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TO STUDY THE EVALUATION OF STRIDE LENGTH ACCORDING TO BMI IN NORMAL HEALTHY FEMALES

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ABSTRACT

Introduction: Locomotion may be described as a translatory progression of the body as a whole, According to traditionally terminology: gait has divided into two phases, Stance phase & swing phase. **Materials & Methods:** 60 subjects were taken on the basis of inclusion & exclusion criteria. After obtaining written informed consent, the subjects were divided among four groups. Group A, Group B, Group C and Group D of 60 subjects in each. Stride length was measured using puddle of water, foot pathway, marker. Anthropometric parameters (Height, weight) were too calculated on 4 groups. **Conclusion:** The data and the results showed that there was gradual decrease in the stride length with the increase in BMI.

KEYWORDS: BMI, COG, Gait Terminology, Foot mounted microgyroscopes & A step Sensor.

INTRODUCTION

Locomotion may be described as a translatory progression of the body as a whole, produced by coordinated and rotatory movements of body segments. Normal gait is rhythmic and characterized by alternating propulsive and retropulsive motions of the lower extremities (Steindler et al., 1995).

Margareta et al., 1994 also stated that gait is a functional task requiring complex interactions and coordination among most of the major joints of the body, particularly of the lower extremities.

THE MOST COMMON GAIT TERMINOLOGY (Winter, 1991).

Table 1: The most common gait terminology.

TRADITIONAL	RLA (Rancho los amigos)
Heel strike	Initial contact
Heel strike to Foot flat	Loading response
Midstance to Heel off	Terminal stance
Heel off to Toe off	Terminal stance
Toe off to Acceleration	Initial swing
Acceleration to midswing	Midswing
Midswing to Deaceleration	Terminal swing

During one gait cycle, each extremity passes through 2 major phases i.e Stance phase and Swing phase. During stance phase, some part of the foot is in contact with the floor, which makes up about 60% of the gait cycle & in case of swing phase the foot is not in contact with the floor, which makes up the remaining 40%. At a normal walking speed, each period of double support occupies about 11% of the gait cycle, which makes a total of approximately 22% for a full cycle. The body is thus supported by only 1 limb for nearby 80% of the cycle. The approximate value of 10% for each double support phase is usually used. (Lamoreaux, 1971). There are two parameters, six variables of temporal parameters & four variables of spatial parameters (Oberg et al., 1993).

According to Oberg et al., 1994 stated that the Support phase which is a component of stride length are the horizontal distance that the toe of the lead foot is forward of the COG at the instant the sprinter lands & the drive phase is a horizontal distance that the COG is forward of the take off foot, at the instant the latter leaves the ground. Flight phase which is the last component of stride length is laso a horizontal distance that the COF travels while the runner is in the air.

PURPOSES OF STRIDE LENGTH ANALYSIS

- Obtaining the accurate descriptions of gait patterns and gait variables typical of different conditions.
- Determing the balance, endurance and energy expenditure.
- Predicting a patient ‘future safety’.
- Identifying and describing gait deviations.
- Describing the differences between a “patient performance” and the parameters of normal gait (Blazevich and Black, 2007).

Table 2: Normal Stride length.

Values of NORMAL Stride Length	Males	Females
	158cm	132cm

Materials used

- Puddle of water, foot pathway & marker
- Instructed the subject to pour the feet inside the puddle of water until the feet are wet
- Subject was asked to walk normally on the foot pathway
- Measured the stride length from the heel strike of one foot to the heel strike of other foot (Clayton, 2001).
- I have used the above shown method, but The other researchers used the different methods for measured the stride length, like footprints method, foot mounted micro gyroscopes and a Step sensor (Allard et al; 1995).

In women stride length increased as compared to men because women walk with higher cadence and shorter strides (Pamela and Cynthia, 2006). Women had significant increased in joint angles as gait speed decreased. e.g knee angle at midstance increased from 15 degree to 24 degree in men and from 12 to 20 degree in women (Oberg et al., 1994). Kerrigan et al., 1998 stated that stride length were significantly slower in elderly person as compared to young adults Elderly people reduced stride length which increases in significant increase in stance time, which is consistent with attempting to increase stability (Winter, 1991).

During running increased 91% to 17.8kmh-1, stride frequency increased only 10% to 176/minute whereas stride length increased 83% to 168cm. American physical therapy association observed that obese person have greater stride length as compared to non-obese person & the elderly women have longer stride length, ankle ROM, pelvic obliquity, walking velocity. Obese person have greater stride length as compared to non-obese person (Browning et al., 2006).

RESEARCH METHODOLOGY

Type of study

The study was comparative in nature

Sample size

60 subjects

Duration of study

Total duration of the study was 4-5 months.

Inclusion criteria

Females between the ages of 18-25 years were taken.

Exclusion criteria

- Flat foot
- Any musculoskeletal injuries affecting the knee and ankle
- Any neurological disorders.

Procedure- 60 subjects were taken on the basis of inclusion and exclusion criteria. After taking written informed consent, the subjects were statistically divided into groups. The groups divided according to BMI range. Subjects divided into four groups named Group A, Group B and Group C, Group D of 15 subject each. Group A comprised of normal group, Group B comprised of mild to severe underweight and Group C comprised of preobese, Group D comprised of obese class 1.

Materials used

- Puddle of water, foot pathway, marker
- Instructed the subject to pour the feet inside the puddle of water until the feet are wet
- Subject was asked to walk normally on the foot pathway
- Measured the stride length from the heel strike of one foot to the heel strike of other foot (Clayton, 2001).
- It has been taken 15 minutes. Mean and Standard deviations were calculated. The result is indicated as a point on the graph.

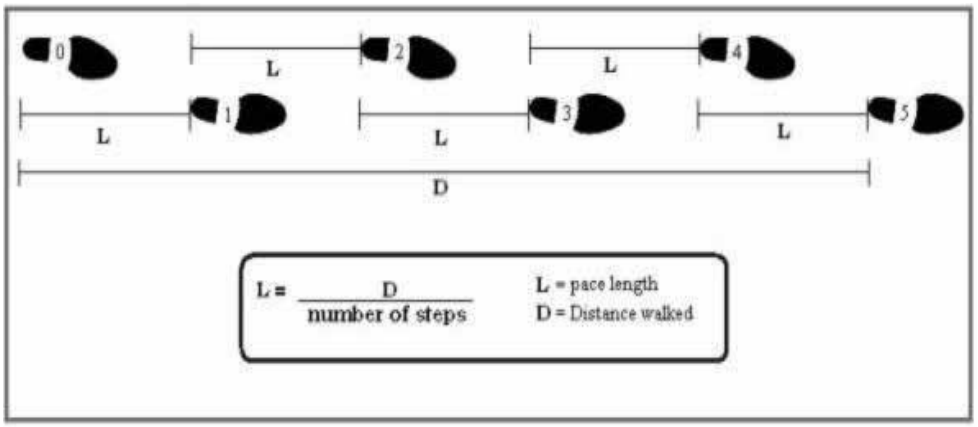


Figure 1: Measurements of stride length.

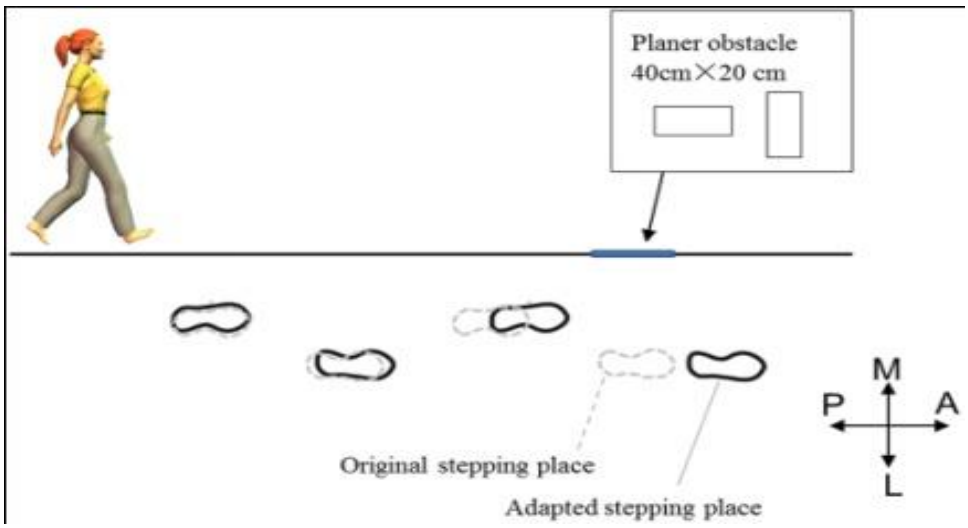


Figure 2: Measurements of stride length.

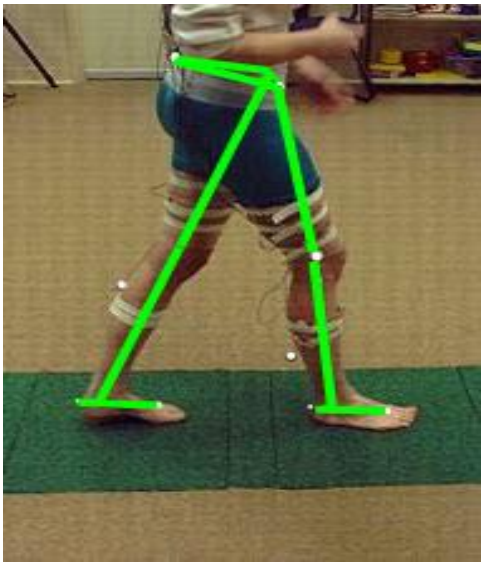
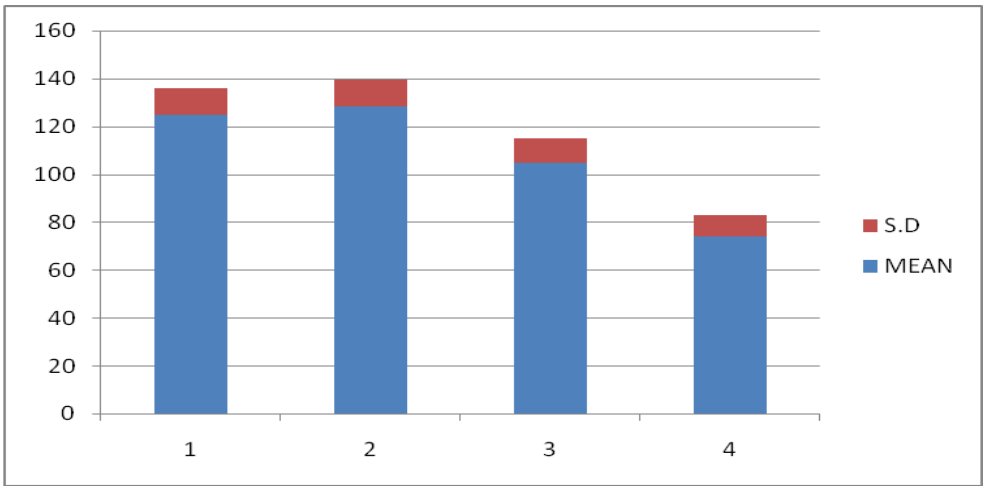


Figure 3: Measurements of stride length.

RESULT ANALYSIS

VARIATIONS OF STRIDE LENGTH ACCORDING TO BMI			
NORMAL RANGE	**MILD TO SEVERE UNDERWEIGHT**	**PREOBESE**	**OBESE CLASS 1**
161 cm	126.5 cm	111.5 cm	76 cm
112 cm	140 cm	100 cm	68 cm
96.5 cm	135.5 cm	113 cm	70 cm
132 cm	136 cm	123 cm	100 cm
113 cm	131 cm	110.5 cm	65 cm
97 cm	130 cm	111 cm	75 cm
159 cm	151 cm	106 cm	62 cm
161 cm	145 cm	109 cm	50 cm
107 cm	115 cm	80 cm	59 cm
130 cm	130 cm	70 cm	70 cm
153 cm	106 cm	92 cm	86 cm
114.5 cm	108 cm	109 cm	90 cm
113.5 cm	120 cm	120 cm	72 cm
90 cm	120 cm	115 cm	80 cm
131 cm	130 cm	102 cm	70 cm

MEAN	S.D
127.7	11.1
128.2	11.3
104.8	10.2
74.1	8.6



DISCUSSION

According to Park, 2013 stated that a people walk with the help of walker have shorter gait velocity, stride length & stride time than those of normal people. It was also shown that the kinematic parameter such as hip extension, knee extension, ankle flexion & ankle extension of walker dependent gait or knee pain group were decreased because a walker dependent people use more hip extension for firing of the central pattern generator neurons which are responsible for consistent stepping during gait.

In case of sprint runners increases maximum to maximum step rate but step length remains the same or decrease slightly (Hunter et al., 2003).

Alexander and Goldspink, 1977 shown that stride rate reach its maximum after a few steps & stride length increases over a longer distance which is the main key point in developing high running velocities.

If fast running occurs by sprint runners, the parameters like step length & step rate increases with increase speed of runners because the athletes have to complete their fastest trail when compared to other persons (Hunter et al., 2003).

According to Forhan and Simone, 2013 observed that Obesity persons are more prone for mobility disability disorders which include all musculoskeletal, neurological, psychological & environmental factors. So, to avoid these problems, the functional mobility strategies are used like postural control or various motor planning techniques. But a more emphasis on Cardiovascular training like treadmill walking, plyometrics, Stair climbing etc.

In the present study, the total mean & SD as in normal group was 127.7±11.1 or in other three groups (Group B, C & D) the mean & SD were 128.2±11.3, 104.8±10.2 and 74.1±8.6 respectively. As the increased body weight leads to decreased spatial parameters than the normal range.

CONCLUSION

The data & the results showed that there was gradual decrease in the stride length with the increase in BMI. Further studies with larger sample size are required to establish the finding.

REFERENCES

1. Alexander, R.MC.N. and Goldspink, G., Mechanics and energetics of animal locomotion, *London: Chapman & Hall*, 1977; 146-148.
2. Allard, P, Blanchi, J.P, Aissaoui, R. and Allard, I.A., Basics of three dimensional reconstruction, *journal of american physical therapy association*, 1995; 63: 19-40.
3. Blazevich, A and Black, A.C., Sports biomechnics, *Journal of physical therapy*, 2007; 29: 20-21.
4. Clayton, M., Creative Walking, 2001; 10: 1-4.
5. Hunter, J.P, Robert, N.M. and Peter, J.M., Interaction of step length and step rate during sprint running, *Applied sciences biodynamics*, 2004; 36(2): 261-271.
6. Lamoreaux, L.M., Kinematic measurements in the study of human walking, *prosthet res*, 1971; 69: 3-12.
7. Margaret, N, Victor, H. And Frankel, H., Basic mechanics of musculoskeletal system, 1994; 3rd edition: 439-445.
8. Marina, A, Yakin, M.A, Gooden, A.S .and David, S., Basics gait parameters, 1982; 14: 5-8.
9. Mary, F and Gill, S.V., Obesity, functional mobility and quality of life, *Best practice & research clinical endocrinology & metabolism*, 2013; 27: 129-137.
10. Oberg T, Karsznia A. And Oberg, K., Joint angle parameters in gait reference data for normal subjects between the ages of 10-79 years of age, *J Rehabil Res Dev*, 1994; 31; 199-215.
11. Oberg T, karznia, A. And Oberg, K., Basic gait parameters, *J Orthop Res*, 1993; 8; 383-389.
12. Pamela, K. L and Cynthia, C. N., Joint structure & function, 2006; 4th edition: 560-561.
13. Park, S., Acomparision of gait characteristics in the elderly people, people with knee pain & people who are walker dependent people, *Department of physical medicine & rehabilitation, Kennyung university, Jphys Ther Science*, 2013; 25: 973-976.
14. Steindler, A, Springfield, I.L. and Charles, C.T., Kinesiology, 1995; 30: 183-184.
15. Viel, E, Maure, S, Humana, L.A. and Salto, L.A., Foot print analysis in gait documentation an instructional shhet format, journal of americal physical therapy association, 2002; 60: 75-99.
16. Winter, D.A., The biomechanics and motor control of human gait, normal elderly and pathological, 1991; 2nd edition: 1153-1154.