Effect of Leg Length With 100m *Sprint* Running Speed on The Men's Soccer Team at SMA 1 Mataram

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ABSTRACT

Running is one of the movements needed in soccer. A person in running motion has several factors that affect his speed. These factors include internal and external factors. One of these internal factors is leg length which is thought to have an influence on the frequency of a person's footsteps so that they produce different speeds. This study aims to determine the effect of leg length on the 100M *sprint* running speed on the men's soccer team at SMA 1 Mataram. This research method is an experimental method that is carried out directly by measuring leg length and running speed with 20 people as respondents from the entire soccer team at SMA 1 Mataram. There is an effect between leg length and 100M *sprint* running speed on the male soccer team at SMA 1 Mataram after the normality test $p > 0.05$ is 0.140 and the relative coefficient is 0.965, where the two characteristics above show a strong influence that has processed through the SPSS application.

Keywords: leg length; running speed; *sprint*

INTRODUCTION

In the game of soccer, running is one of the movements needed in this sport. Running is a movement that uses the motion of stepping feet continuously. The movement includes a movement of the foot that floats in the air and does not support the ground.[1] As it is known that, running is a branch of athletics which is divided into three categories, namely short-distance running, middle-distance running, and long-distance running.[2]

In doing the running movement there are factors that influence, this is useful for getting a good running movement in an athlete. These factors include external factors and internal factors. External factors that refer to temperature, humidity, and also how the condition of the place. As for the internal factors in running sports, namely age, gender, genetics, food intake and anthropometry of leg length. Anthropometry is a science that deals with measurement.[3]

The existence of different limb variations in each human will affect the movement of running. The human leg consists of the femur, tibia, and fibula. To find out how long the complete leg is, the overall length of the femur and tibia can be measured based on height.[4] The presence of this leg length can be an important factor in achieving the running performance of a soccer athlete. Analysis of leg length can be done by measuring the length of the femoral and tibia bones. calculated as the distance between the proximal end of the joint in the upper thigh and the distal inferior surface of the tibia.[5]

In the world of sports, there are relatively different measurements for women and men. In men there is the hormone testosterone. This testosterone hormone has a stronger anabolic effect in protein storage throughout the body, including in muscles.[6]

In the lower extremities there is the femoral region or what is commonly called the thigh region. This region is approximately between the pelvis and the genus joint.

Anteriorly, the thigh region is separated from the abdominal wall by the inguinal ligament. In addition, the femoral region is also divided into three compartments, namely the anterior, medial, and posterior sections by the intermuscular septum which is between the posterior aspect of the femur and the fascia lata (thick layer of deep fascia) which surrounds or covers the femoral region well. In this femoral region there is also a hard skeleton that composes that section, namely bone. The bone in the thigh is called the femur. In the femur bone there is a body of the femoris bone which bends forward and has an oblique direction starting from the neck of the femoris bone then towards the distal end. In the center of the body, there are several surfaces that are owned by the femur, namely posteromedial, posterolateral, and anterior smooth and the edges of the medial, lateral, and posterior.

The tibia has an attachment for the patellar ligament which is known as the tibial tuberosity. The tibial tuberosity will later become a continuation of the quadriceps femoris muscle tendon which is below the patella.

Running is the frequency in which the pace is accelerated so that the body has a tendency to float. Running speed is also influenced by stride length and the frequency of a person's stride.[7]

A runner has internal factors and external factors that affect his running speed. The internal factors are : (1) Genetics, Humans are composed of a protein known as Deoxyribonucleic Acid (DNA) which can determine a person's physical and personality traits.[8] (2) Age, the increasing age of a person certainly affects the condition of muscle and bone mass. This relates to the running speed produced by a runner. Adolescence is the right time for human growth both psychologically and physically. (3) Gender, the difference between men and women is related to the presence of the hormone testosterone which stimulates the growth of bones and muscles.[9]

(4) a person's innate health in the form of a disease from birth or a disease that has just been experienced also affects a person in running. (5) Arcus pedis can help support the body so that the weight of the body is evenly distributed to the front and back of the feet. (6) Leg length has a function to support the upper limbs and determine in walking, running, jumping and kicking.[10]

External factors that influence are wind direction, altitude, food intake, temperature, and one's personal physical exercise.[11] The 100-meter *sprint* is an athletic sport in the short-distance running category that a runner must travel as fast as he can in a distance of 100 meters.[12]

This study aims to determine the effect of leg length on the 100M *sprint* running speed on the men's soccer team at SMA 1 Mataram. The results of this study are expected to be used as a reference in the field of sports medicine regarding things that can be prepared as a companion for a soccer athlete in carrying out their activities.[13]

METHODS
This study used a pure experimental technique with measurements of leg length and 100M *sprint* running speed. Action planning was carried out by taking the entire population of the male soccer team at SMA 1 Mataram, amounting to 25 people as research respondents.

All respondents will be re-selected according to the inclusion criteria needed in the study. The inclusion criteria needed included, (1) male, (2) 15-18 years old, (3) active in extracurricular football, (4) had no lower limb injury, (5) willing to participate in this study by filling in research forms.

At the stage of the procedure, the leg length is measured by: measuring the maximum length of the thighbone (femur): the straight distance that extends from the femoral head to the most distal point on the medial condyles and the maximum length of the shinbone (tibia): the straight distance that extends from the highest on the intercondylar tubercle and the most distal point on the medial ankle (malleoulus medialis).

All research respondents were measured at the same altitude and performed on the left leg. Furthermore, the measurement of the running speed of the men's soccer team at SMA 1 Mataram was carried out with a route length of 100M in the same field position once. The entire data is then processed with the SPSS application by using a correlation test if the data is normally distributed and the Spearman correlation test if the data is not normally distributed.

RESULT AND DISCUSSION
This research was conducted on high school teenage students who took part in this soccer extracurricular taking a large sample of the entire population of its members. The total respondents in this study were 20 people, which there was a reduction from the initial estimate of 25 people. This is due to searching according to the inclusion criteria needed in this study, namely male, still active in extracurricular football, no leg injuries, and willing to take part in the study.[14]

The required age is appropriate, which ranges from 15-18 years which is the effective age category for human bone growth spurts, which may end around the age of 21 years. There are variations in the frequency of steps that distinguish the time produced in this study due to various factors, both internal and external. It has been described in the literature review chapter where internal factors of course have a more significant influence.

This is because the external factors in this study have been averaged for all respondents, namely on flat fields with the same situation. One of these internal factors is the anatomy of different leg lengths in each individual which is the independent variable in this study.

There is a difference in the average leg length from the value obtained in this study with other studies in Bone Regency, which is 94.88 cm and in studies outside Indonesia, the average leg length is 92 cm.[14] The differences obtained from this study with other studies indicate the possibility of internal factors for each individual that are different in each region or in the majority of countries in it. After processing the data using the SPSS application, there are variations in the legs of the SMA 1 Mataram soccer team with an average of 83.0 cm with a 100m *sprint* running speed of 16.08 seconds. Based on SPSS data processing where the research data is normally distributed because the p value > 0.05 from the normality test.

In addition to the variation in the age of adolescents selected by the researchers in this case after the above exposure, as for the gender of the male respondents in this study. It has been widely mentioned that men have a faster *sprint* mechanical property than women.[15]

In the field of football, there are biological aspects that exist in every individual who does the sport. Posture and body structure are a support for any sport. In carrying out sports activities, the legs have an important role in supporting this. The limbs have a function as a support for a person to carry out activities such as walking, running, and other activities. An increase in the variation in leg length also shows an increase in a person's ability to exercise. In this study, the respondent's leg length was measured, namely along the heel of the lower leg to the thigh bone (caput femoris). According to previous research, the difference in leg length in each individual has different running speed results, this is also seen in the results obtained from this study.[16] As with other studies, before this activity takes place, of course there is an equivalent visual examination between respondents in order to get representative results, namely respondents have the same level of fitness (not sick/weak) and have received previous energy intake. This is done to rule out other differences that exist in each individual apart from variations in the limbs.[17]

This study also carried out manual measurements of the anatomy of the leg length, although in the medical field itself there is a medium that can be used to determine more precisely the effective length of the leg, namely using ultrasound. Ultrasound used in previous studies is a method that produces precise leg length measurements with 5 or 7.5 MHZ linear scanner visualization with measurement points starting from the hips, knees, and upper ankles.[18] Although it has been described in the above explanation that the ultrasound method is the more ideal method, this does not break that the conventional method used in this study, namely manual measurement using a measuring tape, has a severe measurement error rate. This can be seen in the results of the data showing a very strong influence, the same as in previous studies.

The different correlations in each respondent that result in different end times do look significant from the results obtained, this shows that the strength in stride length produced by a person in running has a relative strength that increasing stride length is proven to contribute to the 100m *sprint* stride.[19]

In addition to measuring the length of the legs, the 100m *sprint* speed test was also carried out in one treatment. This is done because if someone runs twice, of course there will be an increase in the oxygen needed to recover someone from the previous activity.[20] This will result in reduced speed performance required by respondents, this is in accordance with the extrinsic factors in the theory described in the literature review that oxygen is also needed to restore the energy that humans do in their activities.

The results of this study indicate that the male soccer team at SMA 1 Mataram has an average leg length of 83 cm, and a 100M *sprint* running speed of 16.08 seconds. The minimum value for leg length is 74cm and the maximum value is 93cm. The results of data processing found a normality test of $p > 0.05$, which is 0.140 and a relative coefficient of 0.965, where the two characteristics above show a strong influence between leg length and *sprint* running speed on the male soccer team at SMA 1 Mataram from the data results. which has been processed through the SPSS application.

CONCLUSION
There is an influence between leg length and *sprint* speed of 100 on the male soccer team at SMA 1 Mataram.

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