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Activities stimulant betel nut extract (*Areca catechu* L.) on the improvement of physical activity

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ABSTRACT

Pinang is one plant that is trusted by the public as increase stamina enhancing drugs. From several studies have shown to have a stimulant effect on animal experiments. This study aims to determine the effect of the stimulant betel nut extracts to increase student physical activity. This study is a purely experimental design was complete random with a one-way pattern. Sixteen students (male) were divided into two groups in which the group A and group B using the daily use of two days. Students are requested activity up and down the bench (Harvard Step Test) for 5 minutes and measured the time it takes students as well as the pulse of students per 30 seconds in the first minute (DN 1) second (DN 2) and third (DN 3) to obtain the value Agency Capability Index (IKB) students. Betel nut extract along with the filler material input into the capsules so that each capsule contains 270 mg. Betel nut extract capsules given one time a day for groups A and 1 times a day for 2 days for group B. IKB Data from each group of students who consumption preparations were analyzed by T test results showed that the betel nut extract (*Areca catechu* L.) can increase the activity of students and administration 1 day and 2 days of betel nut extract affects the physical activity of students.

Keywords: betel nut extract, Harvard Step Test, pulse and IKB.

INTRODUCTION

Heightened needs to be done every day demanding the body to produce a lot of energy, but the energy produced by the body is still deemed less. The use of an energy booster supplements are one solution to overcome the energy shortage. The use of supplements with the basic ingredients of medicinal plants is very widely used, due to the size of the side effects that can be caused, easy to obtain and easy to use. In general, the compounds are useful as drugs derived from plants can form all or part of the plant.

One of the plants that can be used as an energy enhancer is a nut [*Areca catechu* L.], the nut is trusted by society as a medicinal plant stamina enhancer or stimulants. Pinang is easy to grow in the tropics and usually planted in the yard, garden or cultivated. Nut has many uses from seeds, husks, leaves, until the midrib [1].

Society has many utilize for stimulant betel nut [2]. Betel nut also has the effect of euphoria and relaxation. The results of the areca nut clinical effect against schizophrenia disease. The most powerful effect arises if the chewed betel nut [3].

Stimulants are compounds that can stimulate the central nervous system that can increase motor activity [behavior of organisms in an environment], reduce fatigue and sleepiness, as well as improving the ability to concentrate and work longer. This activity is highly dependent on the time, the ability to move and get to know a new environment [4] [5]. The research aims to determine the activity of the stimulant betel nut extracts to increase the activity of students with methods Harvard Step Test.

MATERIALS AND METHODS

Materials and tools

Materials used are betel nut (*Areca catechu* L.) (Lubuk Buaya, Padang), the capsule shell, sacharum lactis (BRATACO), chloroform (Merck), distilled water, magnesium powder (Merck), hydrochloric acid (Merck), sulfuric acid (Merck), activated carbon (Norit), acetic acid (Merck) and ethanol (BRATACO).

Equipment used board capsules (Carmapharm), a measuring cup 10 ml (Pyrex), an analytical balance (Kenko), desiccators (Normax), desintegrator tester (Develop), Furnes (WiseTherm), filter paper (Whatman), bench (height 45 cm), timekeeper (Casio), metronome (Musedo) and digital sphygmomanometer (Omron).

Panelists for this study using male students as many as 16 people, healthy, weight 50-65 kg and 17-22 years of age.

Making Betel Nut Extract

The young areca nut halved, taken part in the soft, skin removed, washed, cut with a thickness of 2-5 mm, dry for 1 week and powdered and then weigh as much as 1 kg. The extract is made by maceration, 1 kg of sample was added 10 L of 70% ethanol, first soak for 6 hours while occasionally stirring, then let stand for 18 hours. Furthermore maserat separated by precipitation. Repeat the process extraction at least twice with the type and amount of the same solvent. Collect all maserat, then the solvent was evaporated with a vacuum evaporator (Depkes RI, 2008). Viscous extract obtained is dried in the oven at a temperature of ± 40 C for 8 hours. Dry extract plus the sakarum laktis, stir homogeneous and input in order to obtain capsules each capsule contains 5.6 mg dry extract.

Administration of a Preparation

Tests conducted over 2 days for group A and 4 days for group B with eight panelists each group. In this test panelists were divided into two groups, namely A1, A2, B1 and B2. A1 group was given a placebo (a capsule contents sakarum laktis) and A2 group given the test preparation (betel nut extract 270 mg / capsule) after one hour testing of physical activity. On the 2nd day to do the opposite group performed test A1 and A2 placebo group. The group was given a placebo and the group B1 B2 given test performed on day 1 and day 2, after an hour of physical activity test. On day 3 and 4 treatment contrary, the group given the test preparation B1 and B2 placebo group.

Test Specific Physical Activity (Harvard Step Test) (6) (7)

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 up to 5 minutes. Panelists 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 1, 2 and 3.

Data analysis

The data analysis results with the test method T pairs.

RESULTS AND DISCUSSION

Performed used to increase physical activity by the method of Harvard Step Test is an extract of betel nut (*Areca catechu* L.) fresh. According of identification results in the Department of Biological Science Herbarium Universitas Andalas, it is true seeds used were young betel nut are derived from species *Areca catechu* L. Image of seeds and plants betel nut (*Areca catechu* L.) can be seen in Figure 1.

Extraction is done by using the method of maceration, the reason is simple, requires no special equipment and does not require heating. The process of maceration using ethanol. Extracts obtained freed from ethanol by means evaporated using a rotary evaporator. Extracts obtained characteristic tests in accordance with Herbal Pharmacopoeia in 2008 in the form of calculation of yield, organoleptic inspection, determination of drying shrinkage and determination of ash content. The results of organoleptic inspection of betel nut extract is the consistency of thick, reddish-brown, taste and smell typical chelate. The yield of extracts 18% of dry simplesia betel nut, drying shrinkage of 8.08% and ash content of 1.16%. The results of the examination of betel nut extracts turned out to have been in accordance with the requirements set by Herbal Pharmacopoeia 2008.

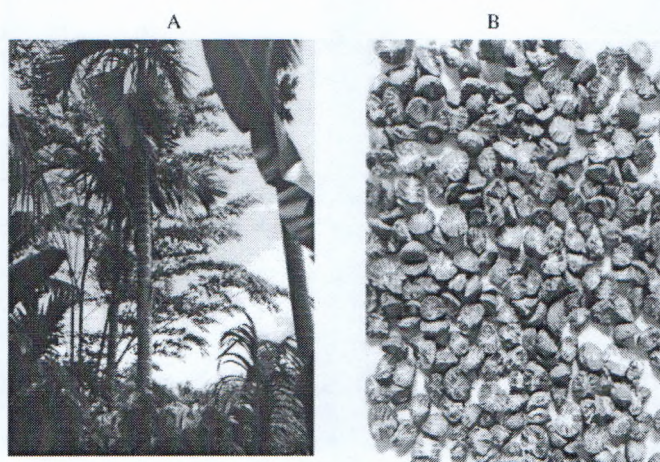


Figure 1. Plant (A) and seeds (B) of betel nut (*Areca catechu* L.)

In testing the nut extract the physical activity of students, performed extracts given in the form of a capsule with extract concentration of 270 mg / capsule. Capsules of extract areca do an evaluation form about the diversity of weights and disintegration time. The results showed that all the capsules have a weight uniformity deviation of 1.39% and a disintegration time of 4.25 minutes. These results meet the requirements according to the Indonesian Pharmacopoeia Edition III.

Before testing on humans, this research must pass Kaji Ethics. Kaji Conduct of this research has been conducted on the Research Ethics Committee of the Faculty of Medicine, University of Andalas and has been passed.

Determining their stimulant effects on betel nut extract that is using the Harvard Step Test. At the Harvard Step Test methods are measuring is the pulse and blood pressure. From the results of the pulse and blood pressure newly determined value Firm Capability Index (IKB) which is a parameter in determining the physical activity of the body. For the pulse measurement averages on the panelists were given extracts of betel nut 270 mg / capsule given once for a day (group A) can be seen in Figure 2 and the group for two days (group B) can be seen in Figure 3.

Based on the results seen in Figure 2 and Figure 3 shows the pulse of the student after mengkosumsi betel nut extract decreased lower than the athletes who ate the placebo. It shows the physical recovery (recovery) athletes who consume betel nut extract better when compared with placebo ($p < 0.01$). When seen the effects of the use of betel nut extracts for one day and two days did not happen difference of meaning.

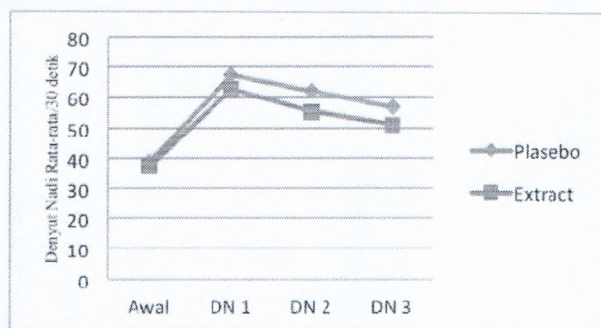


Figure 2. The resulting increase in pulse rate of the students who were given extracts of betel nut for a day (Group A) .Description DNI = pulse minutes to 1 ,DN2 = pulse minutes to 2 and DN3 = pulse minutes to 3

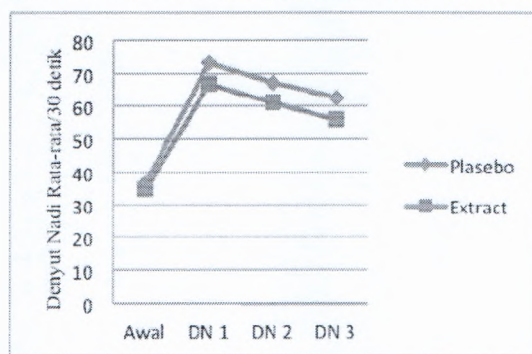


Figure 3. Results increased pulse rate of the students who were given extracts of betel nut for two days (Group A) . Description DNI = pulse minutes to 1 , DN2 = pulse minutes to 2 and DN3 = pulse minutes to 3

In determining the blood pressure , which is a calculated value of systolic blood pressure and diastolic . From the data systolic and diastolic blood pressure values determined Mean Arterial Pressure (MAP) . This value indicates the pressure in the arterial vessels after doing activities (8) . 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.

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

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 grades of students who ate betel nut extracts for one day can be seen in Figure 4 and consuming over 2 days can be seen in Figure 5.

Calculation to see an average increase in blood pressure is determined from the value of MAP (Mean Arterial Pressure). In general, MAP values between 70-110 mmHg, of the results obtained showed that the betel nut extract capsules can raise blood pressure, but not over the limit value MAP same results also demonstrated the value of pulse rise after administration betel nut extract capsules but also a significant decrease compared with no use preparations (helps the body recovery / recovery), it indicates that the use of betel nut extract capsules can provide a stimulant effect that is good for the body.

MAP needs to be done to look at the same elasticity of arterial vessels in the drug safety system affects blood pressure. The results above shows that the average value of MAP in students who consumption betel nut extract nothing <70 and no> 100 mmHg which is in the normal range, this means that the use of betel nut extracts are safe to use when viewed from the side of the blood pressure. But the value of MAP in students who do not consumption betel nut extract (placebo) there are in excess of the normal limit of minutes to 1. From this value is seen that the use of betel nut extracts the students better and safer to blood pressure than did not use. In consuming betel nut extract either a day or two days turned out to be its effect on blood pressure was not significant.

In determining the effects of betel nut extracts on the body's physical activity in improving work ability index can calculate body (IKB) and the method is called by the Harvard Step Test. The value of IKB can be seen Table 1.

Based on the calculation, the value of IKB of students who ate betel nut extracts can be seen Table 2. From the value of IKB seen that the use of betel nut extract has stimulant activity in improving the performance of physical activity. Lowering the pulse rate and blood pressure in students after 5 minutes of inactivity (Harvard Step Test) to assist in the recovery (recovery) student stamina. How to calculate body's ability index (IKB) can use the following formula below.

$$IKB = \frac{\text{duration of up and down (in second)} \times 100}{2 \times (\text{pulse 1} + \text{pulse 2} + \text{pulse 3})}$$

Table 2. Criteria Capability Index Agency (Rusip, 2006)

Criteria	Value	Calculation Results IKB
Very good	5	>90
Good	4	80-89
Enough	3	65-79
Medium	2	50-64
Less than	1	<50

Increase in the average value of IKB in students who ate betel nut extracts IKB day increased 31.83%, while the use of two days increased by 28.55%. The graphic enhancement of the value of IKB is visible Figure 6.

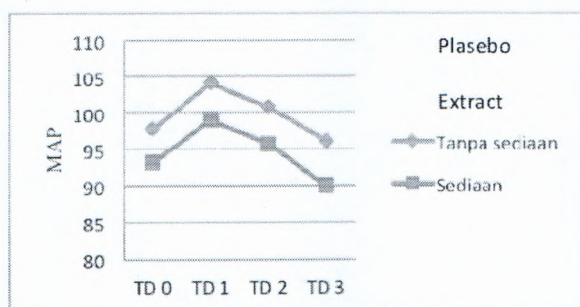


Figure 4. The results of the measurement values by MAPdari student for a day betel nut extract (Group A) .Description DN1 = pulse minutes to 1 , DN2 = pulse minutes to 2 and DN3 = pulse minutes to 3

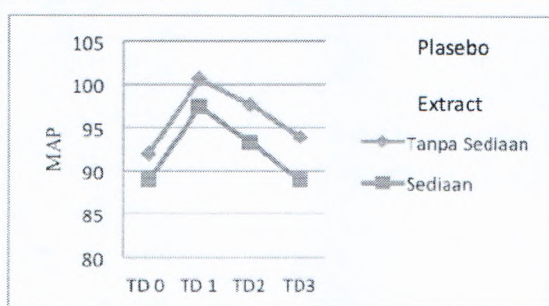


Figure 5. The results of the measurement value of the MAP by students betel nut extract for two days (Group A) . Description DN1 = pulse minutes to 1 , DN2 = pulse minutes to 2 and DN3 = pulse minutes to 3

Table 2. Value Measurement Capability Index Agency of students who ate betel nut extracts

No	Plasebo 1 day (A1)	Extract 1 day (A2)	Plasebo 2 day (B1)	Extract 2 day (B2)
1	51,62	66,92	30,58	37,36
2	38,80	54,5	78,94	85,2
3	31,74	42,8	49,0	70,05
4	16,83	23,4	44,68	67,16
5	16,67	31,21	25,54	30,29
6	54,1	72,88	75,75	89,28
7	36,36	51,02	63,48	87,71
8	88,75	98,68	26,04	39,47
Average	41,85	55,17	49,25	63,52
% Increase	A= 31,83 %		B= 28,55 %	

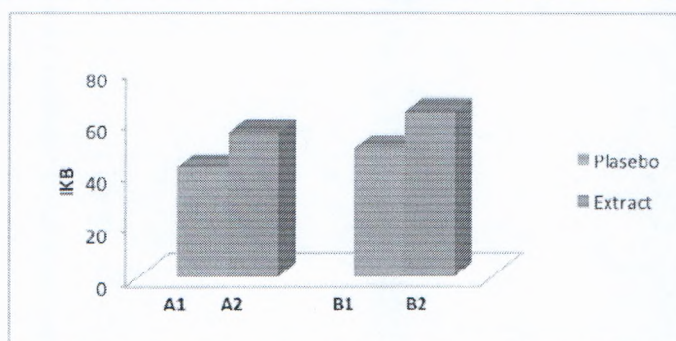


Figure 6. The bar graph of the increase in IKB there are students who ate betel nut extracts. Description: A1 = The student group taking a placebo daily, A2 = The student group using performed day, B1 = The student group taking a placebo two days, B2 = The student group using performed two days

Results of research conducted showed an increase in the ability of the student body index results before and after administration of betel nut extract capsules. This shows that the content of arecoline in betel nut extract that acts as a muscarinic acetylcholine receptor agonists and may increase monoamines such as noradrenaline. Noradrenaline can cause dilatation of the pupil (vigilance), increased blood pressure, vasoconstriction of blood vessels to the muscles, reduces blood circulation to the stomach (decreased appetite), increasing the release of sugar into the blood to increase energy and causes contraction of the muscle. Increased blood pressure and pulse rate in students due to the effects of the administration of a preparation and process the balance of the body, when the panel up and down the bench it would require a lot of energy so that the need for oxygen increases. Administration of a preparation betel nut extract can help the release of the monoamine that can increase heart rate and blood pressure to increase the

blood supply to the muscles and increase the volume of oxygen to the muscles so that the body fitness also increased.

The preparation of drugs that are stimulants has the disadvantage of increased blood pressure and pulse are too long so that it can be a risk factor for heart attack but, based on the results obtained during the test capsule extract of betel nut does not increase heart rate and heart for too long so that it can be said that preparations were given safe to use.

CONCLUSION

From the results of research conducted can be concluded as follows:

1. Betel nut extract capsules 270 mg dose given to students can increase physical activity.
2. Providing for a day and two days of betel nut extracts showed similar results to increased physical activity.

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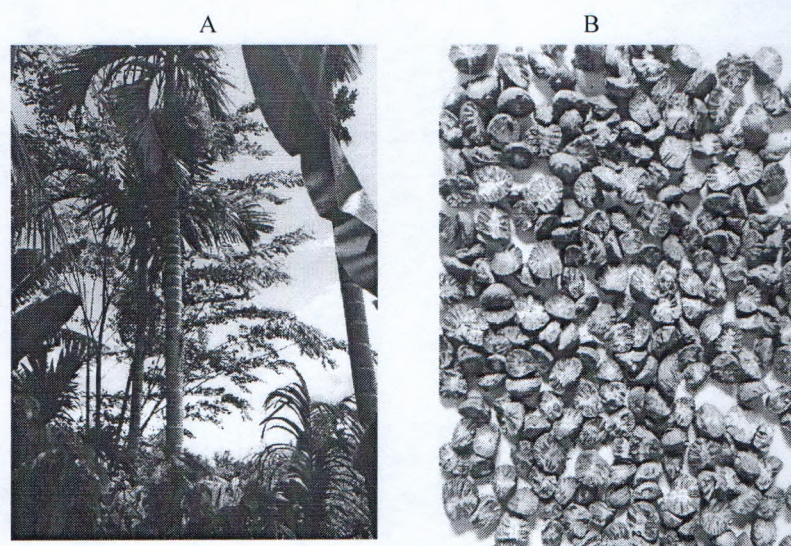


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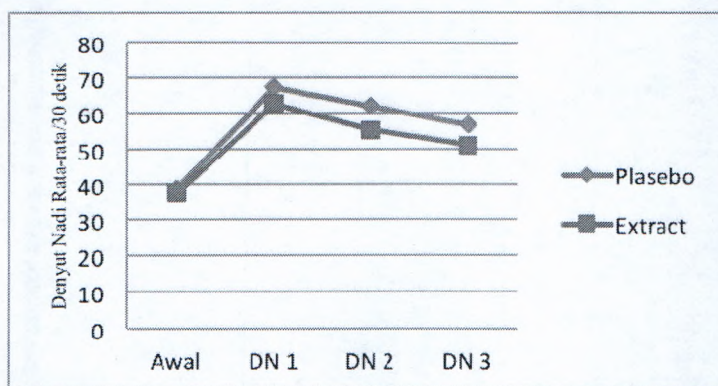


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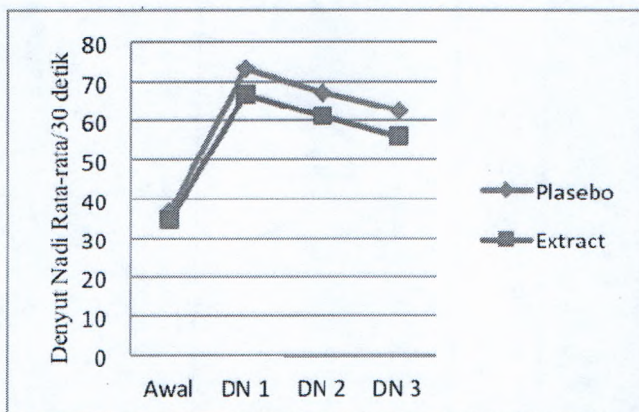


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MAP needs to be done to look at the same elasticity of arterial vessels in the drug safety system affects blood pressure. The results above shows that the average value of MAP in students who consumption betel nut extract nothing <70 and no> 100 mmHg which is in the normal range, this means that the use of betel nut extracts are safe to use when viewed from the side of the blood pressure. But the value of MAP in students who do not consumption betel nut extract (placebo) there are in excess of the normal limit of minutes to 1. From this value is seen that the use of betel nut extracts the students better and safer to blood pressure than did not use. In consuming betel nut extract either a day or two days turned out to be its effect on blood pressure was not significant.

In determining the effects of betel nut extracts on the body's physical activity in improving work ability index can calculate body (IKB) and the method is called by the Harvard Step Test. The value of IKB can be seen Table 1.

Based on the calculation, the value of IKB of students who ate betel nut extracts can be seen Table 2. From the value of IKB seen that the use of betel nut extract has stimulant activity in improving the performance of physical activity. Lowering the pulse rate and blood pressure in students after 5 minutes of inactivity (Harvard Step Test) to assist in the recovery (recovery) student stamina. How to calculate body's ability index (IKB) can use the following formula below.

$$IKB = \frac{\text{duration of up and down (in second)} \times 100}{2 \times (\text{pulse 1} + \text{pulse 2} + \text{pulse 3})}$$

Table 2. Criteria Capability Index Agency (Rusip, 2006)

Criteria	Value	Calculation Results IKB
Very good	5	>90
Good	4	80-89
Enough	3	65-79
Medium	2	50-64
Less than	1	<50

Increase in the average value of IKB in students who ate betel nut extracts IKB day increased 31.83%, while the use of two days increased by 28.55%. The graphic enhancement of the value of IKB is visible Figure 6.

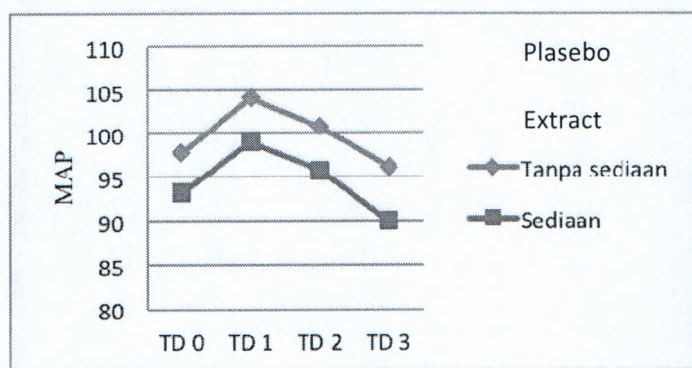


Figure 4. The results of the measurement values by MAPdari student for a day betel nut extract (Group A) . Description DN1 = pulse minutes to 1 , DN2 = pulse minutes to 2 and DN3 = pulse minutes to 3

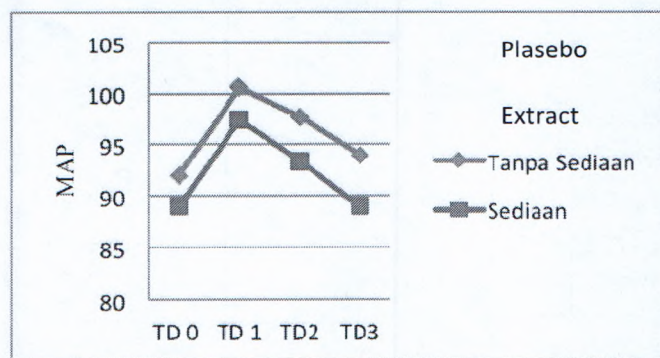


Figure 5. The results of the measurement value of the MAP by students betel nut extract for two days (Group A) . Description DN1 = pulse minutes to 1 , DN2 = pulse minutes to 2 and DN3 = pulse minutes to 3

Table 2. Value Measurement Capability Index Agency of students who ate betel nut extracts

No	Plasebo 1 day (A1)	Extract 1 day (A2)	Plasebo 2 day (B1)	Extract 2 day (B2)
1	51,62	66,92	30,58	37,36
2	38,80	54,5	78,94	85,2
3	31,74	42,8	49,0	70,05
4	16,83	23,4	44,68	67,16
5	16,67	31,21	25,54	30,29
6	54,1	72,88	75,75	89,28
7	36,36	51,02	63,48	87,71
8	88,75	98,68	26,04	39,47
Average	41,85	55,17	49,25	63,52
% Increase	A= 31,83 %		B= 28,55 %	

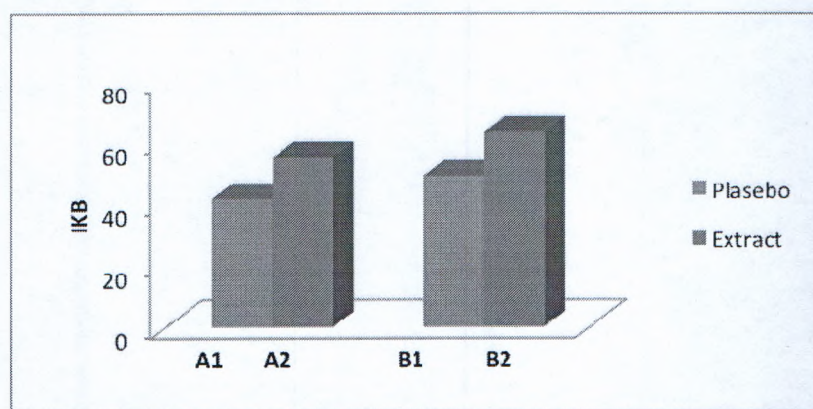


Figure 6. The bar graph of the increase in IKB there are students who ate betel nut extracts. Description: A1 = The student group taking a placebo daily, A2 = The student group using performed day, B1 = The student group taking a placebo two days, B2 = The student group using performed two days

Results of research conducted showed an increase in the ability of the student body index results before and after administration of betel nut extract capsules. This shows that the content of arecoline in betel nut extract that acts as a muscarinic acetylcholine receptor agonists and may increase monoamines such as noradrenaline. Noradrenaline can cause dilatation of the pupil (vigilance), increased blood pressure, vasoconstriction of blood vessels to the muscles, reduces blood circulation to the stomach (decreased appetite), increasing the release of sugar into the blood to increase energy and causes contraction of the muscle. Increased blood pressure and pulse rate in students due to the effects of the administration of a preparation and process the balance of the body, when the panel up and down the bench it would require a lot of energy so that the need for oxygen increases. Administration of a preparation betel nut extract can help the release of the monoamine that can increase heart rate and blood pressure to increase the

blood supply to the muscles and increase the volume of oxygen to the muscles so that the body fitness also increased.

The preparation of drugs that are stimulants has the disadvantage of increased blood pressure and pulse are too long so that it can be a risk factor for heart attack but, based on the results obtained during the test capsule extract of betel nut does not increase heart rate and heart for too long so that it can be said that preparations were given safe to use.

CONCLUSION

From the results of research conducted can be concluded as follows:

1. Betel nut extract capsules 270 mg dose given to students can increase physical activity.
2. Providing for a day and two days of betel nut extracts showed similar results to increased physical activity.

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