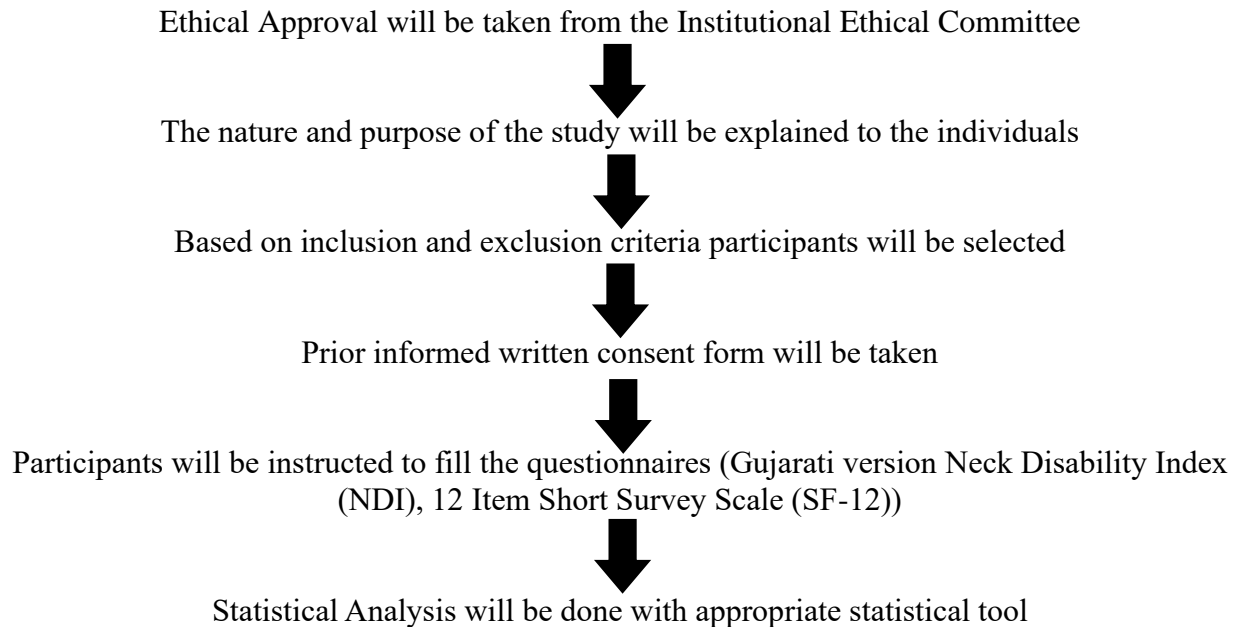❑ Participants consent form
❑ Stop watch

Inclusion Criteria

❑ Willing to participate.
❑ Participants with both genders are included.

❑ Participants with the age of 18 to 45 years in the study. [2,3]

❑ Participants using smartphones for more than 6 hours per day.[5]

❑ Participants able to read & understand Gujarati language.

Exclusion Criteria

❑ Participants with any pathology previous surgery, history of neurological disease, diabetic with shoulder problem and fracture are not included.

❑ History of suffering from kyphosis or structural scoliosis, systemic diseases cause movement restrictions or effect on joint and muscle tissue.

PROCEDURE

Ethical Approval will be taken from the Institutional Ethical Committee

⬇

The nature and purpose of the study will be explained to the individuals

⬇

Based on inclusion and exclusion criteria participants will be selected

⬇

Prior informed written consent form will be taken

⬇

Participants will be instructed to fill the questionnaires (Gujarati version Neck Disability Index (NDI), 12 Item Short Survey Scale (SF-12))

⬇

Statistical Analysis will be done with appropriate statistical tool

Outcome Measures

1) Visual Analog Scale (VAS): Correlation coefficient of 0.80 indicating reliability, a significance level of 0.05. The VAS for disability consisted of three 100 mm lines, each labelled at the left end as 'no disability' (0 mm) and at the right end as 'very severe disability' (100 mm).[6]

2) Neck disability index (NDI): NDI questionnaire is designed to provide information to how neck pain affects a person's ability to manage in everyday life. It has 10 components having scoring from 0 to 5. Total score 50. Greater the score indicates greater disability. Reliability estimated by the internal consistency reached a Cronbach's alpha of 0.99 [7]

3) Wall ball bounce task (WBT): Eye-hand coordination ability subject were asked to stand two meters away from a smooth wall. With the command of the assistant the subject will throws a tennis ball with their right hand against the wall and catches it with the left hand, throws the ball with the left hand and catches it with the right hand. This cycle of throwing and catching is repeated for 30 seconds. Number of catches are individual score. Two trials are permitted. [8]

RESULT

Table 1: Descriptive characteristics of smartphone users (n=60)

Characteristics	Mean	Standard Deviation (SD)
Age(years)	30.60	8.969
Height(cm)	156.48	7.110
Weight(kg)	53.87	6.880
VAS (cm)	3.40	1.749
NDI	22.30	8.969
Eye hand coordination	17.22	2.700

Table: 2 Spearman (r) correlation coefficients of chronic neck pain and eye hand coordination in smart phone users

In smart phone users	Eye hand coordination	
	Correlation coefficient	Level of significance
VAS	-0.557	0.000
NDI	-0.463	0.000

DISCUSSION

The purpose of this study was to determine to the correlation between chronic neck pain and hand eye coordination in smartphone users. The data analysis shows that there is a moderate negative correlation between the chronic neck pain and hand eye coordination. Any changes in the normal alignment of the cervical vertebra would cause alteration in the functions of the distal area. Altered pain sensitivity may affect physical activity levels in chronic neck pain. This result could be because effect of prolonged use of smartphones on posture which could increase stress on muscle, ligaments and tendons. Also cause stress on the articular and ligamentous structures around the neck region. There is an alteration in the nervous system to activate the hand muscle. Sensory receptors around the neck as affected by various changes in neck muscle and neck pathologies. Pain alters the muscle spindle activity and this result in impairment of neck function.

CONCLUSION

The current study found that continuous neck flexion posture and prolonged use of smartphone were both associated with the occurrence of chronic neck pain. Neck flexion is the most common posture in smartphone users adopt when looking at their smartphone visual display terminals for long duration of time. Chronic neck pain was significantly associated with vision and eyestrain. Also eye–hand coordination is the coordinated control of eye movement with hand movement.

Declaration by Authors
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