

## The Relationship Between Leg Length And Stride Length In Students Of The Medical Faculty Of General Achmad Yani University

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### ARTICLE INFO

### ABSTRACT

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The foot is one part of the body that functions in the locomotion process, one of which is walking. Walking is a form of movement in which the centre of gravity of the body moves alternately on the right and left sides of the foot when touching the floor. Walking can be influenced by anatomical and physiological factors. The process of walking can be observed so that it can assess abnormalities in walking in a person that can interfere with activities. This study aims to determine the relationship between foot length and stride length. This study used a cross-sectional design with 60 adult subjects. The parameters measured were leg length, which is the distance drawn from the calcanea tuberosity to the tip of the longest finger, and stride length, which is the distance between the foot that makes initial contact with the other foot during the walking process. The subjects were selected by consecutive sampling. The data were analysed with Pearson correlation. The measurement results of the mean foot length in this study were 26 cm, and the mean stride length was 79.02 cm. The results of this study showed a strong and significant correlation between foot length and stride length. These results indicate that the longer the foot, the more it will help propel the foot when toeing off, so that the stride is longer.

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### 1. INTRODUCTION

The foot is one part of the lower extremity that has the function of supporting the body's weight and maintaining body balance when standing or walking ([1];[2]).The foot is a strong and complex mechanical structure and consists of many muscles, tendons, and ligaments. It is composed of 26 bones and has 33 joints ([2];[3]). Functionally, the foot is divided into three functional areas, namely the forefoot, midfoot, and hindfoot. In accordance with the development of the feet, the age of bone maturation and rigidity of muscles and ligaments varies from 10 to 17 years, so that the walking process for each individual is more stable ([4];[5];[6]). Walking is included in routine physical activity. Walking is one of the locomotor movements on the ground in which the body's centre of gravity moves alternately on the right and left sides of the body at any time. Everyone has characteristics when walking. Health problems are also often related to how a person walks, especially in the elderly. The process of walking can be used to assess its quantity.

The results of measuring leg length and anthropometric measurements have a contributing effect of 10-37% on gait parameters (walking), but when walking speed is included the results increase to 45-77% [7]. Walking also has a positive and significant correlation to several parts of the athlete's body, which include leg width, torso length, arm length, hip width, leg length, and shoulder width, with the movement, stride length, and running speed of the subject as assessed by the results of long-distance running [8]. And there is a correlation between the anthropometry of the lower limbs, namely the thighs, legs, and feet, and the temporal and spatial parameters of gait, and there is a large influence of gender on the research results [8].

The process of walking can be measured by several temporal and spatial parameters, one of which is the length of the step. initial contact (stride length) ([9];[10]).Step length is a common method used for gait analysis, medical rehabilitation, sports training and in the use of the Pedestrian Navigation System ([10];[11];[12]). Leg length and stride length have different characteristics and

depend on the process of bone formation, gender, age, BMI (body mass index), geographical differences, and racial differences of each individual ([13];[9];[10];[11];[12];[14]).

Several previous studies ([15];[16];[17]) stated that there is a relationship between the anthropometry of up and down motion and several gait temporal and spatial parameters, but there has been no specific research regarding the relationship between leg length and stride length. Therefore, this study aims to see the relationship between foot length and stride length as measured by step length so that it can be used as a screening tool in sports that require steps in the process and pay attention to nutrition when the feet are still in the growth process.

## 2. METHOD

This research is anatomical, measuring foot length and stride length. The research was conducted at the Faculty of Medicine, General Achmad Yani Cimahi. It was carried out in January 2020. This research was a cross-sectional study using a purposive sampling method with a total of 60 respondents. Respondent criteria were 18–21 years old with a normal BMI and no history of musculoskeletal disorders that could affect right lower limb movement. and left, and do not use assistive devices while standing or walking. Padjadjaran University Health Research Ethics was published on July 16, 2019 with number 942/UN6.KEP/EC/2019. ISO foot length measurement is measured from the heel (tuberosity calcane) to the tip of the big toe (hallux) or to the tip of the index finger if the length exceeds the big toe. The measurement of stride length in this study was carried out by a walk test based on the EBSCO procedure, asking research subjects to walk in a marked area. The subject is then asked to walk 3 steps before the start sign and stop after passing the finish mark to eliminate the acceleration and deceleration components that occur at the beginning and end of the walk. Average calculation

## 3. RESULTS AND DISCUSSION

The research on the relationship between leg length and stride length was carried out on 60 students at the Unjani Faculty of Medicine. Descriptive data on the characteristics of respondents is in Table 1. Step length can be seen in Table 4.

**Table 1. Characteristics of Respondents Based on Age**

Age	Statistical Measures			
	Total	Percentage (%)	Average Age (Years)	Standard Deviation (Years)
19	3	5	20,53	0,596
20	22	36,7		
21	35	58,3		

**Table 2 Mean Leg Length**

Variable	Statistical Measures					P-value*
	Total	Average (cm)	Standard Deviation (cm)	Centre Value (cm)	Range (cm)	
Leg Length	60	26	0,98	26	24,30-28	0,200

**Table 3. Average Step Length**

Variable	Statistical Measures				P-value*
	Average (cm)	Standard Deviation (cm)	Centre Value (cm)	Range (cm)	
Step Length	79,02	6,29	78	65-95	0,097

**Table 4. Relationship between Leg Length and Stride Length**

Variable	Step Length		
	Correlation Coefficient (r)	Sig (2-tailed)	N
Leg Length	0,83	0,000	60

## Discussion

At 18 years of age in females and 21 years of age in males epiphyseal fusion of the bone occurs progressively and stops at this age [18]. This is expected to get actual results. Based on the results of the study, the average length of the foot was 26 cm. Measurements were taken on both legs, namely the right leg and left leg. The length of the legs varies, this is due to various factors such as age, gender, race, genetics, and nutrition of each individual. This can affect the process of forming the human skeleton, one of which is the foot and this process develops from conception to bone maturity at the age of 18 years in women and 21 years in men ([18]; [19]).

The average result of Step Length is 79.02 cm with a range ranging from 65 cm to 95 cm. This average result is almost the same as research from Nurcahyo.A in Surabaya in 2015 with an average step length of male subjects of  $1099.32 \pm 24.07$  mm.<sup>13</sup> Step length can be influenced by age. With increasing age the intrinsic and extrinsic muscle strength that plays a role in the walking process will decrease, if muscle strength decreases it will also affect the range of motion (ROM). This can lead to a decrease in step length 5% shorter ([2]; [13]; [9]; [10]; [12]).

Based on the results of this study, there is a strong correlation between foot length and step length. The correlation value between step length and foot length of 0.835 shows that r is greater than 0.75, which indicates a very strong relationship between the 2 variables. The results of this study can show that the longer the foot, the better the propulsion of the foot during the toe-off process during the fulcrum phase, so that the steps are longer. The greater the length of the foot, the easier it will be to move the center of gravity forward during the stance phase and reduce plantar flexion so as to reduce ankle activity in terminal stance, which causes longer steps [20]

## 4. CONCLUSION

Based on the results of the research on the relationship between foot length and stride length, it can be concluded that there is a strong and significant relationship between leg length and stride length. Based on this research, the longer a person's legs, the longer the steps will be.

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