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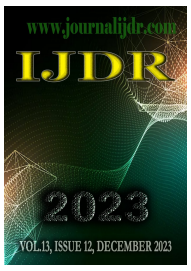

RESEARCH ARTICLE OPEN ACCESS

EFFECTS OF SMARTPHONE MULTITASKING ON DYNAMIC BALANCE

Dr. Muhammad Nauman Kazi*[1], Dr. Rajiv D. Limbasiya[2], Dr. T. Ramaligam[3], Dr. Mital Shah[1] and Saiyed Ahed Shakil[4]

[1]Assistant Professor in Department of Physiotherapy the Sarvajanik College of Physiotherapy; [2]Associate Professor the Sarvajanik College of Physiotherapy; [3]Lecturer in Department of Physiotherapy the Sarvajanik College of Physiotherapy; [1]Inter Student of the Sarvajanik College of Physiotherapy

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Corresponding author:
Dr. Muhammad Nauman Kazi,

ABSTRACT

Background: Balance plays an important role while performing functional activities such as walking and everyday tasks. However, distractions may affect the balance. Earlier studies have found that using smartphone functions during functional activity affects the dynamic balance. However, very few Studies have been done to find out the effects of smartphone multitasking on dynamic balance while performing the Y-Balance test. ***Purpose of the study:*** The purpose of the study was to determine the effects of smartphone multitasking on dynamic balance while performing the Y-Balance test. ***Methods:*** Two hundred healthy young adults were randomly included in the study based on the inclusion and exclusioncriteria. Dynamic balance was assessed by using the Y-balance test. Limb length was priorly checked. During Y- the balance test different smartphone tasks were carried out which were 1) without a smartphone 2) while listening to music & web surfing 3) chatting 4) playing video games. ***Results:*** The result of the study showed that the without smartphone scores on the Y-Balance test are stronglypositive compared with the chatting group. The hearing music group's score onthe Y-Balance test is fair positive compared with without the smartphone group. Whereas, the videogame group's score on the Y-Balance test is weak positively compared with the smartphone group. ***Conclusion:*** There was a significant effect of smartphone multitasking on dynamic balance while performing the Y-Balance test.

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INTRODUCTION

Smartphones are the comfortable gadgets which have made everything reachable through a touch. They have taken such a large part in our daily lives. When using any technological device, there will undoubtedly be some benefits and drawbacks. Smartphone usage in India is expected to increase from 468 million in 2017 to 859 million by 2022. The widespread availability of cell phones and their ability to give a wide range of information has increased the average man's reliance on them, and their excessive use has resulted in numerous issues. According to one study on smartphone use among young people, a person uses a smartphone for 5.1 hours during the week and 5.9 hours on the weekends. This means that, on average, young people use smartphones a lot, and the majority of the features they use are for chatting or playing games. Visual distraction has also been shown to alter static balance during simple, dual, or multitasking tasks, resulting in postural sway. Because cell phones are portable, their numerous features are simple to utilize while walking. Listening to music, messaging, web surfing and playing games aresome of the most typical smartphone functions used during gait. In a static or dynamic context, it is necessary to maintain the equilibrium for functional tasks. Dual tasking with smartphone functions during gait, such as listening to music, chatting, browsing the internet, or playing a videogame, has been shown to affect dynamicbalance. [(1)] Many individuals revealed physical symptoms such as ocular fatigue (31%), myalgia (15%), and brain dysfunction (5%), in research on physical and mental health conditions according to degree and addiction of smartphone use by university students. When walking while using a smartphone, visual and auditory distractions are unavoidable. [(2)] Technological advancements, most notably the invention of cell phones, have transformed our way of life. It is used not only for communication but also for leisure, including messages, music, media, internet access, photographs and games.[(3)] Dual or multitasking refers to walking or working while utilizing various features of a smartphone. However, due to diminished cognitive abilities in an accidental or unanticipated situation, such dual-tasking might result in a fall or damage. The capacity to maintain equilibrium in a static or dynamic Balance has been connected to cognitive ability as well. Dual-tasking with a smartphone while walking, such as listening to

music, sending a message, surfing the web, or playing a game, is thought to impair the dynamic balance needed to perform functional activities by minimizing cognitive ability. [4] Although handheld multimedia devices provide significant convenience, benefit, and enjoyment to users, the injury prevention community is concerned about their potential to distract persons from safe participation in potentially hazardous contexts. Pedestrian injury is a significant public health concern, particularly among college students. Pedestrian-related injuries killed almost 800 young Americans (ages 16-29) in 2009, and approximately 16,000 required hospital visits. [5] The use of handheld multimedia devices is increasing at an alarming rate around the world. Cell phones are expected to be owned by 77% of the world's population. The increased use of mobile phones has raised concerns about the technology's safety. A growing number of research suggests that mobile phone use has a deleterious impact on driving through increasing attentional, cognitive, and perceptual demands. Furthermore, cell phone distraction has been proven to enhance risky pedestrian behavior such as ignoring traffic lights, crossing into oncoming traffic, and being hit by virtual vehicles when crossing a virtual road. It has been considered that using a cell phone while conducting another activity is a regular example of dual-task activity in our daily lives, which we frequently do anywhere. Such behavior may result in a fall or injury as a result of diminished cognitive abilities in an unintended or unanticipated setting. Walking while using a cell phone needs both cognitive and physical ability, as well as an adequate division of attention. [2] Henceforth, the purpose of the study was to determine the effects of smartphone multitasking on dynamic balance while performing the Y-Balance test.

METHODS

Two hundred healthy individuals using smartphones at least 4 hours a day were selected to participate. The procedure was explained to all participants and written consent was taken from each participant before participation in the study.

The testing procedure included performing reach-out without the smartphone, reaching out while chatting through text, reaching out while web surfing and hearing music, and reaching out while playing Subway Surfer.Each participant followed the above-mentioned sequence. Each participant performed the test three times.

- The reach-out will be done following four tasks in all threedirections:

  Task 1: reach-out withoutsmartphone.
  Task 2: Reach out while chatting through text.
  Task 3: Reach out while web surfing and hearing music.
  Task 4: Reach out while playing Subway Surfer.

All participants' leg lengths were measured. LL was employed to standardize reach distance because it has been demonstrated to be a factor affecting YBT performance. With the hips and ankles in a neutral, the LL was measured from the inferior tip of the anterior-superior iliac spine to the distal border of the ipsilateral medial malleolus in a supine position. Each individual had their LL measured twice. For data analysis, the two measures' average was employed. For each direction, the reach distances collected from the three trials were averaged and then normalized to leg length, using the following formula: (reach distance/LL) x100%.

RESULTS

In this study comparing dynamic balance, participants were divided into groups based on their activities, such as without smartphones, chatting, listening to music, and video games. The results showed that the dynamic balance of participants in the anterior, posterolateral, and posteromedial compartments was significantly better in the without smartphone group compared to the other groups. The p-value obtained was found to be <0.001, indicating strong statistical significance. Table 1 shows the descriptive statistics of Y balance test scores. When comparing the dynamic balance of the participants in the anterior compartment, the without smartphone group had the highest unstandardised B score of 4.140 (p=<0.001), followed by the chatting group with a score of 2.032 (p=.030), the hearing music group with a score of 0.294 (p=.754), and the video game group with a score of 0 (p=0). There was no significant difference in dynamic balance between the left and right sides of the participants (Table 2) In the posterolateral compartment, the without smartphone group had the highest unstandardisedB score of 4.230 (p=<0.001), followed by the chatting group with a score of 0.444 (p=0.667), the video game group with a score of 0 (p=0), and the hearing music group with a score of –0.086 (p=.934). There was no significant difference in dynamic balance between the left and right sides of the participants (Table3).

In the posteromedial compartment, the without smartphone group had the highest unstandardised B score of 4.988 (p=<0.001), followed by the chatting group with a score of 0.521 (p=0.623), the hearing music group with a score of 0.891 (p=0.400), and the video game group with a score of 0 (p=0). There was no significant difference in dynamic balance between the left and right sides of the participants (Table 4).

Table 1. Descriptive Statistics results of the study outcomes:

GROUP	SIDE		Minimum	Maximum	Mean	Std.Deviation
Without Smartphone	RIGHT	ANTERIOR	51.58	109.45	76.1299	9.20154
		POSTLAT	43.18	106.98	76.9845	10.51721
		POSTMED	40.14	100.72	70.8096	10.15789
	LEFT	ANTERIOR	56.37	102.43	75.0083	8.19609
		POSTLAT	51.51	109.45	75.1630	11.01524
		POSTMED	46.59	110.69	71.9381	11.65469
Chatting	RIGHT	ANTERIOR	48.65	108.22	73.1233	9.94357
		POSTLAT	48.10	107.40	72.7535	10.51822
		POSTMED	46.96	100.81	67.6032	10.32892
	LEFT	ANTERIOR	51.36	106.58	72.9005	9.43896
		POSTLAT	50.57	104.51	71.3775	10.51537
		POSTMED	47.83	102.87	67.4713	11.51226
Hearing Music	RIGHT	ANTERIOR	47.27	105.75	71.6263	9.91702
		POSTLAT	52.25	98.76	71.1793	9.57037
		POSTMED	44.56	100.36	67.1821	10.39993
	LEFT	ANTERIOR	45.16	98.76	71.1623	9.30311
		POSTLAT	52.64	97.73	70.8471	9.85903
		POSTMED	44.85	102.87	67.8409	10.17643
Video Games	RIGHT	ANTERIOR	46.11	102.87	71.0704	9.45805
		POSTLAT	49.61	109.45	72.3768	10.36909
		POSTMED	46.01	92.67	67.5464	9.87199

Table 2. The Y Balance Test results for the Anterior Compartment

GROUP	SIDE	Mean	Std. Deviation	unstandardized B	F Value	Significance
Without Smartphone	RIGHT	76.1299	9.20154			
	LEFT	75.0083	8.19609	4.140		
Chatting	RIGHT	73.1233	9.94357	2.032		
	LEFT	72.9005	9.43896		19.772	<0.001
Hearing Music	RIGHT	71.6263	9.91702			
	LEFT	71.1623	9.30311	.294		
Video Game	RIGHT	71.0704	9.45805	0^a		
	LEFT	70.8686	9.40459			

Table 3. TheY Balance Test results for the posterolateral Compartment

GROUP	SIDE	Mean	Std. Deviation	unstandardized B	F Value	Significance
Without Smartphone	RIGHT LEFT	76.9845	10.51721	4.230		
		75.1630	11.01524			
Chatting	RIGHT LEFT	72.7535	10.51822			
		71.3775	10.51537	.444		<0.001
Hearing Music	RIGHT LEFT	71.1793	9.57037	-.086		
		70.8471	9.85903			
Video Game	RIGHT LEFT	72.3768	10.36909	0^a	19.701	
		70.9331	10.08847			

Table 4. TheY Balance Test resultsfor Posteromedial Compartment

GROUP	SIDE	Mean	Std. Deviation	unstandardized B	F Value	Significance
Without Smartphone	RIGHT LEFT	70.8096	10.15789			
		71.9381	11.65469	4.988		
Chatting	RIGHT LEFT	67.6032	10.32892			
		67.4713	11.51226	.521		<0.001
Hearing Music	RIGHT LEFT	67.1821	10.39993			
		67.8409	10.17643	.891		
Video Game	RIGHT LEFT	67.5464	9.87199	0^a		
		66.9500	10.50261		13.905	

DISCUSSION

A study of 200 randomly selected participants using smartphones found that smartphone use can distract people and cause accidents. Dual-tasking while using smartphones reduces cognitive abilities and postural control. This study aimed to examine the effect of multitasking on dynamic balance while using various smartphone features. The Y-balance test was used in a series of tasks, including using the phone for music, web surfing, chatting, and playing video games. According to the results of measuring dynamic balance using the YBT, dynamic balance decreased in all three directions during dual-tasking while using smartphone functions relative to a single task without using a smartphone. During the investigation, as the task becomes more complicated the reach distance of the Y – Balance test becomes shorter. There was a significant decrease in dynamic balance while doing the Y- Balance test while using a smartphone for playing video games. Playing games most significantly decreased cognitive ability, resulting in the greatest decrease in dynamic balance. This was followed by hearing music & web surfing simultaneously and chatting which has the least impact on dynamic balance $p<0.001$. In particular, playing games while walking affects cognitive capacity, which lowers dynamic balance and increases the risk of injury, even though it is a common adolescent habit. Dual tasking using a smartphone, while walking or working, which may look trivial, can be a cause of fall or injury. Accordingly, performing a single task rather than employing the diverse functions of a smartphone while walking or working is considered to be a good way to prevent falls or injuries. M Lacour et.al while examining found that dual-task decreases postural and balance control if the advanced cognitive task is given on the other hand single task has no effect on dynamic balance.[6] Therefore, it is beneficial to single-tasking to avoid distraction which reduces postural stability. Likewise, Rabeb Laatar et.al investigated the effect of cell phone use on postural balance and mobility in older compared to young person found that cell phone use decreases standing postural balance in both elderly and young persons. [7]

Jeon Hyeong Lee and Myoung Hee Lee investigated gait and dynamic balance while using a smartphone and concluded that smartphone multitasking during gait decreases dynamic balance. This further demonstrates that using a smartphone while walking reduces dynamic balance since it requires compensatory movements so that walking can be more secure. [2] Therefore, it reduces the capacity of the walker to recognize or manage possible obstacles and dangers in the environment, increasing the likelihood of accidents when walking in an outdoor setting. As a result, it is seen to be a good idea to focus on a single job while walking or working rather than using a smartphone's numerous features.

CONCLUSION

In conclusion, the study results demonstrated a clear correlation between smartphone multitasking and compromised dynamic balance, with notable variations in test scores among the different smartphone task groups. As smartphones continue to play a pervasive role in modern life, it becomes increasingly crucial to understand the implications of their usage on our overall well-being, particularly in tasks requiring physical coordination and balance. These findings shed light on the necessity for mindfulness and moderation in smartphone usage to preserve our physical capabilities and mitigate the potential risks associated with distracted smartphone multitasking.

REFERENCES

Abdelkader NA, Mahmoud AY, Fayaz NA, Saad El-Din Mahmoud L. Decreased neck proprioception and postural stability after induced cervical flexor muscles fatigue. *J Musculoskelet Neuronal Interact.* 2020 Sep1;20(3):421–8.

Hong L, Lai X, Xu D, Zhang W, Wu B, Yu X, Zhao K, Zhang G. Distinct patterns of problematic smartphone use and related factors in Chinese college students. *BMCPsychiatry.* 2022 Nov 30;22(1):747.

Hyong IH. The effects on the dynamic balance of dual-tasking using smartphone functions. *J Phys Ther Sci.* 2015Feb;27(2):527–9.

Laatar R, Kachouri H, Borji R, Rebai H, Sahli S. The effect of cell phone use on postural balanceand mobility in older compared to young adults. *PhysiolBehav.* 2017 May1;173:293–7.

Lacour M, Bernard-Demanze L, Dumitrescu M. Posture control, ageing, and attention resources:models and posture-analysis methods. Neurophysiol Clin ClinNeurophysiol. 2008 Dec; 38(6):411–21.

Lee JH, Lee MH. The effects of smartphone multitasking on gait and dynamic balance. *J Phys Ther Sci.* 2018Feb;30(2):293–6.

Rubinstein, J. S., Meyer, D. E., & Evans, J. E. (2001). Executive control of cognitive processes in task switching. *Journal of Experimental Psychology: Human Perception and Performance,* 27(4), 763– 797.

Schwebel DC, Stavrinos D, Byington KW, Davis T, O'Neal EE, de Jong D. Distraction and pedestrian safety: how talking on the phone, texting, and listening to music impact crossing the street. AccidAnal Prev. 2012 Mar; 45(2):266–71.

Shaffer S, Teyhen D, Litchfield C, Warren R, Koreerat C, Straseske C, et al. Y-Balance Test: A Reliability Study Involving Multiple Raters. Mil Med. 2013 Nov1; 178:1264–70.

Stuti W, Sharma P, Pratap Y, Kumar N. To Study the Effect of Smartphone Multitasking on Dynamic Balance in Young Adults. Indian J PhysiotherOccup Ther Print-ISSN 0973-5666 Electron 0973-5674. 2022;16(1):150–8.

Upshaw JD, Stevens CE Jr, Ganis G, Zabelina DL. The hidden cost of a smartphone: The effects of smartphone notifications on cognitive control from a behavioural and electrophysiological perspective. PLoS One. 2022 Nov17; 17(11): e0277220.

Walankar PP, Kemkar M, Govekar A, Dhanwada A. Musculoskeletal Pain and Risk Factors Associated with Smartphone Use in University Students. *Indian J Occup Environ Med.* 2021 Dec; 25(4):220–4.

wernick-Robinson M, Krebs DE, Giorgetti MM. Functional reach: does it measure dynamic balance? Arch Phys Med Rehabil. 1999 Mar; 80(3):262–9.

Wilmer HH, Sherman LE, Chein JM. Smartphones and Cognition: A Review of Research Exploring the Links between Mobile Technology Habits and Cognitive Functioning. Front Psychol. 2017 Apr 25; 8:605.

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