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THE EFFECT OF CONSUMPTION OF TANGERINE JUICE ON BLOOD PRESSURE REDUCTION IN PREGNANT WOMEN WITH GESTATIONAL HYPERTENSION

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ABSTRAK : PENGARUH KONSUMSI JUS JERUK KERING TERHADAP PENURUNAN TEKANAN DARAH PADA IBU HAMIL DENGAN HIPERTENSI GESTASIONAL

Latar Belakang: Hipertensi merupakan penyakit yang dapat menyerang siapa saja, tanpa memandang usia maupun status sosial ekonomi. Sekitar 90% penderita hipertensi mengalami hipertensi gestasional. Di Provinsi Lampung, hipertensi gestasional mencapai 20,86% pada tahun 2020, sedangkan di Kabupaten Lampung Timur mencapai 17,86% pada tahun yang sama.

Tujuan: Tujuan penelitian ini adalah untuk mengetahui pengaruh konsumsi jus jeruk keprok terhadap penurunan tekanan darah pada ibu hamil dengan hipertensi gestasional di wilayah kerja Puskesmas Rawat Inap Sumber Rejo Kabupaten Lampung Timur tahun 2023.

Metode: Penelitian ini menggunakan pendekatan kuantitatif. Penelitian ini dilaksanakan pada bulan Mei 2023 di wilayah kerja Puskesmas Rawat Inap Sumber Rejo Kabupaten Lampung Timur. Desain penelitian yang digunakan adalah pre-experimental design dengan pendekatan pretest-posttest with one group. Teknik pengambilan sampel yang digunakan adalah purposive sampling.

Hasil: Tekanan darah rata-rata sebelum mengonsumsi jus jeruk keprok adalah 146,62 mmHg (sistolik), dengan simpangan baku (SD) 3,420 dan galat baku (SE) 0,587. Tekanan darah sistolik minimum yang tercatat adalah 140 mmHg, dan maksimum 155 mmHg. Tekanan darah diastolik rata-rata adalah 103,53 mmHg, dengan SD 8,663 dan SE 1,186. Tekanan darah diastolik minimum yang tercatat adalah 90 mmHg, dan maksimum 115 mmHg. Setelah mengonsumsi jus jeruk keprok, tekanan darah rata-rata berkurang menjadi 121,32 mmHg (sistolik), dengan SD 7,417 dan SE 1,272. Tekanan darah sistolik minimum yang tercatat adalah 110 mmHg, dan maksimum 145 mmHg. Rata-rata tekanan darah diastolik adalah 91,50 mmHg, dengan SD 6,458 dan SE 1,108. Tekanan darah diastolik terendah yang tercatat adalah 70 mmHg, dan tertinggi adalah 100 mmHg. Nilai p yang diperoleh adalah 0,000 (lebih kecil dari 0,05), yang berarti hipotesis alternatif (Ha) diterima, yang menunjukkan bahwa terdapat pengaruh yang signifikan konsumsi jus jeruk keprok terhadap penurunan tekanan darah pada ibu hamil dengan hipertensi gestasional di wilayah kerja Puskesmas Rawat Inap Sumber Rejo Kabupaten Lampung Timur tahun 2023.

Kesimpulan: Terdapat pengaruh yang signifikan konsumsi jus jeruk keprok terhadap penurunan tekanan darah pada ibu hamil dengan hipertensi gestasional.

Saran: Disarankan kepada pihak puskesmas agar memberikan informasi tentang penatalaksanaan penurunan tekanan darah pada ibu hamil dengan hipertensi gestasional dengan menggunakan terapi jus jeruk keprok.

Kata Kunci: Hipertensi Gestasional, Kehamilan, Jus Jeruk Keprok.

ABSTRACT

Background: Hypertension is a disease that can affect anyone, regardless of age or socioeconomic status. Approximately 90% of hypertensive patients were affected by gestational hypertension. In Lampung Province, gestational hypertension accounted for 20.86% in the year 2020, while in East Lampung Regency, it reached 17.86% in the same year.

Purpose: The objective of this study was to determine the effect of tangerine juice consumption on blood pressure reduction in pregnant women with gestational hypertension in the working area of Sumber Rejo Inpatient Public Health Center of East Lampung Regency in the year 2023.

Methods: This research employed a quantitative approach. It was conducted in May 2023 within the working area Sumber Rejo Inpatient Public Health Center of East Lampung Regency. The research design used

was a pre-experimental design with a pretest-posttest approach with one group. The purposive sampling technique was used.

Result: The average blood pressure before consuming tangerine juice was 146.62 mmHg (systolic), with a standard deviation (SD) of 3.420 and a standard error (SE) of 0.587. The minimum systolic blood pressure recorded was 140 mmHg, and the maximum was 155 mmHg. The mean diastolic blood pressure was 103.53 mmHg, with an SD of 8.663 and an SE of 1.186. The minimum diastolic blood pressure recorded was 90 mmHg, and the maximum was 115 mmHg. After consuming tangerine juice, the average blood pressure reduced to 121.32 mmHg (systolic), with an SD of 7.417 and an SE of 1.272. The minimum systolic blood pressure recorded was 110 mmHg, and the maximum was 145 mmHg. The mean diastolic blood pressure was 91.50 mmHg, with an SD of 6.458 and an SE of 1.108. The minimum diastolic blood pressure recorded was 70 mmHg, and the maximum was 100 mmHg. The obtained p-value was 0.000 (less than 0.05), meaning that the alternative hypothesis (Ha) was accepted, indicating that there is a significant effect of tangerine juice consumption on blood pressure reduction in pregnant women with gestational hypertension in the working area of Sumber Rejo Inpatient Public Health Center of East Lampung Regency in 2023.

Conclusion: There is a significant effect of tangerine juice consumption on blood pressure reduction in pregnant women with gestational hypertension.

Suggestion: It is recommended for the public health center is to provide information on the management of blood pressure reduction in pregnant women with gestational hypertension using tangerine juice therapy.

Keywords: Gestational Hypertension, Pregnancy, Tangerine Juice.

INTRODUCTION

The World Health Organization (WHO) data from 2020 indicates that approximately 1.13 billion people worldwide have hypertension, which means 1 in 3 people globally are diagnosed with hypertension. Gestational hypertension is estimated to affect around 1.8-4.4% and 0.2-9.2% of total pregnant women globally (Subki et al., 2018). In the year 2020, the World Health Organization (WHO) estimated that 295,000 women and adolescent girls died due to complications related to pregnancy and childbirth. Pregnancy-related hypertension disorders are a leading cause of maternal morbidity, long-term disabilities, and even maternal and infant deaths. Globally, pregnancy-related hypertension accounts for approximately 14% of all maternal deaths (WHO, 2020).

According to the Chairman of the Scientific Committee of the International Conference on Indonesia Family Planning and Reproductive Health (ICIFPRH), as of 2019, Indonesia's Maternal Mortality Rate (MMR) remained high at 305 per 100,000 live births. This is despite the target MMR for Indonesia in 2015 being set at 102 per 100,000 live births. The elevated MMR poses a significant challenge for Indonesia and has become a national priority commitment to reduce maternal deaths during pregnancy and childbirth. The leading causes of maternal death in Indonesia are hemorrhage, hypertension during pregnancy, and others. The causes of MMR include hemorrhage (31%), gestational hypertension (26%), and other factors (28%). The global Sustainable Development Goals (SDGs) target aims to reduce MMR to less than 70 per 100,000 live births by the year 2030 (Ministry of Health, Republic of Indonesia, 2020).

In Indonesia, in the year 2020, the second leading cause of maternal deaths was pregnancy-related hypertension, accounting for 23.98% of cases, following hemorrhage at 28.74%, and circulatory system disorders at 4.97%. It is estimated that by the year 2024, the maternal mortality rate in Indonesia will decrease to 183 per 100,000 live births, and by the year 2030, it will further decrease to 131 per 100,000 live births (Ministry of Health, Republic of Indonesia, 2020).

Hypertension is a condition that can affect anyone, from the youngest to the oldest, regardless of wealth or social status. Approximately 90% of individuals with hypertension have an unknown underlying cause (Utaminingsih, 2015). Hypertension is often referred to as the "Silent Killer" because individuals affected by it frequently experience disruptions or symptoms without being aware of their underlying cause (Triyanto, 2017 cited in Marlina, 2020).

In the year 2020, gestational hypertension accounted for 20.86% of cases in the Lampung Province (Lampung Provincial Health Office, 2020). Additionally, the incidence of gestational hypertension in East Lampung Regency was reported to be 17.86% in the same year (East Lampung Health Department, 2020).

Hypertension during pregnancy requires special attention as it can lead to reduced blood flow to the placenta, affecting the supply of oxygen

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and nutrients to the baby. This can hinder the baby's growth and increase risks during childbirth (Syafira, 2021). Hypertension during pregnancy accounts for 5-15% of pregnancy complications and is among the top three causes of maternal mortality and morbidity. In Indonesia, the mortality and morbidity rates related to hypertension during pregnancy remain relatively high. This is attributed, in addition to unclear etiology, to factors such as (Fandila, 2020 cited in Alvionita, 2022).

Unbalanced nutritional status is a triggering factor for the onset of hypertension. Changes in nutritional status, indicated by weight gain, can directly affect changes in blood pressure (Riayadi et al, 2007). According to Alvionita (2022), sodium and potassium are the main cations in the extracellular fluid of the body, with functions that regulate fluid balance, acid-base balance, and play a role in nerve transmission and muscle contraction. Excessive sodium intake can disrupt the body's balance, leading to edema, ascites, and hypertension.

Current antihypertensive drugs contain chemical substances with toxic side effects, which can lead to conditions such as hypokalemia, heart arrhythmias, hypovolemia, shock, kidney failure, and more. Additionally, these antihypertensive medications are relatively expensive and require lifelong usage. This situation has prompted many communities to revisit traditional herbal remedies, including various fruits, to address hypertension. Fruits such as oranges, celery, cucumbers, chayote, watercress, radish, tomatoes, star fruit, noni, roselle, bitter melon, crown flower, starfruit, watermelon, carrots, avocados, bananas, apples, and kiwi are considered potential options for managing hypertension (Satuhu et al., 2007 as cited in Sukmawati, 2017).

In addition to pharmacological therapy, non-pharmacological therapy can also be provided to individuals with hypertension, which involves nutritional management through dietary interventions. For instance, this may include reducing salt intake, maintaining adequate intake of potassium, calcium, and magnesium, as well as controlling calorie intake if there is weight gain. The DASH (Dietary Approaches to Stop Hypertension) diet recommends that hypertensive patients consume ample amounts of fruits and vegetables, increase their fiber intake, and stay well-hydrated. Herbal therapy is also considered a viable option for individuals with hypertension (Dendy et al., 2018 as cited in Alvionita, 2022).

An increasing number of epidemiological studies consistently demonstrate the protective effects of foods rich in polyphenols (such as fruits, tea, grapes, cocoa or chocolate, and specific citrus fruits) against several intermediate risk factors for Cerebrovascular Disease (CVD), including high Low Density Lipoprotein (LDL) cholesterol, high blood pressure, and endothelial dysfunction. Orange (Citrus sinensis) juice is also regarded as a valuable source of essential nutrients such as vitamin C, folate, and potassium. Vitamin C has recently been found to protect endothelial cells and Low Density Lipoprotein (LDL) from intra and extracellular oxidative stress, reducing the risk of atherosclerosis. Additionally, folate can lower plasma homocysteine concentrations and restore endothelial dysfunction in patients with cardiovascular diseases. On the other hand, potassium can contribute to lowering blood pressure. Consumption of orange juice for four weeks among middle-aged healthy men with normal weight has been recommended to reduce Diastolic Blood Pressure (DBP). Since DBP serves as an indicator of vascular resistance, orange juice consumption can offer health benefits. The consumption of Citrus Sinensis Juice (CSJ), commonly known as orange juice, has become a dietary habit worldwide (Asgary, 2018 as cited in Marlina, 2020).

The incidence of gestational hypertension in the Working Area of Sumber Rejo Inpatient Public Health Center, East Lampung Regency, amounted to 34 out of a total of 211 pregnant women who were still pregnant until the period of June 2023. During interviews, mothers stated that they do not understand how to manage gestational hypertension, fearing that taking antihypertensive drugs during pregnancy might lead to issues for their unborn fetus. Additionally, they expressed concerns due to economic difficulties, resulting in excessive stress and worries.

RESEARCH METHODS

In this study, the author employed a quantitative research approach. The quantitative research method is a systematic investigation used to gather accurate insights into the characteristics of a problem (Notoatmodjo, 2018). Therefore, it was expected that this research would provide a precise understanding of the characteristics of the issue at hand, aiming to classify data to determine whether there was an influence of consuming tangerine juice on reducing blood pressure in pregnant women with gestational hypertension within the working area of Sumber Rejo Inpatient Public Health Center, East Lampung Regency in the year 2023.

RESEARCH RESULTS

General Characteristics of Respondents

Table 1
General Characteristics of Respondents in the Working Area of Sumber Rejo Inpatient Public Health Center, East Lampung Regency, in the year 2023

Respondents Characteristics	Respondents	%
Age (Year)		
20-35 years	21	61,8
36-40 years	13	38,2
Education		
Bachelor	10	29,4
Elementary	1	2,9
Junior High School	8	23,5
Senior High School	15	44,1
Occupation		
Housewives	17	50,0
Trader	5	14,7
Respondents Characteristics		
Employees	2	5,9
Civil Servent	10	29,4
Parity		
Grandemultipara	5	14,7
Multipara	21	61,8
Primipara	8	23,5
Gestational Age		
28-30 weeks	20	58,8
33-36 weeks	14	41,2

Normality Test

The normality test was used to determine whether a sample came from a normal distribution or not. Its purpose was to assess and provide confidence in whether the data was approximately or closely following a normal distribution. The normality test was conducted using statistical software such as SPSS, often employing the Shapiro-Wilk formula when the sample size was less than 50. The decision criterion was as follows: If the p-value (Sig.) from the Shapiro-Wilk test was ≥ 0.05, then the data was considered to be normally distributed.

From the conducted statistical test, the results of the normality test calculations were presented in the following table:

Table 2
The results of the normality test for both the variable before treatment and the variable after treatment

Test Score	Score
Systolic blood pressure before	0,078
Diastolic blood pressure before	0,109
Systolic blood pressure after	0,097
Diastolic blood pressure after	0,101

Based on the table above, it can be observed that the Shapiro-Wilk values for systolic blood pressure before treatment are 0.078 (≥ 0.05), for diastolic blood pressure before treatment are 0.109 (≥ 0.05), for systolic blood pressure after treatment are 0.097 (> 0.05), and for diastolic blood pressure after treatment are 0.101 (> 0.05). Therefore, it can be concluded that the data in this study follow a normal distribution.

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Univariate Analysis

Table 3
Mean Blood Pressure Before Consuming Tangerine Juice on the Decrease of Blood Pressure in Pregnant Women with Gestational Hypertension in the Working Area of Sumber Rejo Inpatient Public Health Center East Lampung Regency in the Year 2023

Variable	N	Mean	Std.Deviation	Std.Error	Min	Max
Systolic Blood Pressure Before	34	146,62	3,420	0,587	140	155
Diastolic Blood Pressure Before	34	103,53	8,663	1,486	90	115

Based on the table above, it can be observed that out of the 34 research samples, the average blood pressure before consuming Tangerine juice in pregnant women with gestational hypertension in the Working Area of Sumber Rejo Inpatient Public Health Center East Lampung Regency in 2023 for systolic blood pressure has a mean value of 146.62, a standard deviation of 3.420, a standard error of 0.587, a minimum blood pressure value of 140 mmHg, and a maximum blood pressure value of 155 mmHg. Meanwhile, for diastolic blood pressure, the mean value is 103.53, the standard deviation is 8.663, the standard error is 1.486, the minimum blood pressure value is 90 mmHg, and the maximum blood pressure value is 115 mmHg.

Tabel 4
The average blood pressure after consuming Tangerine juice in pregnant women with gestational hypertension in the Working Area of Sumber Rejo Inpatient Public Health Center East Lampung Regency in the year 2023

Variable	N	Mean	Std.Deviation	Std.Error	Min	Max
Systolic Blood Pressure Before	34	121,32	7,417	1,272	110	145
Diastolic Blood Pressure Before	34	91,50	6,458	1,108	70	100

Based on the above Table 4, it can be observed that from the 34 research samples, the results show the average systolic blood pressure after consuming orange juice in relation to the reduction of blood pressure among pregnant women with gestational hypertension in the Working Area of Sumber Rejo Inpatient Public Health Center, East Lampung Regency, in the year 2023. The systolic blood pressure has a mean value of 121.32, a standard deviation of 7.417, a standard error of 1.272, a minimum blood pressure value of 110 mmHg, and a maximum blood pressure value of 145 mmHg. Similarly, for diastolic blood pressure, the mean value is 91.50, with a standard deviation of 6.458, a standard error of 1.108, a minimum blood pressure value of 70 mmHg, and a maximum blood pressure value of 100 mmHg.

Bivariate Analysis

Bivariate analysis was conducted using the independent t-test (t-test for paired samples) to determine the effect of consuming orange juice on the reduction of blood pressure among pregnant women with gestational hypertension in the Working Area of Sumber Rejo Inpatient Public Health Center, East Lampung Regency, in the year 2023. The results of the bivariate analysis are presented in the following table:

Table 5
The Effect of Consuming Tangerine Juice on the Reduction of Blood Pressure in Pregnant Women with Gestational Hypertension in the Working Area of Sumber Rejo Inpatient Public Health Center, East Lampung Regency, in the Year 2023

Measurement Results	N	Mean	Different Mean	Std. Deviation	P-Value	CI-95%
Systolic blood pressure before	34	146,62	25,294	3,420	0,000	22,415-28,173
Diastolic blood pressure before	34	121,32		7,417		
Systolic blood pressure after	34	103,53	12,029	8,663	0,000	8,129-15,929
Diastolic blood pressure after	34	91,50		6,458		

Based on the table 4.9 above, it can be observed that from the 34 samples of the study, the difference in mean systolic blood pressure before and after consuming bitter orange juice can be seen in relation to the reduction of blood pressure in pregnant women with gestational hypertension in the Working Area of Sumber Rejo Inpatient Public Health Center, East Lampung Regency in 2023, with a difference in mean value of 25.294, while the difference in mean diastolic blood pressure before and after with a value of 12.029. For the confidence interval of systolic blood pressure before and after with a value of 22.415-28.173, and for the confidence interval of diastolic blood pressure before and after with a value of 8.129-15.929. The t-test results yielded a p-value of 0.000, which is less than α (0.05), indicating that the alternative hypothesis (Ha) is accepted. This implies that there is an influence of consuming bitter orange juice on the reduction of blood pressure in pregnant women with gestational hypertension in the Working Area of Sumber Rejo Inpatient Public Health Center, East Lampung Regency in 2023.

DISCUSSION

Univariate Analysis

The study conducted in 2023 within the Working Area of Sumber Rejo Inpatient Public Health Center, East Lampung Regency, provides valuable insights into the average blood pressure levels before the consumption of tangerine juice among pregnant women with gestational hypertension. Analyzing a sample of 34 participants, the research reveals that the mean systolic blood pressure stood at 146.62 mmHg, accompanied by a standard deviation of 3.420, and a standard error of 0.587. The range of systolic blood pressure values spanned from a minimum of 140 mmHg to a maximum of 155 mmHg. Similarly, for diastolic blood pressure, the study found a mean of 103.53 mmHg, a standard deviation of 8.663, and a standard error of 1.486. The diastolic blood pressure range was between 90 mmHg and 115 mmHg. These results elucidate the baseline blood pressure readings before the consumption of tangerine juice, providing a foundation for assessing the potential impact of the juice on reducing blood pressure among pregnant women with gestational hypertension in the specified area and year.

Gestational hypertension is characterized by high blood pressure that occurs after 20 weeks of pregnancy without the presence of proteinuria. Its prevalence is estimated to be around 6%. A considerable proportion of women (> 25%) with gestational hypertension may progress to pre-eclampsia. The diagnosis of gestational hypertension is typically established after childbirth (Haidar, 2019).

Gestational hypertension is diagnosed in pregnant women who experience a blood pressure reading of 140/90 mmHg or higher for the first time during pregnancy, but without the presence of proteinuria. Gestational hypertension is referred to as transient hypertension if it does not progress to pre-eclampsia and the blood pressure returns to normal within 12 weeks post-partum (Sari, 2016).

The factors that trigger the onset of hypertension include an imbalanced nutritional status. Changes in nutritional status, characterized by weight gain, can directly affect changes in blood pressure (Riayadi et al, 2007). According to Alvionita (2022), sodium and potassium are the major cations in the extracellular fluid of the body, which function to regulate fluid and acid-base balance in the body, as well as play a role in nerve transmission and muscle contraction. Excessive sodium intake can disrupt the body's balance, leading to edema, ascites, and hypertension.

Hypertension during pregnancy can have various effects on both the mother and the fetus, such as abruptio placenta, acute renal failure, intravascular coagulation, preeclampsia, superimposed preeclampsia, and even eclampsia. There are risks of intrauterine growth restriction, prematurity (birth before 37 weeks), and intrauterine death due to reduced uteroplacental circulation and decreased fetal well-being (Basri et al., 2018).

This study follows an approach that aligns with the research conducted by Hernawan (2019). This study is a type of true experimental research with a control group pre-post test design. The sample consists of 30 individuals with systolic blood pressure ranging from 140-180 mmHg and diastolic blood pressure ranging from 90-120 mmHg. Subjects were then divided into two groups, namely the experimental group and the control group. The experimental group received a dose of a mixture of cucumber and sweet orange juice consisting of 100 grams of cucumber and 50 grams of sweet orange, administered twice a day for 7 days. Normality testing was performed using the Shapiro-Wilk method, while statistical analysis used the Independent Samples Test and Anova. The results of the study indicate that the mixture of cucumber and sweet orange juice with a dose of 150 grams, administered twice a day for 7 days, significantly lowered systolic blood pressure with a P-value of 0.000, as well as diastolic blood pressure with a P-value of 0.042.

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Hypertension during pregnancy requires special management due to its potential to reduce blood flow to the placenta, which can affect the supply of oxygen and nutrients to the baby. This can slow down fetal growth and increase risks during childbirth (Syafira, 2021). Hypertension during pregnancy accounts for 5-15% of pregnancy complications and is one of the top three causes of maternal mortality and morbidity.

The Average Blood Pressure After Consumption of Tangerine Juice on the Reduction of Blood Pressure in Pregnant Women with Gestational Hypertension in the Work Area of Sumber Rejo Inpatient Public Health Center, East Lampung Regency, in the year 2023

It is known that from a sample of 34 participants in the study, based on the results, the average blood pressure after the consumption of orange juice in relation to the reduction of blood pressure in pregnant women with gestational hypertension within the Work Area of Sumber Rejo Inpatient Public Health Center, East Lampung Regency, in the year 2023, for systolic blood pressure had a mean value of 121.32, with a standard deviation of 7.417, a standard error of 1.272, a minimum value of 110 mmHg, and a maximum value of 145 mmHg. In the case of diastolic blood pressure, the mean was 91.50, with a standard deviation of 6.458, a standard error of 1.108, a minimum value of 70 mmHg, and a maximum value of 100 mmHg.

Tangerine (Citrus reticulata) are fruits that contain a high amount of potassium, about 116 mg. Mariani (2017) states that several clinical studies indicate that increasing potassium intake can lower blood pressure. In their research, Manurung and Wibowo (2016) also mentioned that potassium can significantly reduce blood pressure by causing blood vessels to dilate, promoting smoother blood flow, and reducing peripheral resistance. Additionally, potassium can inhibit the action of the angiotensin-converting enzyme (ACE inhibitor), thus hindering the conversion of renin into renin-angiotensin and preventing blood pressure elevation. Potassium also functions as a natriuretic and diuretic, leading to increased excretion of sodium and fluids.

In addition to pharmacological treatments, non-pharmacological therapy can also be administered to individuals with hypertension, focusing on nutritional interventions through dietary management. Examples of this approach include limiting salt consumption, maintaining adequate intake of potassium, calcium, and magnesium, and restricting calorie intake if body weight increases. The Dietary Approaches to Stop Hypertension (DASH) diet recommends hypertensive patients to consume ample amounts of fruits and vegetables, increase fiber intake, and stay well-hydrated. Herbal therapy is also considered a viable option for individuals with hypertension (Dendy et al., 2018 as cited in Alvionita, 2022).

In line with the study conducted by Marlina (2020), this research employed a quantitative method with a Quasi-Experimental design, specifically a two-group pre-test post-test design. The study used purposive sampling technique to select 15 participants for the orange juice group and 15 participants for the tomato juice group. The statistical analysis conducted was an Independent Samples t-test.

The research findings revealed that the average systolic blood pressure for the tomato juice group before intervention was 155.60±3.54159 and after intervention was 130.20±6.57050. The average diastolic blood pressure before tomato juice consumption was 97.26±2.15362 and after consumption was 81.33±4.08248. On the other hand, the average systolic blood pressure before orange juice consumption was 155.46±3.46135 and after consumption was 137.26±4.09646. The mean diastolic pressure before orange juice consumption was 97.86±1.24595 and after consumption was 87.80±2.27408.

The research findings that indicate a reduction in blood pressure after consuming tangerines are supported by the fact that tangerines contain potassium, which plays a role in dilating blood vessels. The widening of blood vessels can lower peripheral resistance and increase cardiac output, ultimately leading to normalized blood pressure. Moreover, potassium can also result in increased sodium and fluid excretion. Another beneficial component in tangerines is vitamin C, making it a nutrient-rich, low-calorie food source. With its potassium content of 116 mg and absence of sodium, consuming this fruit makes it one of the best choices for lowering high blood pressure.

Bivariate Analysis

The effect of consuming tangerine juice on reducing blood pressure in pregnant women with gestational hypertension within the working area of Sumber Rejo Inpatient Public Health Center, East Lampung Regency, in the year 2023.

From the analysis of 34 research samples, it is observed that the mean difference of systolic blood pressure before and after consuming orange juice in pregnant women with gestational

hypertension in the working area of Sumber Rejo Inpatient Public Health Center, East Lampung Regency, in the year 2023 is 25.294, while the mean difference of diastolic blood pressure before and after consumption is 12.029. The confidence interval for systolic blood pressure before and after consumption is 22.415-28.173, and for diastolic blood pressure, it is 8.129-15.929. The obtained p-value from the t-test is 0.000, which is less than α (0.05), indicating that the null hypothesis (H0) is rejected. This implies that there is a significant influence of consuming orange juice on reducing blood pressure in pregnant women with gestational hypertension within the working area of Sumber Rejo Inpatient Public Health Center, East Lampung Regency, in the year 2023.

Pregnant women are a vulnerable group prone to nutritional issues, including anemia, Chronic Energy Deficiency (CED), and obesity. There are several important considerations during pregnancy, one of which is the nutritional intake requirements. Insufficient nutrient intake during pregnancy and maternal nutritional problems can lead to fetal growth and development disorders and increase the risk of Low Birth Weight (LBW). Maternal nutritional status and health play a critical role in determining the nutritional status of infants, also known as the First 1000 Days of Life (HPK), which spans from 270 days of pregnancy to the first 730 days of a baby's life. The impacts of fetal growth and development disruptions during pregnancy are permanent and long-term, including effects such as stunting, susceptibility to non-communicable diseases (NCDs), and suboptimal human resource quality. Therefore, improving nutrition through adequate intake during pregnancy plays a vital role in the early childhood golden period. Nutritional improvement and intervention during the first thousand days involve enhancing the maternal nutritional status through supplementary foods and consuming iron tablets, ideally for a minimum of 90 tablets during pregnancy (Ministry of Health, 2013)

Hypertension is associated with elevated systolic, diastolic, or both blood pressure readings. Hypertension can be defined as high blood pressure where the systolic pressure is above 90 mmHg. In the elderly population, hypertension is defined as systolic pressure above 160 mmHg and diastolic pressure above 90 mmHg (Smeltzer et al., 2010; Majid, 2019). Hypertension is a significant factor contributing to non-communicable diseases (NCDs) such as heart disease, stroke, and others, which have become the leading cause of death worldwide (Ministry of Health Indonesia, 2015).

Hypertension is a disease that can affect anyone, regardless of age or socioeconomic status. Approximately 90% of hypertensive cases have no known exact cause (Utaminingsih, 2015). Hypertension is often referred to as the "Silent Killer" because many patients experience symptoms or disruptions without being aware of the underlying cause (Triyanto, 2017 cited in Marlina, 2020).

Oranges contain essential components such as Potassium, Sodium, and Phytonutrients. The presence of Potassium in oranges is crucial for promoting healthy blood circulation. The presence of Sodium in oranges helps lower blood pressure, reducing the risk of stroke, and the Phytonutrients in oranges enhance blood flow throughout the body, including the brain. Both men and women share the same risk factors for hypertension (Padila, 2013). Apart from medication, blood pressure can also be managed by adopting healthy lifestyle changes and dietary modifications. Incorporating oranges (citrus) into the diet is one such dietary approach to reducing blood pressure (Padila, 2013).

Tangerines (Citrus reticulata) are fruits with a high content of Potassium. Mariani (2017) states that several clinical studies have shown that increasing Potassium intake can lower blood pressure. In their research, Manurung and Wibowo (2016) also affirmed that Potassium can significantly reduce blood pressure by dilating blood vessels, allowing smoother blood flow and decreasing peripheral resistance. Additionally, Potassium can inhibit the action of the angiotensin-converting enzyme, thereby obstructing the conversion of renin into angiotensin and preventing an increase in blood pressure. Potassium also acts as a natriuretic and diuretic, leading to an increase in sodium and fluid excretion.

The research conducted by Mahendra (2022) on the effectiveness of orange juice in hypertension included 3 studies, of which 2 studies yielded results considered invalid, leaving only 1 study with valid results. The valid study was carried out by Valls et al. in Spain with a sample size of 159 individuals. The findings of this study indicated that the administration of 500 ml/day of orange juice enriched with hesperidin at 1200 mg or standard orange juice containing natural hesperidin at 690 mg for a period of 3 months led to a significant reduction in both systolic and diastolic blood pressure ($p < 0.05$). Moreover, a comparison between the two revealed that orange juice enriched with 1200 mg of hesperidin was more effective than standard orange juice in lowering blood pressure. In conclusion, orange juice significantly reduces both systolic and diastolic

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blood pressure, and increasing the dosage enhances its effectiveness in reducing blood pressure.

The reduction in blood pressure is partly attributed to the influence of potassium found in sweet oranges. Potassium's effect includes inhibiting the renin-angiotensin system, which subsequently leads to a decrease in aldosterone secretion, resulting in reduced sodium and water reabsorption in the kidney tubules. This mechanism leads to increased diuresis, reducing blood volume and ultimately lowering blood pressure. Additionally, potassium induces peripheral vasodilation, which decreases peripheral resistance and contributes to the decrease in blood pressure. The research findings show changes in blood pressure before and after consuming sweet orange, with respondents reporting reduced dizziness and no significant complaints.

However, the reduction in blood pressure varies among each respondent, as seen in the age categories. For individuals aged 20-35 years, the decrease in blood pressure is more significant, ranging from 15-45 mmHg, while for those aged 36-40 years, the decrease is only 5-40 mmHg. This variation can be attributed to the fact that individuals above 35 years of age are more prone to pregnancy-induced hypertension due to degenerative processes leading to structural and functional changes in peripheral blood vessels, making pregnant women more susceptible to hypertension (Herli Gustiani, 2018).

Moreover, in the education category, individuals with a bachelor's degree experience greater blood pressure reduction. Education level can influence an individual's ability and knowledge to adopt healthy lifestyle behaviors, particularly in preventing hypertension. Higher education levels often correlate with better skills in maintaining a healthy lifestyle and preventing diseases (Puspita, 2016).

In terms of occupation, non-working mothers experience more significant blood pressure reduction compared to working mothers. This is due to the influence of occupation-related stress, which can affect blood pressure, especially in hypertensive patients (Notoatmodjo, 2007).

For pregnant respondents categorized by parity, those classified as grand multiparas experience a slight decrease in blood pressure. This is because parity > 2 and ≥ 4 times pose a risk of hypertension and preeclampsia, as high parity is associated with a decline in reproductive system function (Pratiwi, 2015).

CONCLUSIONS

1. The average blood pressure before consuming orange juice among pregnant women with gestational hypertension was as follows: for systolic blood pressure, the mean was 146.62 mmHg, with a standard deviation of 3.420, a standard error of 0.587, a minimum value of 140 mmHg, and a maximum value of 155 mmHg. As for diastolic blood pressure, the mean was 103.53 mmHg, with a standard deviation of 8.663, a standard error of 1.486, a minimum value of 90 mmHg, and a maximum value of 115 mmHg.
2. The average blood pressure after consuming orange juice among pregnant women with gestational hypertension was as follows: for systolic blood pressure, the mean was 121.32 mmHg, with a standard deviation of 7.417, a standard error of 1.272, a minimum value of 110 mmHg, and a maximum value of 145 mmHg. As for diastolic blood pressure, the mean was 91.50 mmHg, with a standard deviation of 6.458, a standard error of 1.108, a minimum value of 70 mmHg, and a maximum value of 100 mmHg.
3. The t-test results yielded a p-value of 0.000, which is less than the significance level (α) of 0.05. This indicates that the null hypothesis (Ho) is rejected in favor of the alternative hypothesis (Ha), implying that there is a significant influence of consuming orange juice on reducing blood pressure among pregnant women with gestational hypertension in the working area of Sumber Rejo Inpatient Public Health Center, Lampung Timur Regency, in the year 2023.

SUGGESTIONS

1. The researchers are encouraged to apply this therapy beyond academic settings and be capable of addressing similar cases within the community.
2. They should provide public awareness about the management of reducing blood pressure in pregnant women with gestational hypertension using tangerine juice therapy.
3. This study could broaden the foundation for future research and serve as a reference for conducting further studies. Subsequent researchers are expected to introduce additional variables, such as exploring the effects of consuming tangerine juice with different combinations of ingredients.

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