

SWEET STAR FRUIT REDUCES BLOOD PRESSURE IN NORMOTENSIVE SUBJECTS

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ABSTRAK

Obat tradisional selalu disarankan di Indonesia untuk memecahkan masalah medis. Berbagai tanaman obat dapat ditemukan di negara ini. Belimbing manis adalah salah satunya. Belimbing manis dapat menurunkan tekanan darah, mengurangi masalah GIT, dan antioksidan. Belimbing manis terdiri atas kalium, yang berfungsi sebagai diuretik dan menurunkan tekanan darah. Penelitian ini menggunakan buah belimbing manis karena dapat menurunkan tekanan darah. Seleksi sampel menggunakan metode simple random sampling. Kriteria sampel usia 17-22, berat 50-80 kg dengan n = 90, yang dibagi menjadi 3 kelompok. Kelompok kontrol diberi 200 ml air, kelompok perlakuan pertama diberi 200 ml jus buah belimbing manis (Averrhoa carambola L.), dan kelompok perlakuan kedua diberikan campuran 100 ml jus buah belimbing manis (Averrhoa carambola L.) diencerkan dengan air 100 ml. Analisis data menggunakan software SPSS. Hasil menunjukkan penurunan yang signifikan pada tekanan darah sistolik dan penurunan yang tidak signifikan pada tekanan darah diastolik setelah 30 menit pemberian 200 ml jus belimbing manis (Averrhoa carambola L.). Sedangkan, tekanan darah sistolik dan diastolik setelah 60 dan 90 menit menunjukkan perbedaan yang signifikan dalam penurunan tekanan darah. Pengobatan dengan 100 ml jus buah belimbing manis (Averrhoa carambola L.) dan 100 ml air menunjukkan hasil yang sama dengan hasil pengobatan dengan 200 ml jus belimbing manis (Averrhoa carambola L.). Hasil penelitian ini menunjukkan bahwa ada perubahan yang signifikan pada tekanan darah, sedangkan perbedaan dosis jus belimbing manis tidak menghasilkan efek yang signifikan. Sangat disayangkan bahwa data untuk pengolahan SPSS berdistribusi normal. Hal ini mungkin disebabkan oleh beberapa faktor, seperti kondisi tubuh yang berbeda antara satu subjek dengan yang lain. (FMI 2012;48:198-202)

Kata kunci: belimbing, tekanan darah, kalium

ABSTRACT

Traditional medicine is always recommended in Indonesia to solve medical problem. Various medicinal plants can be found in this country. Sweet star fruit is one of them. It can decrease blood pressure, reduce GIT problem, and antioxidant. It consists of potassium, whose function is as diuretic and decreases blood pressure. This research used sweet star fruit because the fruit can decrease blood pressure. Samples selection used simple random sampling method. The criteria of the sample were age 17-22, weight 50-80 kg with n = 90, who were divided into 3 groups. The control group was given with 200 ml of water, the first treatment group was given 200 ml sweet star fruit juice (Averrhoa carambola L.), and the second treatment groups were given with a mixture of 100 ml sweet star fruit juice (Averrhoa carambola L.) diluted with 100 ml water. Data analysis used SPSS software. The results showed significant decrease in systolic blood pressure and a non-significant decrease in diastolic blood pressure after 30 minutes administration of 200 ml sweet star fruit juice (Averrhoa carambola L.). Whereas, systolic and diastolic blood pressure after 60 and 90 minutes showed a significant difference in blood pressure reduction. Treatment with 100 ml sweet star fruit juice (Averrhoa carambola L.) and 100 ml of water revealed similar results with the results of treatment with 200 ml of sweet star fruit juice (Averrhoa carambola L.). The results of this study indicated that there were significant changes in blood pressure, while differences in dose of sweet star fruit juice did not produce significant effect. It was very unfortunate that the data for SPSS processing were normally distributed. This may be caused by several factors, such as different condition of the body between one subject and the others. (FMI 2012;48:198-202)

Keywords: Star fruit, blood pressure, potassium

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INTRODUCTION

Indonesia is a country rich in diversity of flora and fauna. Wealth will be a variety of flora is a challenge for knowledge. Plant is one of the riches that no value because it has a variety of benefits in life. One of the existing benefits is for medicine. Despite the availability

of synthetic drugs, there are many groups of people who often use natural materials for treatment, such as fruit. In line with this, and the development of Science and Technology, the Indonesian government is very concerned with the development of traditional medicine, especially for plants that grow in Indonesia. Besides awareness to follow the pattern of life is getting back to

nature encourages the development of herbal medical services in Indonesia.

One of the many plants that used the Indonesian community is starfruit. There are various types of starfruit, one of whom is a sweet star fruit. Sweet star fruit (*Averrhoa carambola L.*) is the fruit of a plant that is often used as a medicinal plant. Besides as antihypertensive, sweet star fruit is also used to treat diabetes, paralysis, and dizziness. The leaves are used to treat cancer, and flowers can be used to treat toothache. Many of the people who consume the leatherback as blood pressure lowering drugs, but the extent to which the influence of a decrease in blood pressure and the workings of star fruit in lowering blood pressure as yet unclear.

Alternative decrease in blood pressure in the sweet star fruit is almost the same work with the effects of substances which are diuretics. Efficacy of diuretics to decrease blood pressure came from the effects of increased excretion of sodium, chloride and water which ultimately lowers blood volume and extracellular fluid (Panjaitan 2000). In addition, the amount of potassium in star fruit, causes an increase in total body potassium. Increased total potassium, causes an increase in the concentration of intracellular fluid and the resulting withdrawal of extracellular ions into intracellular. This resulted in a decrease in extracellular volume also simultaneously lowering blood pressure (Bali Post 2006).

Research on the efficacy of sweet star fruit (*Averrhoa carambola L.*) had not previously been done. There the few journals that report research, but not research on blood pressure, but on the other properties of sweet star fruit (*Averrhoa carambola L.*). Therefore, in this study to ascertain whether the perception the public has about the effects of sweet star fruit (*Averrhoa carambola L.*) in lowering blood pressure is correct or not. With some of the reasons listed above and based on testing in connection with a potential which is still not widespread, conducted this study to examine one of the role and power of the sweet star fruit, namely as an anti-hypertensive. The purpose of this study was to determine the effectiveness of the efficacy of sweet star fruit (*Averrhoa carambola L.*) on blood pressure reduction.

MATERIALS AND METHODS

Type of research is experimental research with pretest-posttest group design. The population of this study was students of the Faculty of Medicine, University of Airlangga with normal blood pressure. The samples of

this study were male with ages 18-22 years with a body weight between 50-80 kg. Inclusion criteria were subjects not taking any drugs that can affect blood pressure, the subjects did not perform certain activities that can affect blood pressure significantly, and the subject does not suffer from certain diseases that can affect the results of a study of blood pressure. While the exclusion criteria are subject to collapse time of treatment, subjects suffering from disorders of blood pressure (hypotension or hypertension), and the subject was not taking any drugs that can affect blood pressure.

The sample size used was 90 people, which is divided into 3 treatment groups. Therefore, each group consisted of 30 people. By taking the number of samples based on the opinions Gay (as cited in Arita 2005). According to Gay, common causal research that uses a minimum of two groups, namely the control and experimental groups, for each group using at least 30 samples. The number of samples can be reduced, for example 15 samples, as long as the control in the implementation of research tightened. This was done with a note that it is possible to study replicated and the result should be more moderately interpreted (Arita 2005). The sampling technique used simple random sampling where the samples were divided into 3 groups by lottery.

Giving sweet star fruit juice in the sample is determined based on the 2 treatment groups, namely the provision of sweet star fruit juice 200 ml, and the provision of sweet star fruit juice as much as 100 ml were mixed with 100 ml of mineral water. Making this sweet star fruit juice by means of blackmail, and measured to show the 100 ml and 200 ml, then measure the mineral water with mineral water entering to show number 100 ml. After getting sweet star fruit juice with a size of 100 ml and 200 ml, enter starfruit sweet juice 200 ml into a glass and fill 100 ml of sweet star fruit juice mixed with 100 ml of mineral water into a glass of mineral water on the Granting B. the control group was given 200 ml. Provision of mineral water in the sample using the branded mineral water Aqua and measured using a measuring cup to get the specified size (200 ml). The study was conducted from September 2011 in Space Practical Physiology Faculty of Medicine, University of Airlangga. Data analysis used SPSS software with the Single Way Anova test.

RESULTS

Since the number of alpha variable whose value is below 0.05, it indicates the presence of abnormal distribution of the data obtained. Coupled with the absence of any variables that have alpha values above 0.05 in three different treatments as well. So for the

next, way ANOVA single formula can not be used in data processing. Because of this, the Kruskal-Walis formula used to search for the meaning of the data, Kruskal-Walis in which formula is used for data distribution is not normal. The results of the use of the formula alpha Kruskal Wallis in data processing of each variable can be seen in Table 2.

From Table 2 listed above are known α values above 0.05. Kruskal-Walis in the use of the formula agreed that if the α above 0.05 means data or variable was not significant. While α below 0.05 indicate that the results are meaningful. Because the data processing using the Kruskal Wallis formula, given the data distribution is not normal, then the comparison between one variable with another variable that can not be directly processed using SPSS. Therefore to compare between one treatment with another treatment, then in one variable used two further tests which test t_2 free samples and Mann Whitney test. These tests are intended to detect a significant difference between treatment or not one with the other in one variable. Mann Whitney test or t_2 free samples only performed on variables that showed significant results in the previous test. Mann Whitney test done if one α SPSS data analysis results that there is > 0.05 and an α of data analysis SPSS another < 0.05 or α of data analysis SPSS < 0.05 both.

While t_2 test free samples was used if the data analysis SPSS α is equal to or > 0.05 . On the use of Mann Whitney test and t_2 free sample assessment existence of a significant difference or not the two different treatments are shown in the results of the data analysis SPSS α or the results of SPSS output, called Asymp. Sig. (2-tailed). If the α of the data analysis SPSS > 0.05 , it shows no significant difference between the two different treatments. Whereas if the α of the data analysis SPSS < 0.05 , indicating that the presence of a significant difference between the two different treatments. The results of data processing with t_2 test and Mann Whitney free samples to determine the meaning of the data based on the value of α

(Asymp. Sig. (2-tailed)) can be seen in Table 3. From the calculation of the use of SSPs, found no significant differences in treatment α between 1.2 and 3. However, there are significant differences between the 3 treatment on α , α , α , α , and α , but showed a significant difference in each variable between treatment 1 and 2, and α between treatments 2 and 3, while highly significant differences in each variable between treatments 1 and 3.

DISCUSSION

Sweet star fruit (*Averrhoa carambola L.*) contains many properties include high fiber that can be used as lowering cholesterol and aid digestion, vitamin A and C is an antioxidant that can prevent cancer. There was also the content of potassium and fiber pectin in sweet star fruit that is believed to lower blood pressure. Potassium is a positively charged ion and especially many in the cell. A total of 95% potassium is in the intracellular fluid. The role of potassium chloride is along with maintaining the osmotic pressure of the intracellular fluid and acid-base balance. High potassium intake will tend to increase in the concentration of intracellular fluid, so it tends to draw fluid from the extracellular and ultimately lowers blood pressure (Bali Post 2006). Meanwhile, pectin fiber, including soluble dietary fiber in food serves as cleaning toxins from the body, absorbing excess water in the intestines, soften the stool, help deter dental caries and gum, lowers cholesterol, and increase HDL (high density lipoprotein) (Johanis 2007).

Research on the efficacy of sweet star fruit (*Averrhoa carambola L.*) had not previously been done. There are at considerably between research journal report, but not the study of blood pressure, but on the other properties of sweet star fruit (*Averrhoa carambola L.*). Therefore, in this study to ascertain whether the perception the public has about the effects of sweet star fruit (*Averrhoa carambola L.*) in lowering blood pressure is correct or not.

Table 1. Normality of data with a single way ANOVA

Treatment Group	Alpha dsis1	Alpha ddial1	Alpha dsis2	Alpha ddia2	Alpha dsis3	Alpha ddia3
1	0.002	0.21	0.212	0.223	0.15	0.451
2	0.003	0.063	0.018	0.192	0.044	0.19
3	0	0.002	0.002	0.014	0.009	0.035

Table 2. Test Results For Third Meaning a Direct Data Treatment Group

Variables	Test	P (Sig)	Significance
dsis1	Kruskal Wallis	0.139	Not significant
ddia1	Kruskal Wallis	0	Significant
dsis2	Kruskal Wallis	0.003	Significant
ddia2	Kruskal Wallis	0	Significant
dsis3	Kruskal Wallis	0	Significant
ddia3	Kruskal Wallis	0	Significant

Table 3. Results of Comparative Treatment in One Variable

Variables	P (Sig)	Difference	Tests
ddia1 between treatment 1 and 2	0.719	absent	t2 independent sample
ddia1 between treatment 2 and 3	0	present	mann whitney
ddia1 between treatment 1 and 3	0	present	mann whitney
dsis2 between treatment 1 and 2	0.126	absent	mann whitney
dsis2 between treatment 2 and 3	0.131	absent	t2 independent sample
dsis2 between treatment 1 and 3	0.001	present	mann whitney
ddia2 between treatment 1 and 2	0.956	absent	t2 independent sample
ddia2 between treatment 2 and 3	0.001	present	mann whitney
ddia2 between treatment 1 and 3	0	present	mann whitney
dsis3 between treatment 1 and 2	0.223	absent	mann whitney
dsis3 between treatment 2 and 3	0.004	present	t2 independent sample
dsis3 between treatment 1 and 3	0	present	mann whitney
ddia3 between treatment 1 and 2	0.276	absent	t2 independent sample
ddia3 between treatment 2 and 3	0	present	mann whitney
ddia3 between treatment 1 and 3	0	present	mann whitney

Research to prove the effect of a decrease in blood pressure by consuming fruit juice sweet star fruit (*Averrhoa carambola L.*) is the measurement interval and the dose given, in which blood pressure measurements taken after 30, 60 and 90 minutes to consume 200 ml of juice of sweet star fruit (*Averrhoa carambola L.*), 100 ml of juice sweet star fruit (*Averrhoa carambola L.*) and 100 ml of water, and 200 ml of water. The research results are processed using SPSS, showed a decrease in systolic blood pressure were not significant and decreased diastolic blood pressure were significantly from analysis of systolic and diastolic blood pressure early, after 30 minutes of administration of sweet star fruit juice (*Averrhoa carambola L.*) by 200 ml.

As for the systolic and diastolic blood pressure, after 60 and 90 minutes showed a significant difference in blood pressure reduction. While on treatment 100 ml sweet star fruit juice (*Averrhoa carambola L.*) and 100 ml of water, obtained similar results with the results of the analysis on the treatment of 200 ml juice of sweet star fruit (*Averrhoa carambola L.*). This suggests differences in the levels of sweet star fruit juice do not really give

the effect of a significant decrease in blood pressure. However, the effect of sweet star fruit juice (*Averrhoa carambola L.*) against a decrease in blood pressure, can be justified by looking at the results of the analysis of blood pressure reduction was not significant in the administration of 200 ml of water.

In this study, administration of star fruit juice is acute, namely the provision of star fruit juice is given only once and then their blood pressure measured. Based on the results that have been obtained showing that the research conducted showed significant changes in blood pressure were used and this subject can be proved that the true sweet star fruit (*Averrhoa carambola L.*) can lower blood pressure. However, in addition to lowering blood pressure, as well as the expression obtained many side effects in both subjects were given drinking juice of sweet star fruit (*Averrhoa carambola L.*) is.

Many of the subjects who consume sweet star fruit juice is experiencing dizziness and nausea, and also found that subjects experienced drowsiness after taking this sweet star fruit juice, that reason can not be explained. The results of this study indicate that there are

significant changes in blood pressure. However, it is unfortunate that less normal distribution of data in data processing using SPSS. Data distribution is not normal, it may be caused by several factors. These factors are the condition of the body between the subject and other subjects that are not the same. This causes the initial conditions of different blood pressure distribution. In addition, sometimes the current study, the difficulty of limiting the movement of the subject that can affect blood pressure when doing research. Expenses think also can affect blood pressure when the subject of research.

With the high potassium and fiber pectin contained in sweet star fruit (*Averrhoa carambola L.*), as well as the results of the study showed a difference or a significant decrease in blood pressure by administering sweet star fruit juice (*Averrhoa carambola L.*), the sweet star fruit juice (*Averrhoa carambola L.*) can be used as a traditional medicine and therapies for patients with hypertension that may decrease blood pressure. However, further research will be necessary if you want to know more, and certainly the truth content and properties owned by the juice of sweet star fruit (*Averrhoa carambola L.*) on the condition that minimize

risk factors that can affect blood pressure as the research proceeds

CONCLUSION

The provision of sweet star fruit juice lowers blood pressure significantly.

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