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Relationship between Speed, Leg Muscle Explosive Power and Leg Length to Long Jump Ability

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Abstract*:* This study aims to prove the Relationship of Speed to the Ability of Long Jump in the Air. The relationship of leg muscle explosive power to the ability of long jump in the air. The relationship of leg length to the ability of long jump in the air. The relationship of speed, leg muscle explosive power and leg length to the ability of long jump in the air, the research method used is a quantitative research method and this type of research is a correlational study involving three independent variables, namely Speed, Leg Muscle Explosive Power and Leg Length while the dependent variable is the ability of long jump in the air. The population in this study were FIKK UNM students with a sample of 30 people taken by simple random sampling. The data analysis technique used is the correlation coefficient. The results of the study showed that: 1). There is a significant relationship between speed and long jump ability in the air with a value of r = -0.733. 2). There is a significant relationship between Leg Muscle explosive power and Long Jump Ability in the Air with a value of r = 0.712. 3). There is a significant relationship between leg length and the ability to jump long in the air with a value of r = 0.705. 4). There is a significant relationship between speed, leg muscle explosive power and leg length together with the ability to jump long in the air with a value of R = 0.899.
Keywords: speed, explosive power of leg muscles, leg length, long jump ability

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INTRODUCTION

Athletics is the oldest sport and also the mother of all sports. because training in athletics is the basis or beginning of sports, such as walking, jumping, and throwing. all of these have been used in other sports activities even in everyday life. because it has various elements, athletics is said to be the mother of all sports. Various types of Athletics sports, such as long jump.

Long jump is a form of jumping movement that begins with a horizontal movement and continues to a vertical movement of the road that pushes off the strongest leg to obtain a long distance. the goal of the long jump is to jump as far as possible by moving the entire body from one point to another. as mentioned above, the elements that support the ability to jump long and are driven based on patterns to achieve maximum results. how to implement long jump is divided into several styles. Like the style of walking in the air.

Long jump walking style in the air is a type of jumping movement that floats and lands as much as possible. movements in the long jump must be done well and harmoniously without interruption in order to achieve the farthest jump

The basic elements of movement in the long jump with the walking style in the air are the running start, the push off, floating and landing. Two things that an athlete needs to pay attention to are physical condition and the skills learned.

The basic movement elements in the long jump walking style in the air are the running start, push off, floating and landing. Two things that need to be considered by an athlete are physical condition and learned skills. Physical health includes health and posture, while technique includes mastered techniques and things learned from the field of physics, namely regarding the determination of the point of view of gravity. (center of gravity), balance, momentum and torque (tornique).

The leg is the lower limb bone that has an important role in the body's framework to perform movements, however, to perform these movements systematically, a movement system is needed that includes bones, muscles, and joints. To measure leg length, anthropometric measurements are used.

A tall athlete is usually followed by a long-legged athlete, but this is not necessarily the case. However, leg length also contributes to the success of long jump learning. Here, leg length is a major factor in achieving good stride length and rhythm. In general, people with long legs usually have long strides and can have a positive impact on takeoff, support, and flight range when used with long jump.

Based on observations during the long jump course at the FIKK UNM campus, when doing the start, some students did not do a high, fast run-up, could not control their body position, and could not control their body position, so they had difficulty in doing the push-off. which caused the jump results to be very close when doing the push-off or support, most students did not do it with their strongest legs and often did not fit on the support block, this would affect students when floating in the air and were declared to have failed in doing the push-off. When floating in the air, some students could not maintain their body position as long as possible, this would cause students to land or land very close. When landing, some students fell backward or landed using their back limbs and when landing, both feet were not together, this would cause the balance of the students to be unstable. from this description, the researcher conducted a study on the athletics sport branch of the Long Jump number.

METHODS

A. Jenis Penelitian

Penelitian ini adalah penelitian korelasional. Penelitian korelasional merupakan hubungan antara dua variabel atau lebih sebagaimana adanya tanpa perlakukan, (Ma'ruf Abdullah, 2015:321).

B. Tempat dan Waktu Penelitian

Adapun penelitian ini dilaksanakan di kampus FIKK UNM pada Bulan Februari 2025.

C. Metode Penelitian

"Penelitian kuantitatif dapat diartikan sebagai metode penelitian yang berlandaskan pada filsafat positivisme, digunakan untuk meneliti pada populasi dan sampel tertentu, teknik pengambilan sampel pada umunya dilakukan secara random atau acak, pengumpulan data menggunakan instrumen penelitian, analisis data bersifat kuantitatif/statistik dengan tujuan untuk menguji hipotesis yang telah ditetapkan (Sugiyono, 2018:14)".

1. Variabel Penelitian.

"Ada dua variabel yang terlibat dalam penelitian ini yaitu variable bebas dan variabel terikat (Ma'ruf Abdullah, 2015:192)":

a) Variabel Bebas. *(independen variabl),* merupakan variabel yang menentukan arah atau perubahan tertentu pada variabel terikat sebaliknya, variabel bebas berada pada posisi yang tidak terpengaruh oleh variabel terikat (Variabel yang mempengaruhi)
   1) Kecepatan
   2) Daya ledak otot tungkai
   3) Panjang Tungkai

b) Variabel Terikat *(dependend variable),* adalah variabel yang dipengaruhi oleh variabel bebas (Variabel yang terpengaruhi).
   1) Kemampuan lompat jauh gaya berjalan di udara

D. Population and Sample.

1. Population

"Population is a generalization area consisting of: objects/subjects that have certain qualities and characteristics that are determined by researchers to be studied and then conclusions are drawn so that the population is not only people, but also objects and other natural objects. The population is also not just the number of objects/subjects being studied, but includes all the characteristics/properties possessed by the subject/object (Sugiyono 2018; 117)". So in this study the population is all FIKK UNM students.

2. Sample

According to Sugiyono" (2018:118) a sample is part of the number and characteristics possessed by a population if the population is large and researchers cannot study everything in the population. A sample is part of the population taken using a certain technique needed to determine the number of samples using random sampling techniques because the number of populations in this study was too large, so researchers used the Simple Random Sampling technique by drawing lots. According to Ma'ruf Abdullah" (2015:234) the way to determine the sample using the random sampling technique is if the number of subjects is made into a large population, 10-15%, 20-25% or more can be taken, the sample I used in this study was 28% of the student population so that the number of samples obtained was 30 FIKK UNM students".

E. Data Collection Techniques

Techniques for collecting data on speed, explosive power of leg muscles, leg length and long jump ability. at a decisive stage in the research process with the aim of obtaining reliable results. The validity of the data obtained, apart from being determined by the validity of the instruments used, must also be supported by the implementer of the data collection and needs to be designed and prepared optimally.

F. Data Analysis Techniques

After all the research data has been collected, the next step is to analyze the data. This allows the research to draw conclusions about the data through statistical analysis with the help of a computer through the SPSS version 21 program to find out whether there is a relationship between the independent variables and the dependent variables of the long jump ability of the air gait and the three independent variables of speed, leg muscle explosive power and leg length.

RESULT AND DISCUSSION

Based on the results of statistical analysis based on survey research conducted at the FIKK UNM Campus, the following are the results of long jump ability, walking style in the air, speed, leg muscle explosive power and leg length are presented in the following table 1:

Statistical Values	speed (detik)	leg muscle explosive power (cm)	leg length (cm)	Long Jump Ability (cm)
Valid N	30	30	30	30
Missing	0	0	0	0
Mean	7.2167	235.83	97.03	362.33
Median	7.1500	238.00	96.00	360.00
Mode	7.30	238	93	360
Std. Deviation	35158	7.822	4.476	43.997
Variance	124	61.178	20.033	1935.747
Range	1.34	30	15	140
Minimum	6.55	220	90	300
Maximum	7.89	250	105	440
Sum	216.50	7075	2911	10870

2. Data Normality Test

The results of the data normality test for each variable can be formulated as follows:

a. In the normality test of running speed data, the values KS-Z = 0.636 and P = 0.813 are greater than α = 0.05, thus the running speed data obtained are normally distributed.
b. In the normality test of leg muscle explosive power data, the values KS-Z = 0.963 and P = 0.312 are greater than α = 0.05, thus the leg muscle explosive power data obtained are normally distributed.
c. In the normality test of leg length data, the values KS-Z = 0.865 and P = 0.443 are greater than α = 0.05, thus the leg length data obtained are normally distributed.
d. In the normality test of the long jump ability data using the air walking style, the KS-Z value = 0.664 and P = 0.771 were obtained, which is greater than α = 0.05, thus the long jump ability data using the air walking style produced were normally distributed.

3. Hypothesis Testing

a. Relationship between Speed and Long Jump Ability in Air Walking Style of FIKK UNM Students

The first hypothesis tested in this study is "there is a relationship between speed and long jump ability in air walking style of FIKK UNM students". Based on the results of a survey that has been conducted at the FIKK UNM campus, the data from the correlation analysis related to the results of the long jump in air walking style are presented in the following table:

Table 2. The first hypothesis is the relationship between speed and long jump ability in air walking style.

correlation	**N**	**r**	**P_{value}**	Significant
X_1.Y	30	-0,733	0,000	Description

Based on the results of the correlation analysis of Speed data on the ability of the long jump in the air, the value (r) = -0.733 was obtained with a probability level (p) = 0.000 which is smaller than α = 0.05, so H0 is rejected and H1 is accepted (significant correlation coefficient), or speed has a significant relationship with the ability of the long jump in the air, thus it can be concluded that there is a relationship between speed and the ability of the long jump in the air of FIKK UNM students.

b. Relationship between Leg Muscle Explosive Power and the Long Jump Ability of the Air Walking Style of FIKK UNM Students

The second hypothesis tested in this study is "there is a relationship between leg muscle explosive power and the long jump ability of the air walking style of FIKK UNM students". Based on the results of a survey that has been conducted at the FIKK UNM campus, the data from the correlation analysis related to the long jump results of the air walking style are presented in the following table:

Table 3. The second hypothesis is the relationship between leg muscle explosive power and the long jump ability of the air walking style.

correlation	**N**	**r**	**P_{value}**	Significant
X_2.Y	30	0,712	0,000	Description

Based on the results of the correlation analysis of leg muscle explosive power data on the ability of long jump gait in the air, the value (r) = 0.712 was obtained with a probability level (p) = 0.000 < from α = 0.05. then H0 is rejected and H1 is accepted (significant correlation coefficient), Leg muscle explosive power has a significant relationship with the ability of long jump gait in the air. thus it can be concluded that there is a relationship between leg muscle explosive power and the ability of long jump gait in the air of FIKK UNM students.

c. Relationship of Leg Length to the Long Jump Ability of Air Walking Style of FIKK UNM Students

The third hypothesis tested in this study is "there is a relationship between leg length and the long jump ability of air walking style of FIKK UNM students". Based on the results of a survey that has been conducted at the FIKK UNM campus, the data from the correlation analysis related to the results of the long jump in the air walking style are presented in the following table:

Table 4. The third hypothesis is the relationship between leg length and the long jump ability of air walking style.

correlation	N	r	P_{value}	Significant
X_3.Y	30	0,705	0,000	Description

Based on the results of the correlation analysis of leg length data on the ability to jump long in the air, the value (r) = 0.705 was obtained with a probability level (p) = 0.000 <α = 0.05, then H0 was rejected and H1 was accepted (significant correlation coefficient), or Leg Length has a significant relationship to the ability to jump long in the air. Thus, it can be concluded that there is a relationship between leg length and the ability to jump long in the air of FIKK UNM students.

d. Relationship between Speed, Leg Muscle Explosive Power and Leg Length to the Long Jump Ability of Air Walking Style of FIKK UNM Students.

The fourth hypothesis tested in this study is "there is a relationship between speed, leg muscle explosive power and leg length to the long jump ability of air walking style of FIKK UNM students, based on the results of the survey that has been carried out on the FIKK UNM campus, the data from the multiple correlation analysis related to the results of the long jump of air walking style are presented in the following table:

Table 5. The fourth hypothesis is the relationship between speed, leg muscle explosive power and leg length to the long jump ability of air walking style.

correlation	N	R	R^2	P_{value}	Significant
$X_1.X_2.X_3$. Y	30	0,899	0,808	0,000	Description

Based on the results of the multiple correlation analysis of speed data, leg muscle explosive power and leg length on the Long Jump Ability of the Air Walking Style, the correlation value (R) = 0.899 was obtained with a probability level (p) = 0.000 < from α = 0.05, then H0 is rejected and H1 is accepted (significant correlation coefficient), or speed, leg muscle explosive power and leg length have a very significant effect on the Long Jump Ability of the Air Walking Style. Thus it can be concluded that there is a significant relationship between speed, leg muscle explosive power and leg length together on the Long Jump Ability of the Air Walking Style of FIKK UNM students. The determination coefficient value (R2) is 0.808 or 0.808 x 100% = 80.8%, based on these results it can be said that there is a relationship between speed, leg muscle explosive power and leg length together on the Ability, long jump of the air walking style of FIKK UNM students by 80.8% and the remaining 19.2% is influenced by several other factors.

CONCLUSSION

1. There is a significant relationship between speed and long jump ability
2. There is a significant relationship between leg muscle explosive power and long jump ability
3. There is a significant relationship between leg length and long jump ability
4. There is a significant relationship between leg muscle explosive power speed and leg length together with long jump ability

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