



KEMENTERIAN RISET, TEKNOLOGI DAN PENDIDIKAN TINGGI  
UNIVERSITAS HASANUDDIN  
**FAKULTAS KEDOKTERAN**

Jl. Perintis Kemerdekaan Km. 10 Makassar 90245 Telp.(0411)586010, 586297

---

**SURAT KETERANGAN JURNAL**

Yang bertanda tangan dibawah ini menerangkan bahwa :

Nama : Fatoni  
No Pokok : P0200316010  
Program Pendidikan : Doktor (S3)  
Program Studi : Ilmu Kedokteran  
Judul Jurnal :


**Role of Genetic Polymorphism of Angiotensin Converting Enzyme to Cardiovascular Endurance in Men Ages 13-14 Years After Fartlek Training for 3 Months.**

Naskah tersebut telah terakses online pada International Journal : Indian Journal of Public Health Research & Development (editor.ijphrd@gmail.com)

Demikian surat keterangan ini dibuat untuk dipergunakan sebagaimana mestinya.

Makassar , 29 Mei 2019

an. Dekan

 Wakil Dekan Bidang Akademik, Riset  
dan Inovasi

Dr. dr. Irfan Idris, M.Kes

NIP.19671103 199802 1 001



Indian Journal of  
**Public Health Research & Development**  
An International Journal

Indian Journal of Public Health Research & Development <editor.ijphrd@gmail.com>

15<sup>th</sup> May 2019

To: Author (Mr. Fatoni)

### Letter of Acceptance

I have pleasure to inform that your paper titled” **Role Of Genetic Polymorphisms Of Angiotensin Converting Enzyme To Cardiovascular Endurance In Men Ages 13-14 Years After Fartlek Training For 3 Months**” has been accepted for publication in the IJPHRD. Please response immediately to the last comment from reviewer below:

Rewrite the Ethical Clearance.

Ethical clearance - Taken from .....committee.

Source of research and publication Funding, Check for the spellings. Some are still error

Make all the tables properly closed as available format.

Yours sincerely

Prof Vidya Surwade

Prof Dept of Community medicine SIMS, Hapur

Editor, Indian Journal of Public Health Research & Development

[www.ijphrd.com](http://www.ijphrd.com)

**Address for Correspondence**

Prof Vidya Surwade

**Editor, IJPHRD**

**501, Manisha Building, 75-76**

**Nehru place 110019**

**[www.imlp.in](http://www.imlp.in)**

# ROLE OF GENETIC POLYMORPHISMS OF ANGIOTENSIN CONVERTING ENZYME TO CARDIOVASCULAR ENDURANCE IN MEN AGES 13-14 YEARS AFTER FARTLEK TRAINING FOR 3 MONTHS

Fatoni<sup>1,2</sup>, Haerani Rasyid<sup>1</sup>, Rosdiana Natsir<sup>1</sup>, Ilhamjaya Pattelongi<sup>1</sup>, Andi Ihsan<sup>2</sup>,  
Adam Mappaompo<sup>2</sup>, Sudirman<sup>2</sup>

<sup>1</sup>Faculty of Medicine, Universitas Hasanuddin, INDONESIA

<sup>2</sup>Faculty of Science, Universitas Negeri Makassar, INDONESIA

## Abstract

Physical ability is influenced by two factors, namely environmental and genetic factors. Environmental factors that influence are exercise intensity, nutritional intake, and age. Another factor that is not less important in influencing cardiovascular endurance is genetic factors. One of gene variation that is considered to determine the athlete's potential is the variation in the ACE gene symbolized by I and D. The ACE gene insertion / deletion polymorphism (I / D) has an important relationship with cardiovascular fitness with genotype II which shows a lower level of cardiorespiratory fitness with VO<sub>2</sub>max than the Non II genotype (ID and DD). The purpose of this study was to assess how the role of the ACE gene in male cardiovascular endurance aged 13-14 years. This study provides a three-month fartlek training program and conducts cardiovascular endurance tests before and after taking a three-month fartlek training program. In group II genotype subjects showed the results of increased cardiovascular endurance compared to the Non II genotype subject group. Research can conclude a strong relationship between the variation of the angiotensin converting enzyme gene II genotype against male cardiovascular age 13-14 years.

Keywords: ACE gene, cardiovascular endurance, fartlek training

## INTRODUCTION

Efforts to improve sports performance cannot be separated from physical conditions, because the physical condition supports when practicing or competing to show the best performance by displaying techniques and tactics effectively and efficiently. Good physical condition is one of the absolute requirements to achieve optimal performance. Sports training strategies focus on athletes' interests and achievements. Genetic potential of individuals must be considered to get high achieving athletes, because with the appropriate genetic variation there is a greater chance of producing accomplished athletes than athletes who have inappropriate genetic variations if they receive the same training intervention and motivation. This research concentrates on finding the right genetic profile to contribute to sports performance. One of the main objectives of this research is to help trainers to identify and guide individuals with genetic potential to become elite athletes.

ACE gene is an important factor that needs to be considered. The results of this study proves that human physical performance is influenced by genetic profiles (Ma F, et. al, 2013). Allele I was found to have a beneficial effect on higher maximum oxygen uptake values. Characteristic distribution of genotypes was found, where allele II was more common in individuals doing aerobic exercise and DD alleles in individuals who were disciplined in anaerobic exercise (Holdys J et. al., 2011).

The role of ACE gene polymorphism with cardiovascular response with irregular resistance training in women. The subject of DD alleles is greater in post-exercise hypotension, While the allele I showed a greater increase in heart rate after endurance training (De Souza JC, et. al, 2013). the integration of several

genes added to environmental factors, identification of talents and prescription of training programs that maximize the athlete's individual potential based on genetic variable characteristic, will be able to make a revolution in sports science (Rodrigo Goncalves et al, 2007). polymorphism gene ACE II which states higher ACE activity has a correlation with the ability for sports that require endurance, while DD polymorphisms and higher ACE activity are related to sprint ability (Fernanda M and Slocombe R, 2012). Variations in the Angiotensin Converting Enzyme gene which were interacted with resistance showed differences in changes in endurance results, namely genotype II which was better than the variation of DD genotype, with an average increase of 11.57ml / kg / minute, while the DD genotype decreases by an average of -8ml / kg / minute (Arimbi et.al, 2015).

There is an individual variability characterized in response to endurance training, and some research results suggest that this part of the variation is genetically regulated (Rankinen T, et. al, 2002). In addition, the results show that genetic variation. The ACE gene can affect blood pressure response to exercise, although more research is needed to confirm this finding (Goessler KF, et.al. 2015).

Research results of Myerson S, et al. (2017) His analysis showed a linear tendency to increase the frequency of allele I with running distance. The allele I ACE gene is associated with improved endurance performance. In addition, the insertion / deletion (I / D) type polymorphism of the ACE gene also influences the process of performance in the heart as the results of the study. Aziza, L., et al. (2010) which states that the insertion / deletion (I / D) type polymorphism of the ACE gene affects ACE concentration in the blood and affects blood pressure. Blood pressure changes are affected by changes in angiotensin II, aldosterone or active vaso substances.

This relatively new approach needs to be considered by sports institutions in determining the right strategies to foster the seeds of young athletes to improve sports performance. So, research can be utilized by considering the variation of the genotype II of the ACE gene in the search for potential talent for Indonesian endurance athletes. If the genetic information of prospective young athletes obtained earlier, is expected to have a significant influence on the effectiveness of sports training in general.

## RESEARCH METHODS

This type of research is a retrospective cohort study using a cross-sectional design or approach to describe the correlation between factors and effects. Research in October 2018 January 2019 in South Sulawesi. The population in this study were SMP N 3 Sungguminasa students with a age range of 13-14 years, amounting to 78 people to be the number of samples in this study but those who completed until the end of the study were 59 samples. Data were analyzed using SPSS version 24. The results are displayed in the form of narratives and tables.

### Measurement Procedure

The 12-minute run test designed by Cooper is a field test that is relatively easy and inexpensive, because it requires enough running track or can also use public roads and time measuring devices (watch or stopwatch). The cooper test (running 12 minute) is used to determine endurance. The implementation of the 12-minute run test requires a rather complicated procedure, in which participants are required to stop when the 12-minute time has been exceeded, then they need to give a sign where the stop is, to immediately measure the distance the result is taken. If there are many test participants, it needs carefulness to measure it. The distance reached is then confirmed in the physical fitness category table to determine the fitness status of the sampel. The test categories are distinguished by sex and age group. In the implementation the 12-minute run test requires a running track even though it can be carried out on the streets.

Test implementation

- 1) Beginning attitude
  - 2) Participants stand behind the start line
  - 3) Movement:
    - a. In the "READY" command, the participants took a stand, ready to run
    - b. On the "YES" command the participants ran as much as possible until the time showed 12 minutes
    - c. After reaching 12 minutes the stopwatch is turned off and the runners are told to stop at their respective places
    - d. What is measured is how many meters can be taken while running for 12 minutes. If it stops it is considered a failure
    - e. Record of results
- The distance taken during a 12-minute run is recorded in meters, as a result of the test takers.

#### Ways To Calculate Cooper's VO<sub>2</sub>max test

$$\text{Vo2max (ml/kg/mnt)} = \frac{(\text{Distance (Meter)} - 504,9)}{44,73}$$

Results obtained from the above calculations. After that, classify according to the fitness category table based on the Cooper test.

### RESULT AND DISCUSSION

This study was conducted from October 2018 to January 2019. Selection of respondents by age category and sex at SMPN 3 Sungguminasa Gowa Regency by ages 13 to 14 years old. In this study involved 59 male sex students. Characteristics of research subjects include age, weight, and height.

Table1. General characteristics of research subjects

No.	Variable	Means ± SD	Min- max	P
1	Age	13,02 ± 0,13	13 - 14	0,000
2	Weight	37,07 ± 8,073	25 - 64	
3	Height	144,51 ± 6,654	129 - 159	

Source: Primary Data, 2018

Table 1 above present information on average age of sample 13,02 years old with a range of 13 to 14 years old, average weight of 37,07 kg with a range of a minimum weight of 25 kg and a maximum weight of 64 kg, the average height of 144,51 cm with the range of 129 - 159 cm.

Table2. Characteristics of the subject gene variation

NO.	Gene Variation	n	%
1	II	25	42,4
2	Non II	34	57,6
	Total	59	100

Source: Primary Data, 2018