Correlation of Static Balance and Smartphone Usage in Physiotherapy Students

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ABSTRACT

In modern society, multifunctional smartphones are widely used in our daily lives. Nearly 91% of college students keep their neck bent while using their smartphones. These activities have led to a rapid increase in global smartphone usage, changing the dynamic balance of users.

There is a lack of knowledge about the effects of smartphone usage on static balance and the factors associated with smartphone use-related balance disorders. The current study aims to assess the correlation of static balance disorders among the smartphone users who are physiotherapy students, therefore the objective of the study is to assess smartphone usage and static balance and their correlation in physiotherapy students.

80 Participants of both genders age between 18–25 years using a smartphone with > 6 months duration and daily smartphone screen time is 2 hours were included in this study.

Participants were instructed to perform static balance test; Balance Error Scoring System (BESS) was used to assess balance. The smartphone addiction scale was used to assess smartphone usage. Correlation between SAS and BESS were checked, according to Pearson's correlation, the correlation coefficient i.e. "r" value came out to be 0.085. This shows that there is poor positive correlation between SAS and BESS. Hence, The study confirms that there is a poor positive correlation between static balance and smartphone usage in Physiotherapy students.

Keywords: SAS; BESS; Static Balance.

INTRODUCTION

In modern society, multifunctional smartphones are widely used in our daily lives. Smartphones not only serve as multimedia collections, camera lenses, global and satellite navigation systems[1], but also as a means of sending and receiving emails, storing data, playing games and participating in learning interactions.[2]

These activities have led to a rapid increase in global smartphone usage, changing the dynamic balance of users. Among smartphone users, university students in their 20s use smartphones more than any other age group.[3]

Nearly 91% of college students keep their neck bent while using their smartphones.[4] Increased neck flexion increases the compressive stress on the neck structure.[5] It is also been found that 40% of medical undergraduate has smartphone addiction.[6] Severity of musculoskeletal symptoms is also related to hours of smartphone use per dual task work on your smartphone, sending short notes, and prolonged use of more than [4] hours a day will adversely affect dynamic balance control.[7]

Flexing the head forward to different degrees greatly increases the weight that the spine perceives. In neutral position, an adult head weighs 4.5 kg–5.4kg. The forces felt by the neck increase as the head tilts forward, reaching 12.2kg at 15 degrees, 18.1kg at 30 degrees, 22.2kg at 45 degrees, and 27.2kg at 60 degrees.[8]

In today's world with the advancement in mobile technology people spend enormous time on using hand held devices such as tablets and smartphones, which results in prolonged neck flexion with forward bending, resulting in "Text Neck" (TN) or "turtle neck posture.[9]

Maintaining balance is essential for injury prevention and depends on the central nervous system through the integration of sensory information from the vestibular, somatosensory, and visual systems.[10]

Altering any of these entrances will impair the balance and increase your risk of injury. Smartphone users encounter problems related to dynamic balance control, but most of a person's daily activities that typically involve static balance control consume minimal muscle energy.[11]

1. Static balance is the ability to align the centre of mass on his surface of support while the body is at rest.[12]

2. Long-term use of smartphones decreases dynamic balance, while increasing cervical spine position errors, visual fatigue in physiotherapy students.[13]

The present study demonstrated a very weak positive correlation ($r = 0.08$) between smartphone usage and static balance among physiotherapy students. This suggest that smartphone usage alone may not have a significant influence on static balance in this population.

Need of Study

Changes in visual, sensory, and proprioceptive inputs to the central nervous system may be related to static balance in smartphone users. There is a lack of knowledge about the effects of smartphone usage on static balance and the factors associated with smartphone use-related balance disorders. The current study aims to assess the correlation of static balance disorders among the smartphone users and physiotherapy students' population. This study may help to prevent static balance impairment in smartphone users in physiotherapy students. Thus, the need arises, to check the Correlation of static balance and smartphone usage in physiotherapy students.

Hypothesis

Null Hypothesis: There is no correlation between static balance and smartphone usage in physiotherapy students.

Alternative Hypothesis: There is a correlation between static balance and smartphone usage in physiotherapy students.

Aim

To assess correlation between static balance and smartphone usage in physiotherapy students.

Objectives

1. To assess static balance in physiotherapy students.

2. To assess smartphone usage in physiotherapy students.

3. To study correlation between static balance and smartphone usage in physiotherapy students.

Methodology

1. Study design: - Correlation study

2. Study population: - Physiotherapy students

3. Study duration: - 6 months

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4. Sample size: -80

5. Study setting: - Physiotherapy colleges in and around PCMC.

6. Sampling method: - Convenient

Sample Calculation Method- Pilot study was performed on 11 physiotherapy students , in that 4 students were having smartphone addiction according to (SAS-SV) and they showed impaired balance on BESS. Considering the proportion of mobile phone dependency as 36.36% from the pilot study and with a confidence interval of 95% CI and an acceptable error of 10% the minimum sample size calculated is 80 using Winpepi version 11.38 software.

Material

1. Foam pad

2. Stop watch

3. Stopper

4. BESS Score Card

5. Smartphone addiction scale-short version (SAS)

Inclusion Criteria

1. Both genders

2. 18–25 years of age

3. Experience in using a smartphone with > 6 months duration and daily smartphone screen time 2 hours.

Exclusion Criteria

1. visual, auditory, vestibular or neurological deficits

2. traumatic injuries or surgical interventions of the spine and lower limb within one year prior to the beginning of the study

3. Medical conditions which may have a negative effect on balance

4. chronic musculoskeletal diseases, lower limb fractures, and injuries

5. Participation in any neck muscle strengthening and balance training over the past 12 months

6. Beck Depression Inventory (BDI) score > 30/63

7. Dizziness Handicap Inventory (DHI) score > 30/100

8. Sedative drug or alcohol use within the past 48 h.

9. BMI 30 kg/m2, as BMI > 30 kg/m2 could negatively influence balance control

Outcome Measures

1. The smartphone addiction scale BESS

Procedure

Ethical clearance was taken from the ethical committee.

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Physiotherapy students fulfilling the inclusion criteria were selected.

Written informed consent was taken.

To ensure optimal measurement quality, suitable participants were instructed prior to the test trial. This process contained 2 sets of 10 from the Balance Error Scoring System (BESS) element, The patient is asked to perform static balance before performing the test.

Participants are instructed to maintain standing balance with their feet with hands on their while performing in each of the six Bess sub tests.

(a) Double leg stance with feet together (firm surface).
(b) Single leg stance on non-dominant foot (firm surface).
(c) Tandem stance on non-dominant foot in back (firm surface).
(d) Double leg stance with feet together (foam surface).
(e) Single leg stance on non-dominant foot (foam surface).
(f) Tandem stance on non-dominant foot in back (foam surface)

Each subtest was recorded back counting participants' error of deviance from the selected test position with the help of a balance error scoring system.

The failure to maintain the selected test position for less than 5 seconds.

Types of error:-

1. Hand lifted off iliac crest.
2. Opening Eyes.
3. Steps, stumble, aur fall.
4. Moving hip into > 30 degree of abduction.
5. Lifting forefoot or heel.
6. remaining out of test position > 5second.

The Bess is calculated by adding one error point for each error during the six 20 second test.

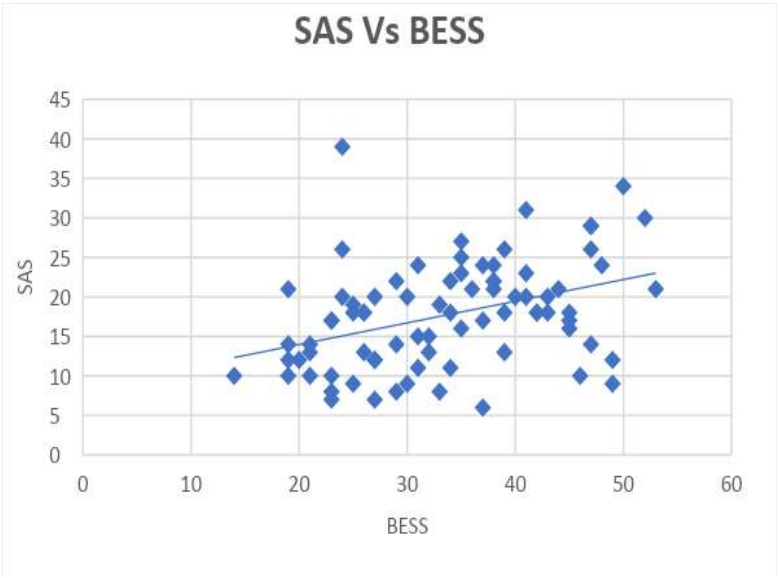
Statistical Analysis

Considering the proportion of mobile phone dependency as 36.36% and with a confidence interval of 95% CI and an acceptable error of 10% the minimum sample size calculated is 80 using Win Pepi version 11.38 software.

RESULTS AND INTERPRETATION

Table No. 1

Correlation of smart phone addiction scale (SAS) with Balance error scoring system (BESS) SAS	**BESS**	
Mean	33.7	17.25
SD	9.542	6.767
Pearson coefficient(r)	0.08525	



The above graph show correlation between SAS and BESS. As x axis represents SAS scores and y axis represents BESS scores. According to Pearson's correlation, the correlation coefficient i.e. "r" value came out to be 0.08525. This shows that there is poor positive correlation between SAS and BESS.

DISCUSSION

The static balance is defined as ability to maintain the posture and orientation of the centre of mass over the base of support with the body at rest.[16] Static balance can be impaired by years of smartphone use relate to visual fatigue, as this is one of the component of balance control system.[19] Alteration in visual input can affect the degree of dependence on proprioceptors and postural sway or static balance.[17] Balance control depends on proprioceptive input from mechanoreceptors and visual and vestibular input to CNS. The long duration of smart phone use enduces viusal fatigue and affects the static balance function.[18] Physiotherapy students use the smartphone more in their 20s than any other age and it has also been seen that 40% of medical students has addiction of smartphone.[6]

In our study to assess the static balance we used the scale Balance error scoring system (BESS). This scale suggests that if the scoring is more than 15 then this indicates that the subject has impaired balace. To assess the smart phone addiction, a smartphone addiction scale short version (SAS-SV) was used. The interpretation of the scale is >34 means the person has a smartphone addiction.

According to the finding of the current study, it is seen that there is poor positive correlation between the Smart Phone Addiction Scale and Balance Error scoring System. It interprets that as the addiction of smart phone increases there is also increase in alteration of static balance. A study of 2022 showed that there is high prevalence association of static balance impairment with increase smartphone usage for more than 4 hours for a span of 4 years. This resonates with the current study as it is seen that there is alteration of static balance with the increase usage of smartphone in Physiotherapy students.

In the article of 2017 stated that there is significant decrease of dynamic balance in subjects who are using the smartphone for more 4 hrs per day. As the author had 3 groups (group A, B, C) in which group A signified that there is no use of smart phone and group B signified that there is less than 4hrs of smartphone use which showed mild impairment in the balance, and the group C which signified more than 4 hour per day usage of the smartphone. On the basis of the study as stated results are impairment of dynamic balance in noted, then there is chance of alteration in static balance as well.[12]

CONCLUSION

The study confirms that there is a poor positive correlation between static balance and smartphone usage in Physiotherapy students.

LIMITATION

The present study has some limitation, first, because the number of male participants was not equal to the number of female participants, the current study cannot conclude that there was no significant difference in static balance between males and females.

REFERENCES

1. Basu, S., Garg, S., Singh, M. M., & Kohli, C. (2018). Addiction-like behavior associated with mobile phone usage among medical students in Delhi. *Indian Journal of Psychological Medicine, 40*(5), 446–451.
2. Bell, D. R., Guskiewicz, K. M., Clark, M. A., & Padua, D. A. (2011). Systematic review of the balance error scoring system. *Sports Health, 3*(3), 287–295.
3. El Azab, D. R., Amin, D. I., & Mohamed, G. I. (2017). Effect of smart phone using duration and gender on dynamic balance. *International Journal of Medical Research & Health Sciences, 6*(1), 42–49.
4. Eom, S. H., Choi, S. Y., & Park, D. H. (2013). An empirical study on relationship between symptoms of musculoskeletal disorders and amount of smartphone usage. *Journal of the Korea Safety Management and Science, 15*(2), 113–120.
5. Gold, J. E., Driban, J. B., Thomas, N., Chakravarty, T., Channell, V., & Komaroff, E. G. (2012). Postures, typing strategies, and gender differences in mobile device usage: An observational study. *Applied Ergonomics, 43*(2), 408–412.
6. Hansraj, K. K. (2014). Assessment of stresses in the cervical spine caused by posture and position of the head. *Surgical Technology International, 25*, 277–279.
7. Harris, B., McCredie, M., & Fields, S. (2020). Examining the psychometric properties of the Smartphone Addiction Scale and its short version for use with emerging adults in the United States. *Computers in Human Behavior Reports, 1*, Article 100011.
8. Haug, S., Castro, R. P., Kwon, M., Filler, A., Kowatsch, T., & Schaub, M. P. (2015). Smartphone use and smartphone addiction among young people in Switzerland. *Journal of Behavioral Addictions, 4*(4), 299–307.
9. Khattak, S., Gul, M., Kakar, H. A., Ullah, G., & Rahman, M. U. (2020). Prevalence and awareness of text neck syndrome and addiction to smartphones in doctor of physical therapy students of Peshawar. *Annals of Allied Health Sciences, 6*(1).
10. Long, J., Cheung, R., Duong, S., Paynter, R., & Asper, L. (2017). Viewing distance and eyestrain symptoms with prolonged viewing of smartphones. *Clinical and Experimental Optometry, 100*(2), 133–137.
11. O'Sullivan, S. B., Schmitz, T. J., & Fulk, G. (2019). *Physical rehabilitation* (7th ed.). F.A. Davis.
12. O'Sullivan, S. B., & Schmitz, T. J. (1994). *Physical rehabilitation: Assessment and treatment*. F.A. Davis.
13. Park, J., Kim, J., Kim, J., Kim, K., Kim, N., Choi, I., Lee, S., & Yim, J. (2015). The effects of heavy smartphone use on the cervical angle, pain threshold of neck muscles and depression. *Advanced Science and Technology Letters, 91*(3), 12–17.
14. Park, Y. H., An, C. M., & Moon, S. J. (2017). Effects of visual fatigue caused by smartphones on balance function in healthy adults. *Journal of Physical Therapy Science, 29*(2), 221–223.
15. Shan, Z., Deng, G., Li, J., Li, Y., Zhang, Y., & Zhao, Q. (2013). Correlational analysis of neck/shoulder pain and low back pain with the use of digital products, physical activity and psychological status among adolescents in Shanghai. *PLoS ONE, 8*(10), e78109.
16. Tabrizi, H. B., Abbasi, A., & Sarvestani, H. J. (2013). Comparing the static and dynamic balances and their relationship with the anthropometrical characteristics in athletes of selected sports. *Middle-East Journal of Scientific Research, 15*(2), 216–221.
17. Wah, S. W., Chatchawan, U., Chatprem, T., & Puntumetakul, R. (2022). Prevalence of static balance impairment and associated factors among university student smartphone users with subclinical neck pain: A cross-sectional study. *International Journal of Environmental Research and Public Health, 19*(17), 10723.

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18. Won, M., Kim, M., Kim, S., & Lee, J. (2014). The effect of visual information provision on the changes of electromyogram activity in trunk and lower leg muscles during dynamic balance control. *The Korean Journal of Sports Medicine, 32*(1), 44–54.
19. Wright, K. E., Lyons, T. S., & Navalta, J. W. (2013). Effects of exercise-induced fatigue on postural balance: A comparison of treadmill versus cycle fatiguing protocols. *European Journal of Applied Physiology, 113*, 1303–1309.