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Activities of root ethanolic extract of *Eurycoma longifolia* Jack on the increase physical activity of athletes

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ABSTRACT

Eurycoma longifolia Jack is a plant of Indonesia has been used as a medicine empirically. The purpose of this research to get information about the effects of ethanol extract of *Eurycoma longifolia* roots to increase the physical activity of athletes. This research was an experimental applying completely randomized design. Sixteen athletes (male) divided into two groups, group A and group B. Athletes were instructed to perform an activity up and down from a chair (Harvard step test) for 5 minutes and measuring the time it takes the athletes as well as the pulse of athletes every 30 seconds in the first minute (DN 1) second (DN 2) and third (DN 3) to get the value of Firm Capabilities Index (AIC) athletes. *Eurycoma longifolia* root extract as much as 5.6 mg inserted into the capsule. *Eurycoma longifolia* root extract given one time a day for groups A and one times a day for two days for group B. AIC data of each group of athletes who consume the extract analyzed by T test results showed that the *Eurycoma longifolia* root extract can increase physical activity, but the variation of length does not affect.

Keywords: *Eurycoma longifolia* root extract, Harvard Step Test, Pulse and AIC.

INTRODUCTION

Indonesia is rich in biological resources and is one of the countries with the world's largest biodiversity after Brazil, which has the highest biodiversity in the world. Indonesia's natural resources potential to be developed as herbal products [1]. One of the herbs that are found in Indonesia, namely *Eurycoma longifolia* Jack. It is one kind of plant in Indonesia which has many benefits and is known as one of the herbs that potential. Parts of plants are often used as medication is the root, commonly used as a stimulant of androgen hormones and stimulates the central nervous system [2]. The benefits of *Eurycoma longifolia* is known empirically is an aphrodisiac and as agent (tonic), especially for women after childbirth [3].

The effect produced by a substance called tonic effect. This tonic effect occurs because of the effects of central nervous system stimulant that can increase mental activity, relieve fatigue, and improve the ability to concentrate [4]. Stimulants can stimulate the sympathetic nervous system, then the adrenal glands will produce hormones epinephrine and norepinephrine in the medulla, epinephrine and norepinephrine useful in increasing organ function. Such as increased heart rate, blood pressure, improve blood sugar muscle, and metabolism [5]. Stimulant associated with the formation of energy, especially to increase physical activity, then the drug is very necessary among athletes to increase stamina and physical strength [6]. This study aims to determine the *Eurycoma longifolia* root extract activities to increase physical activity athlete with methods Harvard Step Test.

MATERIALS AND METHODS

Materials

The materials used are the roots of *Eurycoma longifolia* Jack, the capsule shell, sacharum lactis (BRATACO), chloroform (Merck), distilled water, magnesium powder (Merck), hydrochloric acid (Merck), sulfuric acid (Merck), norit (Norit) acetic acid (Merck) and ethanol (BRATACO).

Capsules board (Carmapharm), volumetric flask 10 ml (Pyrex), an analytical balance (Kenko), desiccator (Normax), desintegrator tester (Develop), Furnes (WiseTherm), filter paper (Whatman), bench (height 45 cm) timekeeper (Casio), metronome (Musedo) and digital sphygmomanometer (Omron).

Panelist

Panelists of 16 people, male, healthy, weight 65-75 kg and aged among 18-22 years.

Preparation *Eurycoma longifolia* root extract

The roots of *longifolia eurycoma* cleaned, chopped and weighed about 350 g. The roots that have been dried, then chopped and macerated using 70% ethanol (01:10) in dark bottles. For the first 6 hours while stirring occasionally, then let sit for 18 hours. Maserat separated by precipitation, filtration twice repeated the process again with the type and amount of the same solvent. Collect all maserat, then the solvent was evaporated with a vacuum evaporator [6]. Viscous extract obtained is dried in an oven at a temperature of ± 40 C for 8 hours. dry extract is added with saccarum lactis, stirring until homogeneous and input into capsules, each capsule contains 5.6 mg dry extract.

Preparation

Tests conducted over two days for group A, and four days for group B. The test uses eight panelists every group. Each group was subdivided into two, that is A1, A2, B1 and B2. A1 group was given a placebo (a capsule contents saccarum lactis) and A2 group were given the test preparation (*Eurycoma Longifolia* root extract 5.6 mg/capsule) after one hour of physical activity. On the 2nd day of testing conducted the opposite of the first day, performed tests given to groups A1 and A2 placebos. Group B1 and B2 were given the placebo group were given the test preparation on day 1 and day 2, after one hour of physical activity assay. Instead, 3th and 4th days of treatment, the group given the test preparation B1 and B2 group receiving placebo[7].

Test Specific Physical Activity (Harvard Step test)

Metronome set the rhythm with the speed of 120 times/minute. On the first beat of the metronome and the second tap to place both feet on the bench. At the third knock panelists lowered feet first ride. In the fourth knock, the second leg was revealed (to stand upright on the floor). This cycle is repeated until 5 minutes. Panelis while riding the bench must remain upright and should not be bent and the rhythm of a metronome beats appropriately. Pulse and blood pressure are calculated at minute 1st, 2nd and 3th.

RESULTS AND DISCUSSION

In this study, the sample used is the roots of the plants of the *Eurycoma longifolia* Jack was obtained from Darmasraya, West Sumatera. Identification of the plant has been carried out in the herbarium of Biology, University of Andalas. Based on the results of this identification can be seen that the sample used in this study is the root of a plant *Eurycoma longifolia*. Forms of plants and roots can be seen in figure 1.

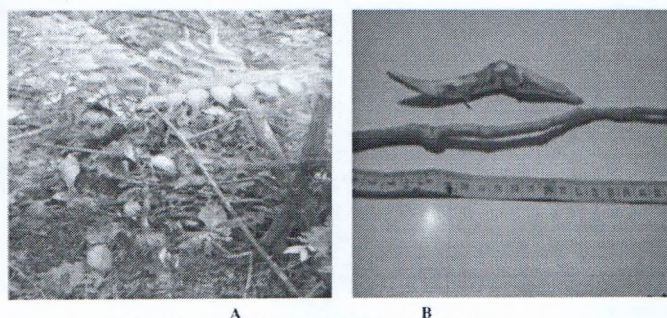


Figure 1. Plants and roots of the *Eurycoma longifolia* Jack
Description: A = The plant, B = The roots of *Eurycoma longifolia*.

From 350g of roots was obtained 13.05g dry extract with a yield of 3.73%. organoleptic examination the extract obtained by the consistency of a thick, brownish-yellow color, characteristic smell, the taste bitter. Examination of drying shrinkage viscous extract obtained 12.23% and ash content of 6.41%. To prove that the phytochemical screening positive for alkaloids, phenolics and steroids. The extract was added to 5.6 mg capsule with the composition of every capsule. Test capsule disintegration and uniformity of weight of 5,15 minutes none capsule that exceeds 1% of the weight of the capsule.

This research has passed the test of the Ethics Committee Ethics Faculty of Medicine, University of Andalas [8].For the pulse measurement results on average in futsal athletes in group A and group B can be seen in Figure 2.

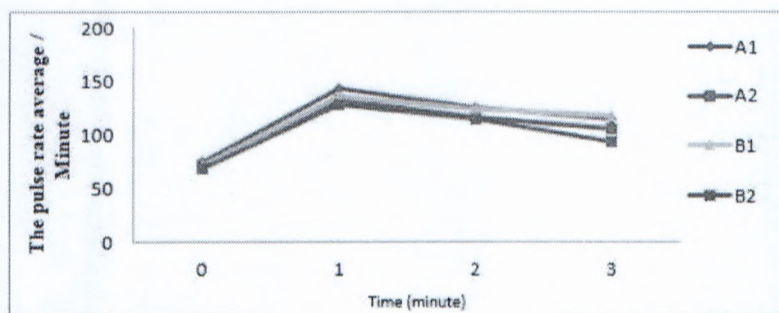


Figure 2. Graph of relation between the number of pulses per minute of futsal athletes

Description: A1 = day^{1st} of placebo, A2 = one day giving *Eurycoma longifolia* root extract 5.6 mg, B1 = twodays of placebo giving, B2 = two day giving of the *Eurycoma longifolia* root extract 5.6 mg.

Based on the results above shows the pulse of futsal athletes after given the extract of the roots of *Eurycoma longifolia* decreased lower than the athletes who are not given the extract. It shows the physical recovery (recovery) athletes who consume the *Eurycoma longifolia* extract better when compared with placebo ($p < 0.01$). It can be seen the effects of the use of extracts of Pasak bumi for one day and two days did not happen difference of meaning.

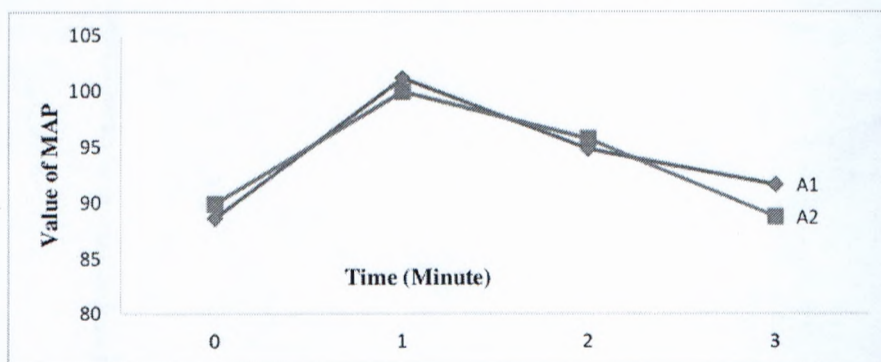


Figure 3. Graphic of the relation between the value of MAP of futsal athletes who consume extract the roots of *Eurycoma longifolia* for one day. Description: A1 = placebo, A2 = extract the roots of *Eurycoma longifolia* of 5.6 mg

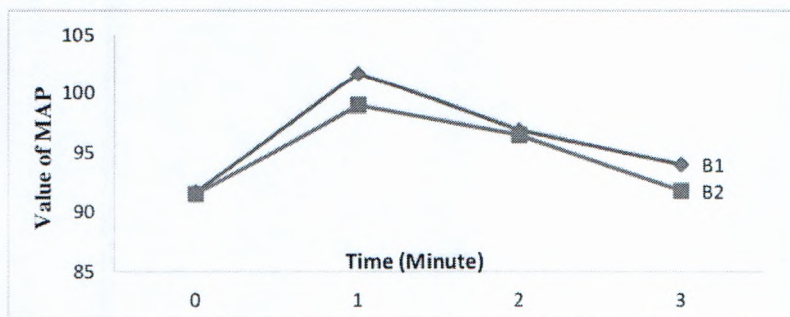


Figure 4. Graphic the relations between the value of MAP of futsal athletes who consume extract the roots of *Eurycoma longifolia* for 2 days. Description: B1= placebo, B2 = extract the roots of Pasak bumi 5.6 mg

In observation of blood pressure, which is a calculated value of systolic blood pressure and diastolic. Furthermore, the value determined Mean Arterial Pressure (MAP), this value shows the pressure in the arterial vessels after the activity. MAP value is the value of the average arterial blood pressure needed to keep the blood circulation to the brain. If the arterial blood pressure is too high may lead to rupture of blood vessels in the brain or cause symptoms of hypertension, but if it is too low, the body will be in a weak condition due to reduced oxygen supply to the brain. To get the value of MAP with the following formula [9].

$$MAP = \frac{(Sistole Pressure + (2x Diastole Pressure))}{3}$$

The normal value of MAP is 70-100 mmHg and when the value is <70 mm Hg or > 100 mmHg showed the disruption of the arterial pressure. MAP value of futsal athletes who consume extract of the roots *Eurycoma longifolia* for one day can be seen in Figure 3 and consuming over 2 days can be seen in Figure 4.

MAP needs to be done to look at the same elasticity of arterial vessels in the drug safety system affects blood pressure. Results average above shows that the value of MAP in athletes given extract of the roots *Eurycoma longifolia* there is no <70 and >100 mmHg which is in the normal range, this means that the use extract of the roots *Eurycoma longifolia* is safe to use when seen from the side of the blood pressure. But the value of MAP in athletes who are not given the extract of the roots *Eurycoma longifolia* there that exceeds the normal limit of 1st minutes. From this value is seen that the use of *Eurycoma longifolia* root extract on the athletes better and safer to blood pressure than did not use. In consuming the *Eurycoma longifolia* root extract either a day or two days turned out to be its effect on blood pressure was not significant [11].

In determining the effect of the *Eurycoma longifolia* root extract on the activity of the body in increase work ability index can calculate in the body (AIC) and the method is called by the Harvard Step Test. The value of AIC can be seen in Table 1.

Based on the calculation, the value of AIC from futsal athletes who consume the *Eurycoma longifolia* root extract can be seen in Table 2. From the value of AIC seen that the use of *Eurycoma longifolia* root extract have stimulant activity in improving the performance of the activities of the body. Lowering the pulse rate and blood pressure in athletes after 5 minutes of inactivity (Harvard Step Test) to assist in the recovery (recovery) stamina athletes. How to calculate body's ability index (AIC) can use the formula below.

$$AIC = \frac{\text{old up and down (in seconds)} \times 100}{2 \times (\text{pulse 1} + \text{pulse 2} + \text{pulse 3})}$$

Table 1. Category Agency Capability Index [10]

Category	Value	Calculation Results AIC
Very good	5	>90
Good	4	80-89
Sufficient	3	65-79
Moderate	2	50-64
Weak	1	<50

Percentage of increase in the average value of AIC in futsal athletes who consume daily extract of the roots *Eurycoma longifolia* AIC increased 17.56%, while the use of two days increased by 24.18%. The graphic enhancement of the value of AIC can be seen in Figure 5.

Table 2. Value Agency Capability Index (AIC) the Athletes Futsal

No	A1	B1	A2	B2
1	59,68	70,63	88,23	96,46
2	79,36	62,66	86,70	86,62
3	69,13	76	78,53	98,03
4	78,53	77,51	84,74	81,74
5	72,57	65,79	81,74	79,36
6	69,28	65,32	78,12	79,78
7	73,52	80,64	83,10	99,03
8	80,35	82,11	99,27	97,4
Rata-rata	72,80	72,58	85,05	89,80

Description: A1 = placebo daily, A2 = extract the roots of the *Eurycoma longifolia* for one day, B1 = placebo for 2 days and B2 = extract the roots of the *Eurycoma longifolia* for two days.

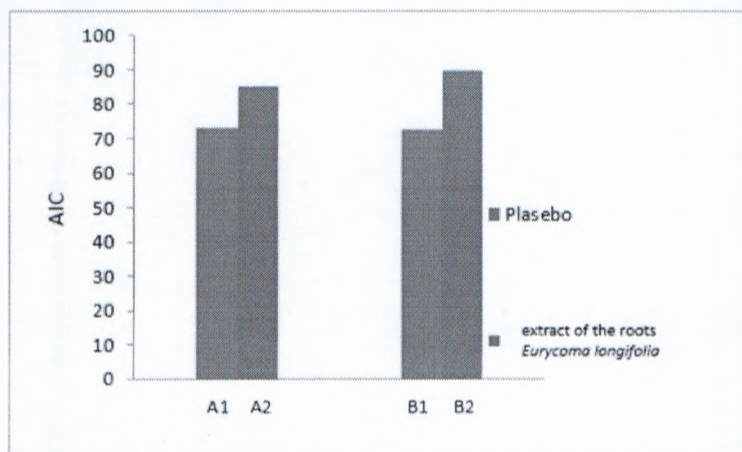


Figure 5. The graphic on the AIC (Agency Index Capability) of Futsal Athletes

Description: A1 = placebo daily, A2 = extract of the roots *Eurycoma longifolia* for one day, B1 = placebo for 2 days, B2 = extract of the roots *Eurycoma longifolia* for two days.

If we seen the average value of AIC between group A and group B seen an increase of 5.58%, but this was not significant after statistical analysis by T test. For the group given the extract for one day when compared with the extract that was given for two days did not show a significant difference.

CONCLUSION

Based on the research that has been done on root extract of *Eurycoma longifolia* Jack. On physical activity futsal athletes with Harvard Step Test method, can be summed up as follows:

1. Provision of the *Eurycoma longifolia* root extract can increase the recovery of physical activity athletes.
2. Provision of the *Eurycoma longifolia* root extract. For one day and two days gives the same effect on increasing physical activity athlete's recovery.

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