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MIXED TOMATO AND SWEET STARFRUIT JUICE AGAINST THE FAMILY PLANNING ACCEPTOR'S BLOOD PRESSURE

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ABSTRACT

Hypertension can be referred to as a condition when the systolic blood pressure exceeds 140 mmHg and the diastolic blood pressure exceeds 90 mmHg, as measured on two occasions with a five-minute interval, while the individual is in a state of sufficient rest and calm. The use of 3-month injectable birth control containing progesterone can increase blood pressure. Increased blood pressure in birth control participants can be overcome pharmacologically and non-pharmacologically. The aim of the investigation was to analyze the administration of a mixture of tomato juice *(Solanum lycopersicum)* and star fruit *(Averrhoa carambola* L.*)* Against lowering blood pressure in injectable Kb acceptors for 3 months. The research design used an *experimental* approach *one group pretest and posttest.* Sampling technique with *purposive sampling,* the number of samples is 30 people. The statistical test employed is the *t-test*. The research showed 24 (80%) respondents had a decrease in blood pressure and 6 (20%) respondents had a fixed blood pressure with an average systole change of 130.00 mmHg and diastole 85.17 mmHg. The findings of *Paired Samples T-Test* obtained a significance value of 0.000 ($p < 0.05$) which means that there is an influence of giving a mixture of Tomato Juice *(Solanum lycopersicum)* and Star Fruit *(Averrhoa Carambola* L.*)* At acceptor kb inject 3 months. This is influenced by the content of potassium as an antidiuretic so that it can reduce sodium levels in the urine by the kidneys

Keywords: tomato and star fruit juice, injectable birth control, blood pressure

INTRODUCTION

The family planning (KB) movement can make a very large contribution to reducing population growth In addition, the Family Planning (KB) program also plays a major role in achieving a reduction in Maternal Mortality Rate (MMR) through family planning in managing safe, healthy and desirable pregnancies (BKKBN, 2021).

In choosing a method of contraception, women must consider various factors including their health status, such as side effects experienced over a long period. Injectable birth control has advantages and disadvantages in its use. The advantages are suppresses ovulation and does not affect breast milk besides that it is also practical, effective, and safe with a success rate of up to 99%. However, 3-month injectable birth control also has side effects such as nausea, vaginal discharge, fatigue, depression (Iswanti et al., 2018), reduced libido, menstrual disorders with complaints *of amenorrhea, spotting, and menorrhagia* besides that blood pressure is higher than 140/80 mmHg in a resting state (Wahyuni et al., 2023). Three-month injectable contraceptives are associated with many side effects, including alterations in blood pressure, menstrual problems, depression, increased vaginal discharge, acne, changes in libido, weight fluctuations, dizziness, migraines, and hematomas (BKKBN, 2021).

Several factors affect blood pressure, among others: age, stress, obesity, serum lipids, and hormonal factors, and one of them is women using hormonal contraceptives. There is also a long impact that will arise from the use of hormonal contraceptives, namely the occurrence of hypertension. Hypertension is one of the risk factors for stroke. An observational study involving more than 1 million subjects of death caused by heart disease and stroke, linearly looked at the results of

systolic blood pressure of 115 mmHg and diastolic blood pressure of 75 mmHg (Fatmawati et al., 2020).

In order to overcome hypertension in individuals using 3-month injectable birth control, both pharmacological and non-pharmacological interventions can be administered. Non-pharmacological therapy can diligently exercise regularly and maintain a diet, by reducing calorie intake (if overweight), limiting salt intake, and can also make juice from fresh fruit (Fadillah & Rindarwati, 2023). Make use of fruits such as tomatoes, cucumbers, star fruit, carrots, melons and watermelons. Indonesia is rich in natural resources, one of which is tomatoes because there are many ingredients available, easy to obtain, and cheap prices (Maigoda & Apriani, 2023).

Tomatoes include a high amount of potassium, with 222 mg per 100 grams of tomatoes. They have low levels of salt and fat. Potassium functions by inducing vasodilation, which leads to a reduction in peripheral resistance and an elevation in cardiac output, hence decreasing blood pressure. Potassium acts as a diuretic, leading to an increase in the production of sodium and fluid. Potassium suppresses the secretion of renin, therefore modifying the functioning of the angiotensin renin system. Potassium has the ability to control the functioning of nerves in both the peripheral and central nervous systems, which in turn can have an impact on blood pressure regulation (Hadi, 2023).

Star fruit, a popular fruit in Indonesia, is readily available in supermarkets at a reasonable price. The star fruit, scientifically known as Averrhoa carambola L, possesses significant advantages in reducing blood pressure owing to its rich composition of fiber, potassium, phosphorus, and vitamin C (Khusuma et al., 2020).

According to research on DASH (Dietary Approaches to Stop Hypertension), it is strongly advised to consume foods that are rich in potassium and fiber, while keeping sodium intake low, in order to effectively reduce blood pressure. In a 100 gram serving of star fruit, the potassium amount is 133 mg and the fiber content is 5 g. This demonstrates that star fruit contains a substantial quantity of potassium and fiber, which can effectively reduce blood pressure, especially when combined with its comparatively low sodium content. Potassium has the ability to control the functioning of nerves in both the peripheral and central nervous systems, which in turn can impact blood pressure (Nhlbi, 2024). The aim of the study was to examine the effects of administering a combination of tomato juice (Solanum lycopersicum) and star fruit (Averrhoa carambola L.) on reducing blood pressure in individuals who received Kb injections for a period of 3 months.

METHOD

The research design employed experimental queasy with a one-group pretest-posttest design. The population involved was all three-month injectable birth control acceptor mothers in a total of 137 acceptors. The samples used in this study were some mothers of three-month injectable birth control participants who met the sample criteria of 30 acceptors. The sampling used was purposive sampling with inclusion criteria for injectable KB acceptors for 3 months more than 1 year, had a history of increased blood pressure during contraceptive use, were not undergoing oral therapy, there had no allergy to tomatoes and star fruit. While the exclusion criteria have complications.

Research instruments using observation sheets contain records of respondents' blood pressure before and after treatment. The standard operating procedure used to make a mixture of juice by mixing 450 grams of tomatoes and sweet star fruit adding 50 ml of water and 2 gr of granulated sugar given 2 times a day for 7 days. Making juice mixtures is carried out by researchers and monitoring as long as respondents consume juice mixtures directly. After the 7th day of the juice mixture, post-treatment blood pressure measurements were taken within 24 hours after the last treatment. Where before the treatment has gone through an ethical test conducted by the ethical clearance board and is suitable for use. As well as obtaining consent by respondents through Informed consent.

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RESULTS

Table 1 Frequency Distribution Characteristics of Acceptor Respondents KB Injectable 3 Months

Characteristics of respondents	n	%
Age		
< 25 year	8	26,7
25 - 35 Years	10	40
> 35 years	12	33.3
Education		
Low	0	0
Inter mediate	20	66,7
Tall	10	33,3
Work		
Work	22	73,3
Not working	8	26,7
Smoking habit		
Smoking	2	6,7
Not smoking	28	93,3
CoffeDrinking habit		
Drinking coffee	13	43,3
Don't drink coffee	17	53,7
Body Mass Index		
Underweight	2	6,7
Normal	12	40
Overweight	15	50
Obesitas	1	3,3
Genetica		
History of hypertension	7	23,3
No history of hypertension	23	76,7
Duration of use		
<2 year	11	36,6
>2 year	19	63,3
Total	30	100

Referring to Table 1, from the 30 respondents, almost half were at the reproductive age of 25-35 years, a total of 12 respondents (40%) with a length of contraceptive use of more than 2 years, a total of 19 respondents (63.3%)

Table 2 Frequency Distribution of Blood Pressure Before and After Treatment

Blood Pressure (mmHg)	n	%
Before		
120 – 139 / 80 - 89	12	40
140 – 159 / 90 - 99	18	60
>160 / >100	0	0,0
After		
<120 / <80	9	30
120 – 139 / 80 - 89	15	50
140 – 159 / 90 - 99	6	20
>160 / >100	0	0,0
Category		
Climb	0	0
Remain	6	20
Go down	24	80
Total	30	100

Average Changes in Blood Pressure

Referring to the study findings, the average systole blood pressure before treatment was 110.30 mmHg and the average diastole blood pressure before treatment was 90.50 mmHg. After treatment, the average change in systole blood pressure was 130.00 mmHg and the average diastole was 85.17 mmHg.

Based on Table 2 *Averrhoa Carambola* L it is known that from 30 respondents before being given Tomato Juice *(Solanum lycopersicum)* and Star Fruit *(Averrhoa Carambola* L.*)* more than half experienced grade I hypertension 18 respondents (60%) *and half of the respondents of 15 (50%) were in the prehypertensive category after being given a mixture of* Tomato Juice *(Solanum lycopersicum)* and Star Fruit *(Averrhoa Carambola* L.*)*.

It is known that 30 respondents after being given a mixture of tomato juice *(Solanum lycopersicum)* and star fruit *(Averrhoa Carambola* L.*)* Almost all respondents experienced a decrease in blood pressure by 24 respondents (80%). The bivariate analysis using the Paired Samples T-Test yielded a significance value of 0.000 ($p < 0.05$), indicating that there is a significant influence of administering a mixture of tomato juice (Solanum lycopersicum) and star fruit (Averrhoa Carambola L.) on acceptor kb inject after three months.

DISCUSSION

General characteristics of respondents

The findings study from the 30 respondents revealed that almost half were aged >35 years, a total of 12 respondents (40%) with long use of contraceptives of more than 2 years, a total of 19 respondents (63.3%). While from the level of education, more than half have an education
Occurred in working mothers amounting to 22 respondents (73.3%).

The incidence of hypertension with the duration of use of injectable birth control three months has a significant relationship. The finding supports that of the prior study, namely the incidence of hypertension is higher in three-month injectable birth control acceptors than one-month injectable birth control acceptors. Acceptors who use three-month injectable birth control will experience an increase in blood pressure in the first 24 months and more. The hormonal contraceptives use for a period of more than five years will risk an increase in blood pressure compared to less than five years. Blood pressure will increase 2-3 times in women who use hormonal contraceptives (BKKBN, 2021).

The age of mothers in this study was at most in the range of >35 years. This age range is a reproductive age that has a higher risk than normal reproductive age so the hypertension in women of this age tends to be higher due to hormonal influences (Rahmadhani, 2021). Maternal education in the study was dominated by secondary education. Maternal education affects the incidence of hypertension (Formal education has a great influence on one's knowledge, if someone is highly educated they will have high knowledge, and vice versa if someone has low education will have low knowledge and will affect understanding of something. Yet, it is essential to note that a person with low education is not knowledgeable where knowledge or information can be obtained not only formally but also informally (Munawaroh & Jacoeb, 2020).

The work of 3-month injectable birth control acceptors based on the results of the study was dominated by working mothers. Mothers who have many jobs will have risk factors for hypertension due to several triggering factors, such as stressor levels, workload, deadlines, environments that tend to be harsh, and excessive physical activity. From the study findings, it can be found from 30 respondents, that 2 respondents (6.7%) do not have a habit of smoking, and 17 respondents (43.3%) have a habit of drinking coffee.

Previous study has established a correlation between smoking and the occurrence of hypertension. This is due to the presence of nicotine in cigarettes, which is absorbed by the tiny blood capillaries in the lungs and subsequently pumped to the brain. Nicotine stimulates the adrenal glands to release epinephrine, a hormone that constricts blood vessels, leading to increased blood pressure. Additionally, nicotine accelerates heart rate and strengthens heart contractions, further raising blood pressure. Cigarette smoke contains carbon monoxide, which displaces oxygen in the bloodstream, compelling the heart to work harder in order to supply sufficient oxygen to the body's organs and tissues (Efriandi et al., 2023).

Hypertension is also related with genetic factors, as supported by previous research indicating a connection between genetic factors and the occurrence of hypertension. This risk is particularly heightened in individuals with a family history of hypertension (heredity), increasing the likelihood of developing essential hypertension. Genetic factors play a significant role in the development of hypertension (Setiani & Wulandari, 2023).

Referring to the study findings, half of the respondents 15 (50%) had an overweight body mass index. This is in line with previous research, obesity can cause hypertension because fat deposits narrow blood vessels so that blood flow is insufficient and the heart has to work harder to meet blood flow resulting in hypertension, the mechanism involved in obesity to hypertension involves sympathetic activation of the nervous system and renin-angiotensin-aldosterone as well as the occurrence of endothelial dysfunction and kidney function abnormalities that are very influential with the onset of hypertension and in obesity there is a decrease in peripheral resistance while sympathetic nerves increase (Yuniarti & Rosyada, 2021).

Effects of Tomato Juice *(Solanum lycopersicum)* and Star Fruit *(Averrhoa Carambola* L.*)*

From the findings of bivariate analysis with the Paired Samples T-Test test, a significance value of 0.000 ($p < 0.05$) was obtained, which means that there is an influence of giving a mixture of tomato juice *(Solanum lycopersicum)* and star fruit

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(Averrhoa Carambola L.*)* on 3 Months Injectable Kb Acceptor.

Sweet star fruit is a fruit that is widely known by the people of Indonesia and is easily found in the market and the price is affordable. Sweet star fruit is found to be very helpful in addressing lower blood pressure because of the content of fiber, potassium, phosphorus, and vitamin C. The potassium content in one sweet star fruit 127 grams is 207 mg and the fiber content is 5 grams. This shows the potassium and fiber content in star fruit has a significant amount in helping lower blood pressure. In sweet star fruit, there are nutrients that have health benefits for the body (N. Rachmadanur et al., 2023).

Previous research has shown that consuming sweet star fruit juice has an effect or has a positive effect on blood pressure. Sweet star fruit juice therapy has been shown to affect the workload of the heart, potassium-sodium pumps, and increase urine production, and bring calm which ultimately affects blood pressure. Sweet star fruit juice therapy is effective for lowering blood pressure or controlling blood pressure to remain stable in patients with primary hypertension. The potassium in sweet star fruit juice can make the blood pressure lower by causing vasodilation, causing a decrease in total peripheral retention and increasing cardiac output (Legi et al., 2020).

Other research results also show that star fruit juice is effective in reducing high blood pressure because this fruit contains high potassium and low sodium. The consumption of a lot of potassium will also increase its concentration inside the intracellular, so it tends to draw fluid from the extracellular part and lower blood pressure. Sodium and potassium are macro minerals that have a close relationship in various body tissues. From research conducted by several nutritionists, it was found that there is a relationship between changes in the ratio of sodium and potassium in food consumed with an increase in the amount of people with hypertension (Maigoda & Apriani, 2023).

The Latin name of the tomato is Gycopersicum esculentum Mill, and the Latin name of the Cucumber is Cucumis Sativus L. While in general Indonesians already know and call it a tomato and cucumber. Mixed tomato and cucumber juice have chemical content including potassium, magnesium, phosphorus, fiber, vitamin C, and folic acid. Potassium content plays a role in reducing blood pressure in people with hypertension. High potassium will increase its concentration inside the intracellular fluid, so it tends to draw fluid from the extracellular part and lower blood pressure. In addition, potassium can cause a vasodilating effect, causing a decrease in total peripheral retention and increasing cardiac output (Permana & Falah, 2022).

Referring to the study findings, the average systole blood pressure before treatment was 110.30 mmHg and the average diastole blood pressure before treatment was 90.50 mmHg. After treatment, the average change in systole blood pressure was 130.00 mmHg and the average diastole was 85.17 mmHg.

The tests revealed a p-value of 0.000, where it indicates that there is a significant difference between the systolic blood pressure of hypertensive patients before and after treatment. Blood pressure refers to the magnitude of the force exerted by circulating blood on the inner walls of arteries. With each contraction of the heart muscle, the blood is forcefully pushed against the walls of the blood vessels, resulting in the measurement of systolic blood pressure, which is represented by the top number. Diastolic blood pressure, which is the lower figure, is the measure of the pressure exerted on the walls of blood vessels while the heart is in a relaxed state between beats (Luthfiyah & Widajati, 2019).

There was a disparity in blood pressure levels seen prior to and after the administration of a blended juice consisting of tomato and cucumber. This is due mainly to cucumber to lower blood pressure or hypertension. The diuretic properties of cucumbers make their water content high and serve as blood pressure lowers. The mineral content of cucumbers, namely potassium, magnesium, and phosphorus can also lower blood pressure (Journal et al., 2022).

The study determined that the juice blend of tomatoes and star fruit effectively lowered blood pressure in individuals with hypertension, as seen by the notable disparity in average blood pressure

levels before and after treatment. Lowering blood pressure with a mixture of tomato and star fruit juice is influenced by the potassium content as an antidiuretic so that it can reduce sodium levels in the urine by the kidneys. The reduction of fluid in circulation will decrease peripheral resistance so that by itself blood pressure will decrease. From the research that researchers conducted, it can be concluded that the juice mixture of tomatoes and star fruit can be used to lower blood pressure in 3-month injectable birth control acceptors so that acceptors with hypertension do not require large enough costs to control their blood pressure and there are no complications that are very dangerous for 3-month injectable birth control acceptors.

CONCLUSION

There is an effect of giving a mixture of tomato juice and star fruit juice on reducing systolic and diastolic blood pressure in 3-month injectable KB acceptors.

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