

INFLUENCE OF TEXTING ON MOBILITY AND PROPRICEPTION

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Abstract

Usage of smartphones while performing dual tasks causes distraction. It has shown negative influence on standing postural balance and gait. This study aims to explore the influence of texting on mobility and proprioception in younger adults. Forty young adults participated in this study. Each participant was assessed for mobility using TUG test & Proprioception using Bosu Ball. A standard protocol of texting was prepared & the participant had to walk a distance of 3 meters first without texting and then with texting a standard protocol on his/her smartphone. Proprioception was assessed by evaluating the sway while the participant stood on a foam surface (Bosu Ball) first without texting and then with texting a standard protocol on his/her smart phone. The influence of texting on mobility and proprioception was highly significant ($p < 0.000$). The results interpreted that there is difficulty in maintaining postural sway while standing on a foam surface with texting. Also, the results showed reduce mobility when the participant was texting on smartphone. In conclusion, there is a significant reduction in mobility and proprioception when an individual is performing a dual task of texting. This further affects the awareness of surroundings. To sum up, the purpose of this study is to correlate dual task with smartphone to proprioception and mobility which is satisfied successfully.

Keywords: Dual Task Effect, Smart Phone Texting, Balance, Mobility, Proprioception.

INTRODUCTION

Smart phones play an integral part of human life. Use of smart phone for texting/typing while performing a dual activity causes distraction and reduced awareness of the surroundings. Moreover, distraction from smart phone use was shown to increase unsafe pedestrian behavior, such as ignoring traffic lights, crossing into oncoming traffic and more hits by virtual vehicles while crossing a virtual road. Recent study, done by Eric M.Lamberg, Lisa M.Muratori; April 2012; Smart phones change the way we walk ; Gait & Posture; showed that, typing / texting while walking is more challenging and modifies the way we walk. There is reduction in gait velocity, increase in lateral deviation and increase in linear distance traveled while an individual is walking and texting on a smart phone. This was found out when gait parameters were assessed like step length, stride length and cadence. Interestingly, standing postural balance was also seen to be impaired in young adults when they were texting on smartphone. Smartphone use can take a toll on other neurological parameters like proprioception and mobility which can go unnoticed. Thus, this study was performed to explore the influence of texting use on proprioception and mobility. The aim of this study was to explore the influence of texting on smartphone on proprioception and mobility in young adults. The objectives were to measure influence of texting on proprioception using foam and firm surface, to measure influence of texting on mobility using the Timed UP & Go test, to compare the parameters of proprioception and mobility when the subject is with and without texting on smartphone.

MATERIALS AND METHODS

Forty participants (age group – 18 to 25) gave written informed consent to participate in this study.

These participants were from suburban areas of Pune and had used smartphones for at least 2 years. Any participant suffering from any orthopedic, neurological, visual and hearing impairment or with intellectual disability were excluded from the study. These participants were asked to perform the following tests.

Procedure of assessment

Each participant was reduced to perform the following tests, first without smartphone and then texting a standard protocol on his/her smartphone.

Timed up and Go test

The subject was asked to sit on the chair at one end of the 3 meters distance. As soon as the timer started, the subject got up, walked a distance of 3 meters, turned around, came back and sat on the chair again. Time taken to complete this was noted down in seconds.

Test for Proprioception

The Subject will stand on a firm surface (Bosu ball) with normal base of support for at least 20 seconds. Examiner assessed for sway or need for handhold support and graded it from Grade 1 to Grade 4.

- *GRADE 4: Able to maintain steady balance without handhold support (static)*
- *GRADE 3 : Able to maintain balance without handhold support, limited postural sway (static)*
- *GRADE 2: Able to maintain balance with handhold support; may require occasional minimal assistance (static)*
- *GRADE 1: Requires handhold support and moderate to maximal assistance to maintain position (static)*

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Pic 1. TUG without



Pic 2. TUG with texting



Pic 3. Standing on foam surface without texting



Pic 4. Standing on foam surface with texting

Statistical analysis

Statistical tests were processed using SPSS software. One sample t-tests was done to study the change in mobility and proprioception while texting. There was a significant influence of texting on mobility and proprioception in younger adults. p value was observed to be highly significant. ($p < 0.000$)

RESULTS AND DISCUSSION

Standard deviance, Mean, Variance, Ranges and Significance Values were drawn out to interpret and formulate a meaningful conclusion

Timed up and go test

By performing one sample t test, the mean and standard deviation (Mean + SD) for TUG test without texting on a smartphone is - 7.5130 + 1.07203. The mean value and standard deviation for TUG test with texting a standard protocol on smartphone is - 8.8613 + 1.28738

This suggests that the time required to complete the mobility test is increased by 1.34 seconds which is highly considerable. Texting on a smartphone while performing timed up and go test has affected the time required to complete the test. Mobility is the ability to move from one position to another independently and safely. The phenomenon that could explain this decrease in performance is the dual-task effect. This dual-task effect simply is when individuals simultaneously divide

their attention between dual tasks and neither task receives the attentional resources it would have if it were attempted alone. Performing dual-task activity is perceived to be difficult and needs high mental efforts. Thus performing dual tasks impairs attention span which attributes to decreased gait speed in younger adults when using a smart phone. Hence more time was required to perform TUG test while Texting.

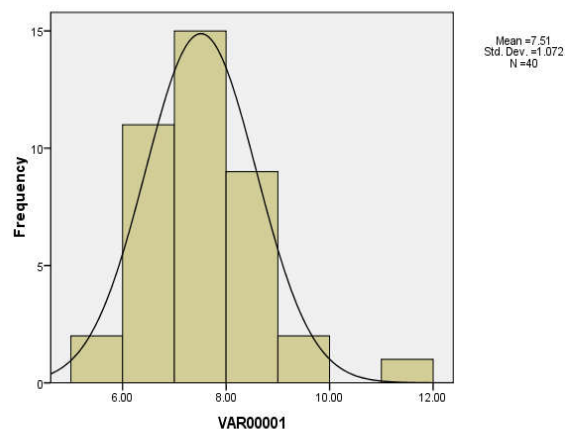


Fig. 1. TUG test without texting

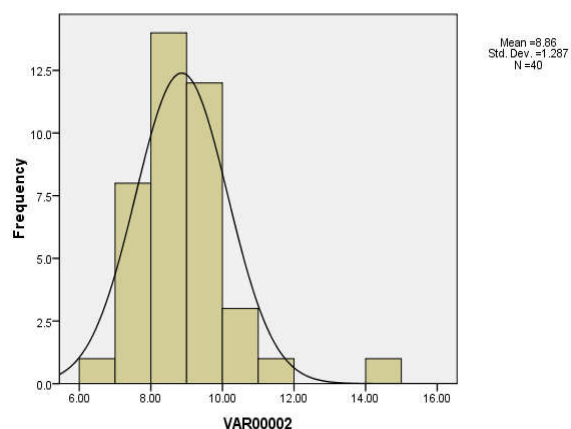


Fig. 2. TUG test With Texting

Test for proprioception (Standing on a Bosu Ball)

By performing one sample t test, the mean and standard deviation (Mean + SD) for Standing on a foam surface (Bosu Ball) without texting on a smartphone is - 3.7250 + 0.045220. The mean value and standard deviation for standing on a foam surface (Bosu Ball) with texting a standard protocol on smartphone is - 2.5500 + 0.71432. This implies that it is difficult to maintain proprioception and the participant requires handhold support while standing on a Bosu Ball with texting. This suggests that the participant was able to maintain proprioception with minimal handhold support and may require occasional minimal assistance (Grade 2) when he/she was standing on a Bosu ball with texting on a smartphone. Proprioception is the perception or awareness of the position and movement of the body. It is composed of input from sensory nerve endings called *proprioceptors* that are present in the *skeletal muscle* and visual feedback from the *extra ocular muscles* of the eyes. By knowing where the eyes are pointing, the brain is aware of the position of objects in the surrounding space. These sensory inputs are then transmitted to the higher centers via two pathways - *spinocerebellar pathway* and *dorsal column pathway*. Both tracts terminate in the cerebellum and integrate proprioceptive impulses from all parts of the body.

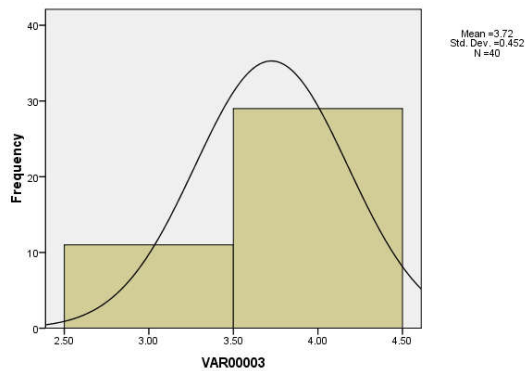


Fig 3. Standing on a Bosu Ball with texting

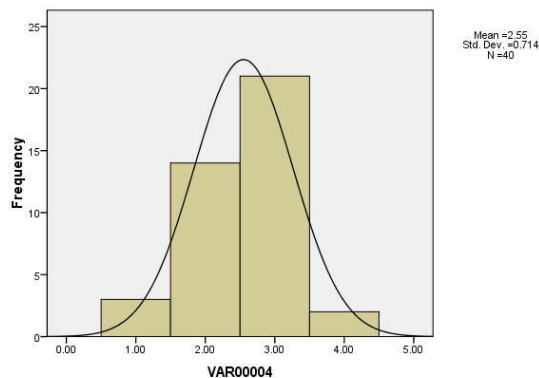


Fig. 4. Standing on a Bosu ball without texting

While performing the study, the participants were asked to maintain their proprioception while texting on the smartphone. Texting on the phone occluded their visual input. Due to the lack of sensory input from the extra ocular muscles, it is difficult to gather information regarding the surroundings i.e. the spatial orientation of objects around. Thus, the participants were required to rely entirely on the sensory input from the skeletal muscles. Also, according to a few previous studies, the ability to estimate the location of a body part degrades quickly during visual occlusion. The significant reduction in proprioception of young adults while texting may be attributed to the fact that using a smartphone while completing tasks reduces sensory input from the visual feedback. Thus it is difficult to maintain cognitive ability and leads to decreased dynamic balance.

Conclusion

This study was the first to find out the influence of texting on smartphone on proprioception and Mobility in younger adults. Through this study, it can be concluded that texting on the smartphone reduces the mobility & Proprioception of an individual. A study that elaborates the effect of different lightings i.e. day light, night light and dim light on proprioception and mobility in smartphone users can be done. In the future research, similar study can be used to examine the effect of using mobile phone on Proprioception and Mobility of older adults

Clinical implication

Interesting practical implications emerge from this study. As per the study, reduced mobility and proprioception while doing dual task of texting on smartphone causes distraction and reduced awareness of the surroundings. Younger adults should

be careful and avoid using smart phones in challenging dual task conditions or sensory environments (e.g. uneven walking surfaces, unnoticed obstacles) in order to prevent falls. Health care professionals can design protocols as well as optimize assessment and intervention planning, to prevent these falls. Moreover, they should be advised for limited use of smartphone while doing dual activity.

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