

# Relationship of Explosive Muscle Limbs and Long Legs to 100-Meter Running Ability

Yuaddil Ihsan\*, Atradinal

Universitas Negeri Padang, Jl. Prof. Dr. Hamka Air Tawar Padang, Sumbar

Sport Education Majors

Yuaddilihsan23@Gmail.com<sup>1</sup>

**Abstract**—This study aims to determine the relationship between explosive muscle limb power and long legs either individually or together with the ability to run 100 meters student Sports Activities Unit Of Athletic Universitas Negeri Padang. The type of research used is correlational. The sample in this research is all Athletes Athletic Sports Athletics Unit State University of Padang that routinely follows the training of 15 people. Student data is taken, which then tested data hypothesis processed by product-moment correlation formula and double correlation. Based on the results of the analysis, 1) there is a significant relationship between explosive muscle limb power to the running ability of 100 meters students, 2) there is a significant relation of limb length to the running ability 100-meter students, 3) there is a significant correlation between explosive muscle limb power and limb length to running ability 100-meter students.

**Keywords**—*explosive muscle limb power, long legs, running ability of 100 meters*

## 1. INTRODUCTION

A 100-meter run is a various run numbers that contested in athletic sports. "The technique used in running different from other running numbers. In achieving the highest achievement there are four items that an athlete needs to possess, namely physical, tactic, mental, and technical conditions"[1]. The development of science and technology that occurs has a positive impact on all aspects of human life, so that all activities can be learned and manipulated to get better results. Physical condition is a determining factor in the development process of an athlete in a sport of achievement. In Athletics, the most popular race number is the 100 meters. In running 100 meters the physical aspect needed was the explosive power of the leg muscles, the length of the legs. "The explosive power of limb muscles is related to power which means a condition that occurs from a combination of two elements of physical conditions, namely speed and strength"[3]. Then "suggests that explosive power is the ability of a combination of strengths with speed that is realized in the form of the ability of muscles to cope with a load with a high speed of contraction"[4]. "The explosive power of the leg muscles has a direct influence on the results of sprint running"[5].

An important explosive power is owned by a 100 meter runner to use in the acceleration phase after

being released from the start beam. "Explains that there is a large contribution given by explosive power in the process of reaching the maximum speed of a sprint runner"[1].

Then the length of the leg is interpreted as a factor that can help a sprinter maximize speed by producing far steps. "The length of the leg is the size of the entire leg from the groin down, In addition "the leg length is also a strength advantage because with a good leg length and explosive it does not rule out the possibility of affecting muscle strength"[3].

Based on the description above, it is important to conduct research to strengthen the theory so that in selecting athletes sprinting the trainer has a definite size and trains which physical conditions need to be addressed so that the athlete's performance is better.

"There were techniques that must be known by runners.

1) Start, when the runner hears the first command "willing" the runners prepare to take a crouching position with both legs resting on the start block and the back leg knees placed on the ground slightly forward from the tips of the front toes"[5]. The hands are placed behind the start line about shoulder width apart, with the fingertips touching the ground. The body and shoulders are balanced above the hands and head relaxed. When the runner hears the command "ready" the knee is lifted from the ground in such a way that the two legs are slightly bent (90° front legs and 130° rear legs) and the foot presses on the starting beam, the hips rise so that they are higher from the shoulder which is above the hand, the arm is held straight with the body weight evenly distributed to all fulcrums and the eye view remains low. At the start of the start of the gun, the athlete refuses his leg from the start beam, at the same time raising his hand from the ground to balance the body. The forefoot is firmly straightened to give a forward push and the hind legs are immediately stretched enough to create rapid movements. Meanwhile, the arms are balanced and help with leg movements by emphasizing strong and fast running movements. 2) Acceleration, during the start steps, the body goes (in position) low like a free arrow from its arc at an angle of 45° and with steps that are low but fast. But these steps must not be deliberately shortened. 3) Finish, in athletic conditions, is indicated for running numbers as completion of running distance. In the sprint technique there are running principles that must be understood, a) The landing of the foot must always be at the tip of the foot, while the knee is slightly bent or in a slightly crooked state. b) The position of the

body is leaning forward, the view is not far ahead. c) Swing hands relaxed, elbows bent to form an angle of  $90^\circ$ . d) Hand wrists remain straight but not stretched. e) Straight back and in line with the head, neck muscles remain relaxed, mouth slightly opened. f) Between the legs, hips, and arms are a unit of motion that takes place in a permanent and harmonious manner"[6]. In the 100 meters run according to "it contains several conditions namely "reaction speed, movement acceleration, maximum speed, speed endurance"[7].

Thus, the 100 meters run in addition to requiring a long speed range is also very helpful for runners to reach the finish line in a short time.

## 2. METHOD AND RESULTS

### Kinds Of The Research

This type of research is a chorealist study which aims to find out how much the relationship between limb muscle explosive power and leg length to 100 meter running ability of UKP Athletics students at UNP.

### Place And Time Of The Research

The time of this research was carried out on December 4 to 7, 2017. The place for conducting research in the athletic field of the Faculty of Sports Sciences, Universitas Negeri Padang.

### Populations

According to "Population is a generalization area that is an object or subject that has certain qualities and characteristics set by the researcher to be studied and conclusions drawn"[8]. In this study the population included students from Universitas Negeri Padang who routinely carried out exercises in the Athletic Activity Unit.

No	Name	Grade	Major
1	Afrizoni	2016	Kepelatihan
2	Panji	2016	Kepelatihan
3	Sadrizal	2014	Kepelatihan
4	Novrizal	2014	Kepelatihan
5	Agus	2012	Pendidikan olahraga
6	Irfan	2017	Kepelatihan
7	Nanda	2016	Kepelatihan
8	Yunus	2016	Pendidikan olahraga
9	Ivan	2016	Kepelatihan
10	Yoko	2016	Kepelatihan
11	Syawal	2016	Kesrek
12	Andre	2017	Pendidikan olahraga
13	Nanda R.	2017	Kepelatihan
14	Rahmat	2013	kepelatihan
15	Govin	2015	Pendidikan olahraga

### Samples

The sample according to "is part of the number and characteristics possessed by the population.

In this study the sampling was done by census technique"[8]. According to) census is the overall sampling of the existing population as the target of research. In this study the researchers took all students of the Universitas Negeri Padang Sports Activities Unit who routinely attended 15 exercises.

### Descriptions

In this study the variables studied were leg muscle explosive power (X1) and leg length (X2) as independent variables, and as the dependent variable was the 100 meter running ability of students at the Universitas Negeri Padang Athletic Activity Unit. These three variable data were obtained from the results of the leg muscle explosive power test, leg length and 100 meter running ability. Furthermore, the results of the study will be elaborated, including among others: data description, hypothesis analysis requirements test, hypothesis test and discussion.

### Analysis

Variabel	N	$\bar{X}$	Std.dev	Min	Mak
Daya Ledak Otot Tungkai	15	245,13	2,92	238	250
Panjang tungkai	15	83,6	1,18	82	86
Kemampuan lari 100 meter	15	11,99	0,14	12,25	11,72

### Analysis of the relationship between explosive limb muscle power (X1) on 100 meter running ability

When consulted with the price of criticism  $r$  Product Moment with  $N = 15$  and  $\alpha = 0.05$  at 0.5140 it turns out that  $r$  count = 0.52 >  $r$  table = 0.5140. Thus there is a significant relationship between the explosive power of limb muscles towards the 100 meter running ability of students majoring in sports education in the faculties of sports science at Universitas Negeri Padang.

### Meaning Test Correlation Coefficient with Test t.

By looking at the distribution table  $t$  with  $dk = N-2 = 13$  and  $\alpha = 0.95$  obtained at 1.77 Thus  $t$  count = 2.20 >  $t$  table = 1.77, then  $H_0$  is rejected and  $H_a$  is accepted. In this case there is a significant relationship between leg explosive power and 100 meter running ability, and it can be agreed whether increasing the explosive power of the leg muscles will improve the ability to run 100 meters.

### Analysis of the Relationship Between Leg Length (X2) Against 100 Meter Running Capability.

When consulted with the price of criticism  $r$  Product Moment with  $N = 15$  and  $\alpha = 0.05$  at 0.5140 it turns out that  $r$  count = 0.57 >  $r$  table = 0.5140. Thus there is a significant relationship between the length of the leg toward the 100 meter running ability of the student majoring in sports education at the Faculty of Sport Sciences, Universitas Negeri Padang.

### Meaning Test Correlation Coefficient with $T_{test}$

By looking at the distribution table  $t$  with  $df = N - 2 = 13$  and  $\alpha = 0.05$  it is obtained at  $1.77$ . Thus  $t_{count} = 2.51 > t_{table} = 1.77$ , then  $H_0$  is rejected and  $H_a$  is accepted. In this case, there is a significant relationship between the length of the limb and the 100 meter running ability of the sports education department of the Universitas Negeri Padang Faculty of Sport Sciences, and it can be stated that the longer the leg, the better the 100 meter running ability can be done.

### Meaning Test of Double Correlation Coefficients.

$H_0$  = There is no meaningful relationship between  $X_1$  and  $X_2$  with  $Y$

$H_a$  = There is a relationship that means between  $X_1$  and  $X_2$  with  $Y$

By using  $dk = 2$  as a numerator and  $n - k - 1 = 15 - 2 - 1 = 12$  as a denominator, then in distribution  $F$ , the value of  $F_{table}$  is 3.8800. So  $F_{count} (4.1600) > F_{table} (3.8800)$ , then  $H_0$  is rejected and  $H_a$  is accepted. Then the conclusion is that there is a significant relationship between  $X_1$  and  $X_2$  together with  $Y$ .

### 3. CONCLUSION

Based on the results of research on the relationship of leg muscle explosive power and leg length with 100 meter running ability of students of the Athletic Sports Activity Unit of Universitas Negeri Padang, it can be summarized as follows. a) There is a significant relationship between leg muscle explosive power and 100 meter running ability of the Student Unit of Athletic Sports Activities in Universitas Negeri Padang. b) There is a significant relationship of leg length with 100 meter running ability of students of the Athletic Sports Activity Unit of Universitas Negeri Padang. c) There is a significant relationship between the explosive power of leg muscles and leg length together with the 100 meter running ability of the Student Unit of Athletic Sports Activities in Universitas Negeri Padang.

Based on previous description and the conclusions above, the following suggestions can be put forward. a) To the Students of the Department of Physical Education, Faculty of Sport Sciences, Universitas Negeri Padang, it is recommended to focus more on training the components of limb muscle explosive power in an effort to improve 100 meters running ability. b) If the Athletics Lecturer of the Sports Education Department of the Faculty of Sports Sciences, Universitas Negeri Padang provides knowledge of the exercises that are proportional to train the strength of the explosive strength of the leg muscles. c) With the relationship of the length of the legs in the ability to run 100 meters, the trainers and lecturers need to consider the length of the legs in choosing a 100-meter running track and can provide the correct training program for the explosive power of the leg muscles.

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