

Research Paper :

## Study of correlation of leg length with stride length in middle-distance running

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Received : February, 2011; Accepted : March, 2011

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### ABSTRACT

From the results of the study under the present conditions, it can be concluded that leg length and stride length are significantly correlated, thus accepting the hypothesis proposed by the research scholar successfully. It indicates that the middle-distance runners with greater leg length may be at advantage by having greater stride length. Thus, they can perform better than those with lesser leg length.

Topare, Shirish V. and Asanare, Avinash M. (2011). Study of correlation of leg length with stride length in middle-distance running. *Internat. J. Phy. Edu.*, 4(1) : 73-76.

**Key words :** Leg length, Stride length, Middle-distance running

During the last 50 years the world has seen athletic performance rising very steeply. Almost everyday new performances, records are being created in sports like swimming, diving, athletics, not because human potential has suddenly increased but because principles of biomechanics, biodynamics are being exploited in the training of athletes right from the very beginning. Performance variables are being constantly studied under the controlled and field conditions very carefully by using scientific technology. Today no athletic effort fructifies without scientific backup.

Thus, nowadays best athletes are those who know how to use science and technology on day to day basis. Sport training today is perhaps most complicated task. Running is a vigorous conditioner for most of body's largest and most powerful muscles.

The 800m is far more challenging race because of the speed involved. It is almost sprint. For efficient running, the athlete must possess natural speed in abundance, but their high level success is based on the development of perfect mechanical form. In order to deliver maximum driving force, remaining in balance and avoiding tension. According to Ken Brauman, (1986) the horizontal speed of running is made up of mainly two components: the leg speed and the stride length. Improvement in either will increase speed as long as one is not improved at the expense of others.

In addition to increasing stride length, improvement in speed can come through improvement in the level of

maximum speed, endurance, acceleration ability and reaction time. The length of stride generally ranges from 7 feet to 8½ feet. Stride length can be measured by dividing total distance with number of strides.

The speed at which the athlete runs is equal to the product of two factors: stride length and stride frequency. The large angle of thighs, legs, flexible hip joints, and a high bent knee action of the free leg all of which produce optimum stride length to bring the body in a correctly balanced position for next leg drive. A stride length is greater in toe to toe contact than in toe-take off to heel landing.

Anthropometry is the measure of woman (anthro=man, pometry=measure). The study of anthropometry is the study of human body measurements to assist in understanding human physical variations and aid in anthropological classification. Anthropometry plays vital role in determining athletic potential of any athlete. Anthropometric variables significantly influence the performance capacity of any athlete (Thani, 1995).

### Purpose of the study:

The present study was undertaken to study the correlation of leg length with stride length in middle-distance running *i.e.* how leg length influences the length of strides and ultimately the running speed of athletes.

### Significance of the study:

Much less work has been done in the past regarding

the correlation of leg length with stride length, thus this study will try to investigate the effect of variation in leg length on stride length. This would give experimental evidences on the specific role of leg length in improving athletic performance. Many people like coaches, athletes and forthcoming research scholars may get benefited from this study.

### Hypothesis:

It has been hypothesized that, there will be significant correlation between leg length and stride length in middle-distance running.

### Delimitations:

- Total 60 subjects were selected.
- Only male subjects were selected.
- The subjects were from age group between 18 to 24 years.

### Limitations:

- There was no control on socio-economic status of subjects.
- The subjects were selected randomly.
- There was no control on diet, rest and daily life activities of subjects.

### Definition of terms:

Stride length:

Stride length is defined as the distance between the mark made by the nail nearest to the toe of the running shoe on the track of one leg and that of the other leg in the process of running.

Leg length:

The distance between hip joint to the level of ground in standing position.

## METHODOLOGY

### Selection of subjects:

The researchers have collected data on field. For this, the researchers have selected students from their own college by using random sampling method.

The subjects were 60 male students (Appendix-A). The subjects were good enough to be expected to represent the college in different sports and games. The students ranged in age from 18 years to 24 years. The subjects were healthy without any health problems.

### Description of test procedure:

The length of stride was the criterion measure in this study. For this, the procedure adopted are mentioned

Appendix – A					
Sr. No.	Leg length	Stride length	Sr. No.	Leg length	Stride length
1.	83	176	31	84	177
2.	84	175	32	90	187
3.	82	177	33	84	175
4.	85	175	34	87	186
5.	87	178	35	82	178
6.	88	180	36	82	179
7.	84	181	37	84	177
8.	90	185	38	84	179
9.	86	178	39	84	181
10.	84	179	40	84	179
11.	87	183	41	92	187
12.	82	175	42	84	175
13.	82	178	43	84	176
14.	84	179	44	84	175
15.	84	180	45	87	186
16.	84	177	46	84	177
17.	84	175	47	91	187
18.	92	186	48	84	178
19.	84	179	49	87	179
20.	86	183	50	82	176
21.	84	176	51	84	179
22.	87	181	52	84	178
23.	84	180	53	87	186
24.	91	188	54	84	178
25.	84	180	55	84	179
26.	87	186	56	84	180
27.	82	176	57	88	186
28.	82	178	58	87	186
29.	89	187	59	82	176
30.	84	176	60	82	175

below:

The front edge of foot print of running shoe nearest to the toe of running shoe of the left leg with that nearest to the toe of running shoe of right leg was taken as a Left-Right stride. A similar procedure was adopted in measuring the Right-Left stride. The average of four consecutive strides has been considered as the maximum stride length. Thus, the average of four consecutive strides after reaching a distance of 740 m. was considered as “Stride Length” in this study because in middle-distance running fairly steady pace is maintained throughout the race but much of them end with fast sprint.

While runner attains the maximum speed along the proper striding, the R-L strides did not differ statistically from L-R strides. Hence, the average of all the four strides was taken as the criterion measure.

### Procedure of administering the test:

The leg lengths of the subjects were measured by

using steel tape graduated in centimeters and meters. The leg lengths were measured before the measurement of stride lengths of the subjects. The distance between the hip joint of subject to the ground level in standing position was considered as leg length.

For the administration of test and for collection of data delivered by subjects, the permanent track of the college was used by researcher. Two lanes *i.e.* first and second, 1.22m in width were marked on the track of 400m of the college. A stagger in the second lane was given at 14.08m from starting line. A line was drawn across these lanes at a distance of 740m from the starting line at which runner is said to achieve his maximum speed and hence strides become approximately even. Both the lanes were thoroughly brushed so that no foot prints were found to be left on it. For getting clear foot prints lime powder was spread over the track in these two lanes up to 15m from the line marked at 740m towards finish line. The subjects were made to run 800m, two at a time, with standing start. The subjects were asked to use running shoes to provide clear marks made by front edge of shoe. Starting blocks and spikes were not used as the use of which requires skill and this calls for a fairly long period of training for reliable performance, moreover the length of strides at the maximum speed of running do not change with use of starting blocks.

The measurements were taken by a steel tape graduated in centimeters and meters. A front edge of foot print was used at the zero point of the tape. One of the assistants held the nail on the edge of the print created by the front edge print of toe of running shoe. The other assistant used to place the extended end of tape over the following shoe prints on the edge of running shoe. The measurement for each length of stride was read twice (forward and reverse) and recorded by the researcher himself. Special care was taken to avoid parallax error in reading by taking a perpendicular view of reading in each case of measurement. The average of two readings was taken as true length of strides. In this way, four consecutive strides, just after reaching the 740m line were measured. Two assistants were placed on the opposite sides of the lanes to determine which foot strikes first after reaching the said mark and were noted by the researcher himself to identify which strides were R-L strides and which were L-R strides. The measurement was recorded to the nearest centimeter below the distance covered *i.e.* fractions less than one centimeter were ignored.

Each subject was warmed up on his own by exercising before actual performance. The subjects had adequate instructions in this event. They were exhorted

to run their best. One of the researchers himself was a starter. "On your mark", "Set", and "Sounding clapper" were used in the commands for starting. However, no one was called back for false start as stride length is not affected by slow reaction to start call.

#### Level of significance:

For testing hypothesis, the level of significance of correlation was set at 0.05.

#### OBSERVATIONS AND DISCUSSION

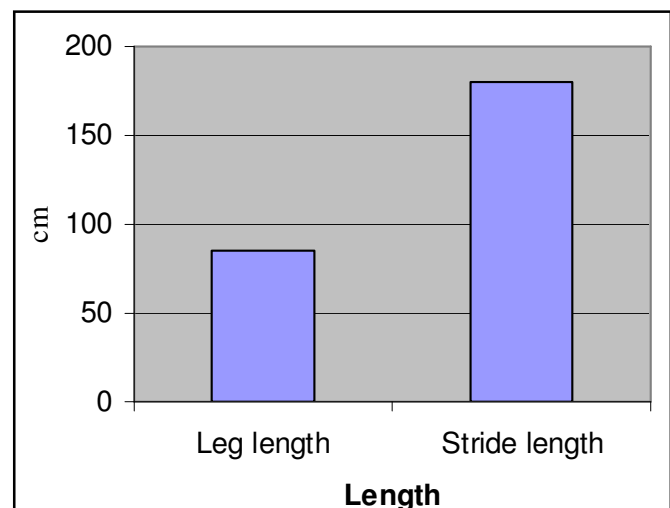
To determine the significance of correlation between the means of leg length and stride length, data collected from group of middle-distance runners Pearson's coefficient of correlation ( $r$ ) was employed as statistical method. The level of significance was set at 0.05 (Table 1).

After statistically analyzing the data (Table 1), it was observed that the obtained " $r$ " *i.e.* 0.821997 was greater than tabulated " $r$ " *i.e.* 0.250 at 0.05 level of significance. This indicates that there is significant correlation between the means of leg length and stride length of middle-distance runners (Fig. 1).

The findings of the study show that, under the conditions of the study, there is evidence to conclude that there is significant correlation between leg length and

**Table 1: Correlation of leg length with stride length**

	Leg length	Stride length
Number of subjects	60	60
Mean	85.1	179.7333
Obtained " $r$ "	0.821997	
Tabulated " $r$ "	0.250	



**Fig. 1: Correlation of leg length with stride length**

stride length. Thus, the increased leg length might bring about improved stride length which is one of most important factors in speed of running.

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