



P-ISSN: 2394-1685
E-ISSN: 2394-1693
Impact Factor (ISRA): 5.38
IJPESH 2019; 6(1): 109-112
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www.kheljournal.com
Received: 19-11-2018
Accepted: 25-12-2018

Dr. Raghvendra Shukla
Teacher, Directorate of
Education, Govt. of NCT of
Delhi, Delhi, India

Dhananjay Shaw
Professor and HOD, DPES,
University of Delhi, New Delhi,
India

Corresponding Author:
Dhananjay Shaw
Professor and HOD, DPES,
University of Delhi, New Delhi,
India

A study on female and male in regard to selected gait variables while walking with fast speed

Dr. Raghvendra Shukla and Dhananjay Shaw

Abstract

A study conducted with the objective to comparison between female and male in regard to selected gait variables while walking with fast speed. The study was delimited to female and male subjects (N=75), age ranging from 17 to 25 years. The study delimited to selected spatio-temporal gait variables namely as Gait Line Length (mm), Contact Time (sec), First and Second Peak Force (N), First and Second Peak Pressure (N/cm²), First and Second Peak Force Time (ms), First and Second Peak Pressure Time (ms), Difference between Peak Force Time (ms), Difference between Peak Pressure Time (ms). The Data Recording and quantification were administered by Pressure Plate from Zebris with model FDM-S. Collected data were computed with mean, standard deviation and independent t-test. There was significant difference between female and male while walking with fast speed in regard to selected gait variables namely as Gait Line Length of Left and Right Foot(mm), Contact Time of Left and Right Foot (sec), First and Second Peak Force of Left and Right Foot (N), First and Second Peak Pressure of Left and Right Foot (N/cm²), First and Second Peak Force Time of Left and Right Foot (ms), First and Second Peak Pressure Time of Left and Right Foot (ms), Difference between Peak Force Time of Left and Right Foot (ms), Difference between Peak Pressure Time of Left and Right Foot (ms) at 0.05 level of significance. Out of selected 20 variables 08 variables are found significant. Hence, we can concluded that there was significant difference between female and male while walking with fast speed.

Keywords: gait, spatio-temporal

Introduction

Walking is one of the simplest ways to get active and stay active. With each step you take, you travel further down the path to a healthier lifestyle. Research has shown that walking can have a significant impact on your health by lowering your chances of heart disease. Learn more about the benefits of walking and how incorporating it more can lead to healthier living. It is a regular and simplest exercise of human beings. In the gait cycle involving steps and strides makes a complete gait cycle. A step is only one single step and a stride is a complete gait cycle. The step time is the time taken from one foot touching the floor to the other foot (Loudon, 2008). Gait means Locomotion. It is the way in which an individual ambulates (Morgan, 2012) ^[1].

Sandra J. Shultz (2005) ^[2] describes gait as, “someone’s manipulation or locomotion, involves the total body. Gait speed determines the contribution of each body segment. Normal walking speed primarily involves the lower extremities with the arms and trunk providing stability and balance. The faster the speed, the more the body depends on the upper extremities and trunk for propulsion as well as balance and stability. The legs continue to do the most work as the joints produce greater ranges of motion through greater muscle responses. In the bipedal system the three major joints of the lower body and pelvis work with each other as muscles and momentum move the body forward. The degree to which the body’s centre of gravity moves during forward translation defines efficiency. The body’s centre moves both side to side and up and down during gait” (Shultz, 2005) ^[2].

Gait is the walking pattern of an individual. Medical professionals can tell a lot about a person's variable like, neurologic, muscular and skeletal problems and health from their gait (Steiner, 2018) ^[3].

The common differences between female and male in regard to physical, musculoskeletal, body weight, height, number of anthropometric measurements as well as performance variables namely strength, power, endurance and speed.

Hence, it was hypothesized that there should be significant differences in selected gait variables between female and male while walking with fast speed. There is no comparative study on selected gait variable on Delhi population at the altitude of 214.42 m above sea level is available, hence the findings of the study will serve as basic reference for number of research and applications namely biomechanics, biomedical engineering, ergonomics, sports medicine industry and other multidisciplinary researches.

Methodology

For the purpose of the study 75 (37 females and 38 males) subjects were randomly selected (age ranged from 17 to 25 years) from Indra Gandhi Institute of Physical Education and Sports Sciences (University of Delhi), B-block, Vikaspuri, New Delhi-110018. The subjects were explained about the

research, objectives and benefit of the research and also motivated to put their best as per their consent.

Testing Protocol

In the biomechanics Laboratory (Indira Gandhi Institute of Physical Education and Sports Sciences, University of Delhi, B-Block, Vikaspuri, New Delhi-110018) the Zebris FDM-S pressure plate was used for the purpose of the study. A length of area for gait measurement was used for the study was Ten meters (Fig: 1). The walking area had marked at six meters. Three meters on each side from the pressure plate. The free open area of two meters had been given to the subject on each side after the walking area. The subject was taught to walk at fast speed as per the pace of the subject. Three trials was taken from each subject.

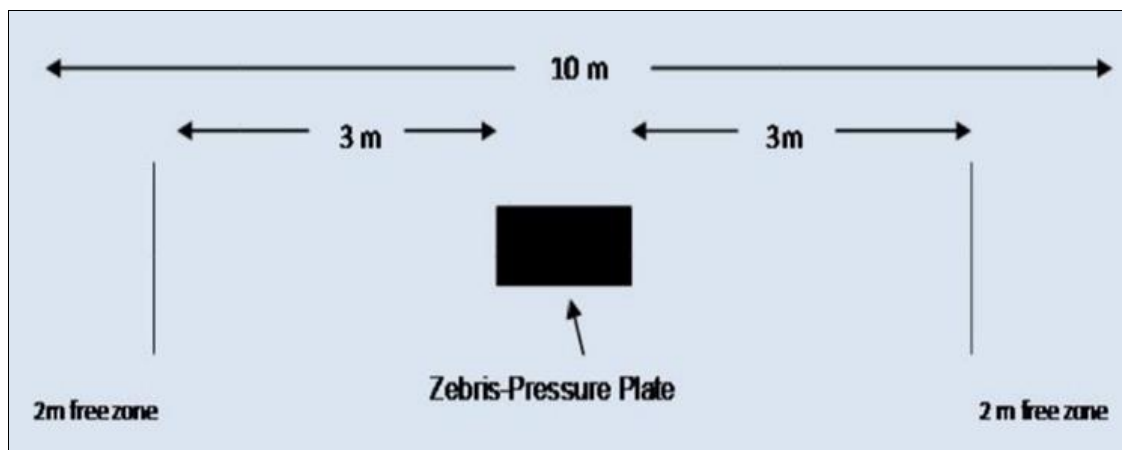


Fig 1: Pressure Plate Recording Protocol

Statistical Procedure

The data obtained was analyzed by using the following statistics:-

Mean, Standard Deviation, Independent t-test of large sample

was computed for comparing between male and female in regard to the selected spatio-temporal variables and walking gait variables at fast speed. The level of significance chosen was 0.05 for testing the hypothesis.

Table 1: Selected Gait Variables

S. No	Abbreviations	Variables
1	GLLL	Gait Line Length of Left Foot
2	GLLR	Gait Line Length of Right Foot
3	CTL	Contact Time of Left Foot
4	CTR	Contact Time of Right Foot
5	FPFL	First Peak Force of Left Foot
6	SPFL	Second Peak Force of Left Foot
7	FPFR	First Peak Force of Right Foot
8	SPFR	Second Peak Force of Right Foot
9	FPPL	First Peak Pressure of Left Foot
10	SPPL	Second Peak Pressure of Left Foot
11	FPPR	First Peak Pressure of Right Foot
12	SPPR	Second Peak Pressure of Right Foot
13	FPFTL	First Peak Force Time of Left Foot
14	SPFTL	Second Peak Force Time of Left Foot
15	FPFTR	First Peak Force Time of Right Foot
16	SPFTR	Second Peak Force Time of Right Foot
17	FPPTL	First Peak Pressure Time of Left Foot
18	SPPTL	Second Peak Pressure Time of Left Foot
19	FPPTR	First Peak Pressure Time of Right Foot
20	SPPTR	Second Peak Pressure Time of Right Foot

Results**Table 2:** Comparison Between Female and Male in Regard to Selected Gait Variables at Fast Speed

Variables	Code	N	Mean (mm)	Std. Deviation	F	Sig.	V	T
GLLL	Female	37	200.6827	14.44543	2.28	.136	1	-6.178*
	Male	38	224.6024	18.74838			2	-6.199
GLLR	Female	37	201.3451	15.23435	.010	.921	1	-8.008*
	Male	38	229.5729	15.28810			2	-8.009
CTL	Female	37	.5589	.06467	.026*	.873	1	.114(NS)
	Male	38	.5574	.05228			2	.114
CTR	Female	37	.5511	.06231	.204	.653	1	-.998(NS)
	Male	38	.5645	.05371			2	-.996
FPFL	Female	37	662.5981	103.52658	8.819	.004	1	-7.158
	Male	38	887.8608	161.88445			2	-7.198*
SPFL	Female	37	619.4543	92.09326	2.396	.126	1	-6.092*
	Male	38	778.0258	129.64276			2	-6.119
FPFR	Female	37	658.4711	100.73230	9.134	.003	1	-7.322
	Male	38	877.5961	152.50431			2	-7.360*
SPFR	Female	37	607.2692	101.64599	3.296	.074	1	-6.162*
	Male	38	777.9303	135.32838			2	-6.186
FPPL	Female	37	40.1705	9.25407	.974	.327	1	-.422(NS)
	Male	38	41.2189	12.02829			2	-.424
SPPL	Female	37	39.8786	7.65525	.140	.709	1	.265(NS)
	Male	38	39.3768	8.70482			2	.265
FPPR	Female	37	38.6622	9.07611	2.554	.114	1	-1.100(NS)
	Male	38	41.2937	11.46755			2	-1.103
SPPR	Female	37	40.1938	9.93412	.640	.426	1	.537(NS)
	Male	38	39.0303	8.82503			2	.536
FPFTL	Female	37	122.43	23.735	.043	.837	1	-1.003(NS)
	Male	38	127.63	21.109			2	-1.001
SPFTL	Female	37	401.62	46.279	.588	.446	1	-1.421(NS)
	Male	38	415.53	38.181			2	-1.417
FPFTR	Female	37	127.84	23.468	.041	.840	1	.642(NS)
	Male	38	124.47	21.896			2	.641
SPFTR	Female	37	413.78	50.352	1.203	.276	1	-.622(NS)
	Male	38	420.26	39.283			2	-.620
FPPTL	Female	37	41.35	43.853	3.852	.053	1	.699(NS)
	Male	38	35.26	30.557			2	.696
SPPTL	Female	37	428.38	48.621	.104	.748	1	-.747(NS)
	Male	38	436.58	46.457			2	-.746
FPPTR	Female	37	38.11	28.562	4.700	.033	1	-1.405
	Male	38	58.42	83.262			2	-1.421(NS)
SPPTR	Female	37	437.30	53.627	.123	.726	1	-.436(NS)
	Male	38	442.37	46.872			2	-.436

*Significant at .05 level, NS = Not Significant at .05 level

1= Equal Variances Assumed, 2= Equal Variances Not Assumed

N= Sample Size, 'F'= F-Ratio, t= t ratio

Summary and Findings

There was significant difference between female and male in regard to variables namely GLLL ($t = -6.178$), GLLR ($t = -8.008$), FPFL ($t = -7.198$), SPFL ($t = -6.092$), FPFR ($t = -7.360$), SPFR ($t = -6.162$) at 0.05 level. Rest of the variables namely as CTL ($t = .114$), CTR ($t = .998$), FPPL ($t = -.422$), SPPL ($t = .265$), FPPR ($t = 1.100$), SPPR ($t = .537$), FPFTL ($t = 1.003$), SPFTL ($t = -1.421$), FPFTR ($t = .642$), SPFTR ($t = -.622$), FPPTL ($t = .699$), SPPTL ($t = -.747$), FPPTR ($t = 1.421$) and SPPTR ($t = -.436$) were not found to be statistically significant at 0.05 level of significance.

Discussion of Findings

Findings in regard to Gait Line Length of Left Foot (GLLL) and Gait Line Length of Right Foot (GLLR) are related to Foot Length. The male having longer foot length as compare to female.

Findings in regard to First Peak Force of Left Foot (FPFL), Second Peak Force of Left Foot (SPFL), First Peak Force of

Right Foot (FPFR) and Second Peak Force of Right Foot (SPFR) are related to the height, weight, speed and power. The male having dominant force over the female in all these variables.

The foot surface area of male is higher at same time force parameter are also higher. Pressure defined as force/area of foot and that could be the reason of insignificant difference between female and male subjects in regard to First Peak Pressure of Left Foot (FPPL), First Peak Pressure of Right Foot (FPPR), Second Peak Pressure of Left Foot (SPPL), Second Peak Pressure of Right Foot (SPPR), the timing variables namely as First Peak Force Time of Left Foot (FPFTL), Second Peak Force Time of Left Foot (SPFTL), First Peak Force Time of Right Foot (FPFTR), Second Peak Force Time of Right Foot (SPFTR), First Peak Pressure Time of Left Foot (FPPTL), Second Peak Pressure Time of Left Foot (SPPTL), First Peak Pressure Time of Right Foot (FPPTR) and Second Peak Pressure Time of Right Foot (SPPTR) found to be non significant difference between

female and male. The attributing factors are counter related compensatory force production to accomplished the task, which are poor in female than that of male in regard to the above mentioned variables there is great research gap.

References

1. Morgan T. Biomechanics and Theories of Human Gait. 2012 Mar 28. Retrieved from [cdn2.hubspot.net:https://cdn2.hubspot.net/hub/52884/file/5411457pdf/docs/morgan.2012.pdf](https://cdn2.hubspot.net/hub/52884/file/5411457pdf/docs/morgan.2012.pdf)
2. Shultz SJ, *et al.* Examination of Musculoskeletal Injuries. 2nd ed, North Carolina: Human Kinetics, 2005, 55-60.
3. Steiner S. What is Gait? - Definition, Types, Analysis and Abnormalities. 2018 Feb 27. Retrieved from [www.study.com: https://www.study.com/academy/lesson/what-is-gait-definition-types-analysis-abnormalities.html](https://www.study.com/academy/lesson/what-is-gait-definition-types-analysis-abnormalities.html)
4. Walking, take the first Step. 2018 Mar 03. Retrieved from <http://www.heart.org>: http://www.heart.org/HEARTORG/HealthyLiving/PhysicalActivity/Walking/Walking_UCM_460870_SubHomePage.jsp
5. Shalini SS. A Study on the Effect of Step Aerobic Training on Selected Ground Reaction Force Variables of Female: A thesis in Physical Education (Doctoral, s Thesis). University of Delhi, Delhi, India, 2010.
6. Shephard RJ. Fitness of a Nation: Lessons from the Canada Fitness Survey. Basel: S Karger, 1986.
7. Smith SF, Smith CM. Personal Health Choices. Boston: Jones and Barlett Publishers, inc, 1990.
8. Assessing Physical Fitness and Activity in General Population Studies, T. F. Drury (Ed.). Washington, DC: U.S. Public Health Service, National Center for Health Statistics, 1988, 107-140.
9. Bacon C, Myers T, Karageorghis CI. Effect of Movement-Music Synchrony and Tempo on Exercise Oxygen Consumption. Manuscript Submitted for Publication, 2008.
10. Francis P, Carley J, Kolen P. The Effect of Platform Height on Knee Joint Kinematics and Vertical Ground Reaction Forces in Step Training. San Diego University Biomechanics Laboratory. Awaiting Publication, 2008.
11. Haskell WL, Montoye HJ, Orenstein D. Physical Activity and Exercise to Achieve Health Related Physical Fitness Components. Public Health Reports. 1987;100:202-21.
12. Newton SJ, Zebas CJ, Schroeder JM, Crussemeyer JA. Rearfoot Motion of the Basic Step and Backward Lunge at Different Step Heights. American College of Sports Medicine. 2003 National Convention. San Francisco, CA. 2003 May 29.