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ORIGINAL ARTICLE

READING AND TEXTING WHILE WALKING EFFECTS ON GAIT INDICES AMONG COLLEGIATE STUDENTS

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ABSTRACT

Background: Dysmenorrhea divides into two type's primary dysmenorrhea (PD) and secondary dysmenorrhea (SD). Dysmenorrhea with absence of pelvic abnormality is termed primary dysmenorrhea (PD) and is likely experience among young women population aged between 15 to 25 years. Despite the effectiveness of the exercise on managing PD, the immediate result of the intervention towards pain was not signified. The study aimed to evaluate the immediate effect of Brisk Walking (BW) with or without Music Therapy (MT) in reducing menstrual pain among youth with primary dysmenorrhea. **Material and methods:** This experimental study involving 102 female subjects with primary dysmenorrhea aged between 18 to 25 years were divided into two equal groups: a Brisk Walking group (n=51), and Brisk Walking with Music Therapy group (n=51). The menstrual pain was assessed using the Numeric Rating Scale (NRS) for pre and post-test taken within 2 menstrual cycle period. The Maximum Heart Rate of each subject were calculated prior Brisk Walking and exercise was conducted within 60 -70% of the individual's Maximum Heart Rate for 20 minutes. The Music Therapy was completed in their home with music provided by researcher for 20 minutes duration. **Results:** The data was assessed using the Paired T-test and Independent T-test. The result within the group showed significant value with $p<0.05$ in both groups. Comparison between groups also showed significant difference $p<0.05$. **Conclusion**: A greater improvement was seen in the Brisk Walking with Music Therapy intervention group in managing primary dysmenorrhea. In specific, it is also proven that both study groups, Brisk Walking and Brisk Walking with Music Therapy promote pain reduction.

Keywords: Dysmenorrhea, Menstrual Pain, Exercise, Aerobics, Brisk walking, Music therapy

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INTRODUCTION

Mobile phones have become an important part of every one's life.77% of the total world's population uses mobile phones. Walking while using a mobile phone affects both how we walk and how interact with our environment. Text messaging is popular and frequently used as it cost effective and easy. Texting or reading messages while walking is a customary task for youngsters [1,2].

This is one of the complex dual tasks that are mastered by youngsters to perform efficiently in their highly demanding life. Walking is a complex task that requires a co-ordinated functioning between all body parts and brain. With this in mind, the aim of this study was to examine the effects of walking at different speeds while using a mobile phone on spatial temporal stride parameters among collegiate students [3,4].

The physical effects can typically manifest through decreased gait velocity, stride length, and increased duration of double support time. Such adaptations require intact attention and executive function attention can get diverted during using mobile phones and doing motor task simultaneously thus, affecting either one or both task adaptations[5-7].

Young individuals rarely just walk. They are frequently engaged in additional tasks, such as talking on a mobile phone, listening to music or texting messages. Emerging research evidenced the dangers of distracted walking and reduced situation awareness in pedestrians using Smartphone. Subjects may try to control foot placement and joint kinematics during cell phone use or another cognitive task with a visual component, to ensure sufficient dynamic margins of stability [8].

Use of cell phones is expanding every day; hence safety experts have started exploring the effect of such distractions while walking for commuter safety. Studies indicate a growing number of accidents and injuries while walking and using mobile phones simultaneously[9].

Therefore, task prioritization and its effect on gait while texting and walking are currently unknown. Plummer et suggested that although ill effects of messaging while driving have been proved to be fatal in many studies, safety risks associated with it on simple walking is yet to be explored [10].

These physical changes can occur in parallel with change in attention behaviors, such as; looking both ways when crossing the road and focusing attention on the oncoming traffic in particular among young adults. With this in mind, the aim of this study was to examine the effects of walking at different speeds while using a mobile phone on spatiotemporal stride parameters among young adults. A recent study showed that, for what concerns their frontal plane margin of stability, experienced texters are more affected by the physical than by the cognitive demand of texting. Subjects may try to control foot placement and joint kinematics during cell phone use or another cognitive task with a visual component, to ensure sufficient dynamic margins of stability[11].

METHODOLOGY

This was a cross sectional study done on 50 participants. The participants were recruited through convenience sampling. The assessment was done in physiotherapy

department of A.C.S Medical College and Hospital, Chennai. The study conducted for duration of two months.

Inclusion criteria: Smartphone users above 18 years of age, College students of Faculty of Physiotherapy, ACS Medical college campus, both male and female and who used touch screen cell phones at least 4 hours since last 6 month were selected for the study

Exclusion criteria: Subjects with Non Smartphone users, Unwilling participant are excluded, Psychosomatic disorders, Neurological, musculoskeletal for cognitive deficit that may affect walking abilities where are excluded with uncorrected refractive errors were excluded from the study.

Outcome measure: quantitative gait analysis from parameters of the gait.

Procedure: After taking ethics clearance college authorities and after explaining the study procedure and taking consent of participants they were screened. 8 meter walkway area was prepared in the A.C.S Medical College campus, Faculty of Physiotherapy Corridors. Which was free from visual or auditory distraction? The condition of walking was decided by chit method; Walking pattern, Walking while reading, Walking while texting were recorded.

The participants were asked to step in the chalk powder tray without wearing footwear and then walk on the floor. While reading, all subjects were given a common content. While texting common audio was played for all subjects. The subjects having spectacles where allowed to wear the specs during the study procedure.

The step length, stride length, and angle of toe out were measured. Following procedure was used for measurement.

Step length: the line was drawn perpendicular from the heel of one foot of same food and distance will be measured in centimeters. Stride length: the perpendicular was drawn the heel of the foot, and another perpendicular from the heel of the consecutive opposite extremity foot and the line was drawn and distance measured in centimeter. The degree of toe out: a line was drawn from the centre of the heel of one foot and second toe, and the angle is measured.

Data Interpretation

Data analysis was done using paired t-test on comparison of each parameter between only walking, walking and texting, walking and reading was done.

Variables	N	Minimum	Maximum	Mean	Std. Deviation	Skewness	
						Statistic	Std. Error
AGE	15	19.00	23.00	20.9333	1.38701	-.050	.580
Height	15	162.00	178.00	172.93	5.39	-.630	.427
Weight	15	56.00	78.00	64.53	6.48	.092	.427

Table – 1- Descriptive Statistics on Anthropometric Measures

#SL	STEP LENGTH		Df	t – TEST	Significance
	MEAN	S.D			
Walking	55.26	2.25	14	95.09	≤0.001***
Walking & Reading	52.80	1.97	14		≤0.001***
Walking & texting	44.73	.731	14		≤0.001***

Table-2 Comparison of Step Length Score between Different Variables

The above table reveals the Mean, Standard Deviation (S.D), t-test, degree of freedom (df) and p-value between variables.
This table shows that statistically highly significant difference in variables (***- P ≤ 0.001)

#Stride Length	Stride length		Df	T - test	Significance
	Mean	S.D			
Walking	118.20	2.65	14	103.73	≤0.001***
Walking & Reading	109.26	3.01	14		≤0.001***
Walking & texting	100.00	1.41	14		≤0.001***

Table 3 Comparison of Stride Length Score between Different Variables

The above table reveals the Mean, Standard Deviation (S.D), t-test, degree of freedom (df) and p-value between variables.

This table shows that statistically highly significant difference in variables (***- P ≤ 0.001)

#Doto	DOTO		Df	T - test	Significance
	Mean	S.D			
Walking	8.34	.169	14	94.62	≤0.001***
Walking & Reading	8.61	.102	14		≤0.001***
Walking & texting	9.02	.150	14		≤0.001***

Table 4 Comparison of Degree of Toe out Score between Different Variables

The above table reveals the Mean, Standard Deviation (S.D), t-test, degree of freedom (df) and p-value between variables. This table shows that statistically highly significant difference in variables (***- P ≤ 0.001)

RESULT

On comparing Step Length Score between walking (55.26 centimeters), walking and reading (52.80 centimeters) & walking and texting (44.73 centimeters) shows highly significant difference between variable mean values at P ≤ 0.001

On comparing Stride Length Score between walking (118.20 centimeters), walking and reading (109.26 centimeters) & walking and texting (100 centimeters) shows highly significant difference between variable mean values at P ≤ 0.001

On comparing degree of toe out Score between walking (8.34 degrees), walking and reading (8.61 degrees) & walking and texting (9.02 degrees) shows highly significant difference between variable mean values at P ≤ 0.001

DISCUSSION

Human locomotion requires a harmonious interaction between nervous system, musculoskeletal system and environment. Doing two tasks simultaneously causes competition for resources leading to the affected performance of one or both the tasks. Use of mobile phones while walking,crossing the road or stair climbing is a common activity nowadays; hence,the safety of such practice needs to be studied. Keeping in mind theory of capacity sharing, it was hypothesized that, either gait or response on a mobile phone would get compromised when both tasks are done simultaneously[12,13].

This study was planned to test the above-stated hypothesis. Gait involves complex mechanism, and at present, inexpensive, quantitative and reliable clinical methods of evaluating gait are limited. Temporal and spatial variables such as step length, step duration, stride length, cadence, and velocity provide essential quantitative information and are used ubiquitously in classic research of over 30 years[14].

The length of one stride includes all the phases of the gait cycle whereas step length is an indication of gait symmetry. The angle of toe out signifies base of support i.e. balance. Hence these parameters were included for assessment in this study. It was observed that stride and step length decreased and angle of toe out increased as per the complexity of task increased.

This suggests asymmetrical gait pattern, narrow BOS, small and closer steps and a compensatory increase in the angle of out to maintain balance while performing dual task of reading and texting while walking which is due to increased attention demand (see in table 1, 2, 3).

Phone dimensions, duration of use per day, duration of experience of mobile phone use, visual acuity practice of reading and texting while walking was not taken into account hence their influence on gait parameters cannot be commented[15,16].

To maintain uniformity, all assessments were done in a closed setting hence the effect of moving traffic; other distractions could not be simulated. Thus findings of this study may not

be generalized for daily walking conditions. A similar study can be replicated in community or an open environment to see the actual effect of changing the environment on these parameters [17,18].

Parameters similar to those observed at normal walking speed despite a slight increase in the perceived exertion. In the present study, the increase in walking speed was approximately 17% so it is possible that larger increases in walking speed would have resulted in significant changes in the computed spatiotemporal gait parameters [19- 21].

The task assigned to participants involved both “thinking” and “typing” while walking, as it happens in the everyday life use of a Smartphone. Walking-typing most probably increased the visuospatial attention load, while walking thinking allowed the participant to spend more time looking at the path instead of the display. This might explain the small velocity reduction observed [22,-24].

Results of this study also showed a similar phenomenon. Many other researchers also had similar observations which they attributed to alteration in gait kinetics and kinematics, increased attention demands and decrease in reaction time[25--27].

Ethical Clearance: Ethical clearance has obtained from Faculty of Physiotherapy, Dr. MGR. Educational and Research Institute, Chennai, Tamil Nadu, Reference number: No: E-42/ PHYSIO/ IRB/ 2019-2020, Dated: 29/01/2019.

Conflict of interest: There was no conflict of interest to conduct this study.

Fund for the study: It was a self-financed study.

CONCLUSION

Thus the study concluded that reading and texting and reading it will indicate that simultaneous can affect an individual’s gait performance adversely. It is maximally affected when attention demands are chal-lenged while do combination of walking with reading and texting.

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