DOI: https://doi.org/10.53350/pjmhs211551313

ORIGINAL ARTICLE

The Effectiveness of Young Coconut Water and Watermelon Juice in Reducing Blood Pressure

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ABSTRACT

Background: Blood pressure is influenced by psychosocial (stress), genetic, age, gender, nutritional status, and lifestyle (diet, lack of fiber consumption, smoking, lack of physical activity). 30 ml of young coconut water contains 61 mg of potassium, 5.45 mg of sodium, and 1.3 mg of sugar, affecting blood pressure changes. Coconut water contains K minerals and is useful for lowering blood pressure. Whereaswatermelon contains anti-hypertensive content, namely sodium, beta carotene, and potassium. Watermelon is rich in water, amino acids, L-arginine, which can maintain healthy blood pressure.

Aim: This study aims to determine the effect of young coconut water and watermelon juice on blood pressure in the 2013 nursing students of Respati University Yogyakarta.

Methods: This type of research is a quasi-experimental design with a nonequivalent control group pre and post-test. The sample was taken by simple random sampling, namely the control group (18 respondents), the young coconut water group (18 respondents), and papaya juice (18 respondents). Data pre-posttest of each group was tested using Paired T-test. The comparison control-treatment group was tested using an independent-test.

Results: The mean differences of systole and diastole pre-posttest blood pressure in the control group were -1.8 mmHg and -1.0 mmHg. The mean difference in systole blood pressure and the pre-posttest diastole of young coconut water groups were -3.1mmHg and -2.4 mmHg. The mean systole and diastole blood pressure in the pre-posttest watermelon juice group were -2.9 mmHg and -1.5 mmHg. The pre-posttest results of systole and diastole blood pressure analysis in the p-value control group were 0.100 and 0.450. The pre-post test results of systole and diastole blood pressure analysis of young coconut water groups gained p-value of 0.030 and 0.194. The pre-post test results of the juice watermelon group's systole and diastole blood pressure analysis gained p-value of 0.032 and 0.181. The posttest results of systole and diastole blood pressure analysis in the control group and young coconut water gained p-value of 0.014 and 0.157. The post-test results of the systole and diastole blood pressure analysis control group and juice watermelon gained p-value of 0.013 and 0.420.

Conclusion: Consumption of young coconut water and watermelon juice affects systole blood pressure, but it does not affect diastole blood pressure in nursing students in 2013 in Respati University Yogyakarta.

Keyword: Blood pressure, Coconut Water, Watermelon Juice

INTRODUCTION

Blood pressure is a significant factor in the circulatory system. An increase or decrease in blood pressure will affect the homeostasis in the body. Blood pressure is always needed to push blood flow in the arteries, arterioles, capillaries, and venous systems to form a permanent blood flow. If blood circulation becomes inadequate again, there is a disruption in the oxygen transport system, carbon dioxide, and other metabolic products. On the other hand, the body's function will experience disturbances in the formation of urine in the kidneys or the formation of cerebrospinal fluid and others [1]. There are two types of blood pressure abnormalities: hypertension or high blood pressure and hypotension or low blood pressure [2]. Hypertension or "high blood pressure" is a condition when a person experiences a rise in blood pressure either slowly or suddenly. The diagnosis of hypertension is established if a person's systole blood pressure persists at 140 mmHg or more [3]. Low blood pressure or hypotension is when a person experiences low blood pressure, usually less than 90/60 mmHg [4]. Kumar researched that he mentioned that high blood pressure or hypertension was almost 1 billion people or one among four adults suffered from high blood pressure or hypertension [5]. According to Basu, approximately 10-30% of almost all countries experienced hypertension [6]. Data from *Riskesdas* in 2013 stated that the prevalence of hypertension in Indonesia reached 25.8%, with a higher incidence of cardiovascular complications in women (52%), and it was 48%in men. The prevalence of hypertension in Indonesia reached 31.7% of the population at 18 years and over [7]. Yogyakarta is included in the top 5 incidences of hypertension, in which the percentage of rural areas was 51.7%, and in the big cities, the percentage was 47.7% in 2012 [8].

Another blood pressure disorders are hypotension. According to research by Shibao stated that the incidence of orthostatic hypotension in the United States is 30% of older adults and up to 70% of nursing home residents [9]. Furthermore, based on the research conducted by Keller (2013), it was found that the incidence of orthostatic hypotension occurred in 47-58% of patients with Parkinson's disease, 13-32% of those with hypertension, 16-25% of those with diabetes mellitus and 24% of them with carotid artery stenosis [10]. Meanwhile, the percentage of orthostatic hypotension in Indonesia was 12.65%, mentioned by Setiati (2004) [11]. According to Rahman, factors that influence blood pressure including age, exercise, stress, race, obesity, gender, medication, and disease processes. Other factors that can affect blood pressure are lifestyles such as high sodium diet and lack of fiber, such as fast food, smoking habits, low physical activity due to lifestyle, psychosocial (stress level), genetic, age, type sex, and nutritional status [12]. Disorders of blood pressure disorders can cause problems for

individuals. For example, hypertension can cause stroke, heart weakness, coronary heart disease (CHD), and kidney disorders, resulting in disability and even death. Hypertension, or the so-called silent killer, is one of the most influential risk factors for cardiovascular causes [13]. In contrast, hypotension can lead to dehydration, heart failure, heart attack, changes in heart rhythm, fainting (emotional stress, fear, insecurity/pain), anaphylaxis (life-threatening allergic reaction), blood donor, internal bleeding, blood loss, pregnancy, atherosclerosis (hardening of the arterial wall) [14].

Handling blood pressure disorders can be distinguished according to abnormalities in blood pressure. Among other things, disorders of blood pressure in hypertension can be divided into non-pharmacological and pharmacological treatments. One non-pharmacological treatment method is improving lifestyle through regular physical activity, sodium intake decrease, potassium, magnesium intake maintenance, cholesterol intake decrease, and pharmacological ways anti-hypertensive drugs regularly [15]. Whereas in the hypotensive blood pressure disorder, non-pharmacological treatment can be done by increasing activity such as regular walking or jogging and a sleeping head up ± 30 cm, and comfortable bedding. Besides, pharmacological treatment of hypotensive blood pressure disorders can be done by consuming drugs to raise blood pressure [16]. Fruits and vegetables contain high potassium and low sodium to maintain blood pressure within normal limits. Some examples of fruits rich in benefits are coconut and watermelon, in which the coconut fruit contains 95.5% water, 0.1% protein, <0.1% fat, 4.0% carbohydrate, and 0.4% ash. Coconut water contains 2.2 - 3.4 mg / 100ml of vitamin C and vitamin B complex. Besides, young coconut water also contains 30 ml of coconut water containing 61 mg of potassium (potassium), 5.45 mg sodium, and 1.3 mg sugar [17]. The benefits of consuming young coconut water are losing weight, maintaining the immune system, preventing kidney stones, killing intestinal worms, maintaining body fluids, electrolytes in young coconut water to help absorb drugs and facilitate. The entry of drugs into the bloodstream, instead of blood plasma, as an isotonic drink helps prevent osteoporosis, helps control diabetes, and restores dizziness caused by motion sickness. Besides, the highest content of young K mineral water can restore stamina. Consuming K minerals can also reduce hypertension [18]. Another fruit that can lower blood pressure is watermelon because there are some anti-hypertension drugs in watermelons, namely sodium, beta carotene, and potassium. Watermelon is rich in water content, amino acids, and L-arginine, maintaining healthy blood pressure. The INTERSALT study results have identified an inverse relationship between blood pressure and potassium intake through food and increasing potassium intake by 30-45 mmol, associated with a reduced systole blood pressure of 2-3 mmHg [19].

METHOD

The type of research used was quasi-experiment (quasi-experiment), with the Pre Test and Post Test Nonequivalent Control Group design. In the design, respondents were divided into three groups, two treatment groups, and one was the control group as a comparison. This study's data collection was carried out at Respati Yogyakarta University in May 2018 to nursing students with normal blood pressure. Nursing students with the criteria of adult age did not take medication for blood pressure disorders, did not have heart and kidney disease, and were willing to become respondents. One group consisted of 18 students. In the control group, samples did not receive treatment, and blood pressure was measured daily pre-posttest. In the control group (1), the samples received 170 ml of young coconut water daily in the afternoon for seven days, and the blood pressure was measured daily pre-posttest. In the control group (2), the samples received watermelon juice from 300-gram watermelon, and blood pressure was measured daily in pre-posttest. The blood pressure pretest was measured before treatment, and the blood pressure posttest was measured after treatment. Normality test data was done using Shapiro Wilk with pretest and posttest systole blood pressure, namely 0.124 and 0.50. The results of the normality test in pretest and posttest diastole blood pressure were0.147 and 0.58. The results of the normality test obtained> 0.05, meaning that the data is usually distributed. Statistical tests of pretest-posttest in each group used Paired T-test. Statistical tests for comparison effect between control group with treatment group used independent T-test.

RESULT

Samples Characteristic: The results of the study including age, sex, BMI, and Smoking Behavior of students. The results of the study are presented in Table 1. From table 1, it is known that the most age in the control group, coconut water group, and watermelon juice group were 22, 21 & 22, and 21, namely ten respondents (55.6%), eight respondents (44.4%), and nine respondents (50.0%). Most of the control group sex is male, namely 12 people (55.6%). Most of the respondents' sex in watermelon juice group and young coconut water is women, namely12 people (66.7%). In the control group and young coconut water, all BMI categories were standard (100%), whereas, in the watermelon juice group, there were three respondents (16.7%) in the underweight category. Most respondents in the three categories of the non-smoking category were 13 respondents (72.2%) in the control group and 16 respondents (88.8%) in the young coconut water and watermelon juice groups.

Systole Blood Pressure Pretest-Posttest in Control Group

Data on pretest-posttest systole blood pressure in the control group can be seen in Table 2.

Based on Table 2, it can be seen that pretest systole blood pressure in the lowest average control group was obtained on the third day, which was 118.1 mmHg, while the highest average was obtained on the zero-day, which was 123.3 mmHg. Posttest systole blood pressure in the lowest average control group was obtained on the first day, namely, 116.1 mmHg, while the highest average was obtained on the last day, 118.6 mmHg.

Table 1 Frequency Distribution of Respondent Characteristics on the Difference in the Blood Pressure Effectiveness Decrease between Consumption of Coconut Water and Watermelon Juice

Characteristic	Control Group		Coconut Water Group		Watermelon Juice Group	
	f	%	f	%	f	%
Age						
21	7	38,9	8	44,4	9	50,0
22	10	55,6	8	44,4	7	38,8
23	1	5,5	2	11,2	2	11,2
Total	18	100,0	18	100,0	18	100,0
Gender						
Female	8	44,4	12	66,7	12	66,7
Male	10	55,6	6	33,3	6	33,3
Total	18	100,0	18	100,0	18	100,0
IMT						
Underweight	0,0	0,0	0,0	0,0	3	16,7
Normal	18	100,0	18	100,0	10	55,5
Overweight	0,0	0,0	0,0	0,0	5	27,8
Total	18	100,0	18	100,0	18	100,0
Smoking						
Yes	5	27,8	2	11,2	2	11,2
No	13	72,2	16	88,8	16	88,8
Total	18	100,0	18	100,0	18	100,0

Tabel 2 Systole Blood Pressure Pretest-Posttest Data of Control Group on the Difference in Effectiveness of Blood Pressure Reduction between Coconut Water and Watermelon Juice Consumption.

Group	**Pretest-Posttest Systole Blood Pressure (mmHg)**				
	Days	**Min**	**Max**	**Mean**	**SD**
	0	100	138	123,3	7,9
Control	1	100-96	137-135	118,8-116,1	10,3-11,2
	2	110-102	134-130	120,0-116,8	8,8-8,9
	3	100-99	136-137	118,1-116,4	11,3-11,8
	4	100-98	132-130	119,6-116,6	10,1-10,0
	5	108-100	133-132	121,2-118,4	8,6-9,1
	6	110-109	133-133	121,3-118,5	7,7-8,1
	7	101-100	136-135	119,7-117,2	9,4-9,8
	8	100	132	118,6	8,8

Diastole Blood Pressure Pretest-Posttest in the Control Group

Diastole pretest-posttest blood pressure data in the control group can be seen in table 3. Based on table 3, it can be seen that pretest diastole blood pressure in the lowest average control group was obtained on the second day, which was 77.8 mmHg, while the highest average was obtained on the second day, which was 81.8 mmHg. Posttest systole blood pressure in the lowest average control group was obtained on the second day, which was 75.7 mmHg, while the highest average was obtained on the fifth day, which was 80.0 mmHg.

Tabel 3 Diastole Blood Pressure Pretest-Posttest Data Control Group on the Difference in Effectiveness of Blood Pressure Reduction between Coconut Water and Watermelon Juice Consumption

Grup	Diastole Blood Pressure Pretest-Posttest (mmHg)				
	Days	Minimal	Max	Mean	Primary school
	0	72	94	81,4	6,1
Control	1	65-62	90-89	77,8-75,7	8,6-9,2
	2	73-67	93-90	81,8-79,5	7,1-8,1
	3	69-66	91-90	78,2-76,9	6,0-6,7
	4	70-67	89-88	78,4-75,7	5,1-6,1
	5	67-65	92-92	81,6-80,0	7,3-7,9
	6	66-65	89-88	80,3-79,0	5,7-5,8
	7	70-69	90-89	80,8-79,8	6,1-6,1
	8	74	89	78,8	4,1

Systole Blood Pressure Pretest-Posttest in Young Coconut Water Groups: Based on table 4, the systole blood pressure pretesting the young coconut water group was the lowest on the fourth day, 109.8 mmHg, while the highest average was obtained on the zero-day was 115.7 mmHg. Posttest systole blood pressure in the young coconut water group was the lowest on the fourth day, which was 107.9 mmHg, while the highest average was obtained on the first day, which was 112.1 mmHg. Data on pretest-posttest systole blood pressure in the treatment group using young coconut water can be seen in table 4.

Tabel 4 Systole Blood Pressure Pretest-Posttest Data on Young Coconut Water Groups on the Difference in Effectiveness of Blood Pressure Reduction between Coconut Water and Watermelon Juice Consumption

Group	Systole Blood Pressure Pretest-Posttest (mmHg)				
	Days	Min	Max	Mean	Primary school
Young Coconut Water	0	110	129	115,7	6,5
	1	100-98	135-135	115,6-112,1	8,1-9,7
	2	95-94	126-124	113,5-110,7	8,6-8,5
	3	96-96	126-125	113,8-111,1	8,6-7,8
	4	99-96	125-125	109,8-107,9	7,1-7,0
	5	100-94	134-135	114,7-111,4	9,7-11,5
	6	100-97	130-128	112,6-109,4	9,5-9,8
	7	103-99	126-122	114,3-110,0	7,4-7,8
	8	99	129	111,0	8,7

Diastole Blood Pressure Pretest-Posttest in Young Coconut Water Groups: Based on table 5, it can be seen that the diastole blood pressure pretesting the young coconut water group was the lowest on average at zero-day, which was 73.6 mmHg, while the highest average was obtained on the second day, which was 79.5 mmHg. The diastole blood pressure post-test in the young coconut water group was the lowest on the sixth day, which was 71.7 mmHg, while the highest average was obtained on the last day, 76.9 mmHg. Diastole pretest-posttest blood pressure data in the young coconut water group can be seen in table 5.

Table 5 Diastole Blood Pressure Pretest-Posttest Data for Young Coconut Water Groups on the Difference in Effectiveness of Blood Pressure Reduction between Coconut Water Consumption and Watermelon Juice

Group	Diastole Blood Pressure Pretest-Posttest (mmHg)				
	Days	Min	Max	Mean	Primary school
	0	60	88	73,6	5,3
Young Coconut Water	1	65-61	90-90	76,6-74,5	7,7-7,9
	2	65-60	110-89	79,5-73,8	12,5-7,9
	3	63-60	88-86	77,8-75,2	6,2-6,6
	4	65-64	85-83	74,9-72,8	5,6-5,9
	5	63-61	88088	77,4-75,2	6,1-6,3
	6	65-62	85-84	74,1-71,7	5,7-6,6
	7	67-63	90-89	77,3-74,9	6,6-7,3
	8	65	99	76,9	8,6

Table 6 Systole Blood Pressure Pretest-Posttest Data on Watermelon Juice Group on the Difference in Effectiveness of Blood Pressure Reduction between Coconut Water Consumption and Watermelon Juice

Group	Systole Blood Pressure Pretest-Posttest (mmHg)				
	Days	Min	Max	Mean	Primary chool
	0	89	138	112,11	14,1
Watermelon Juice	1	98-90	137-133	113,3-111,2	10,1-9,9
	2	100-93	133-127	114,7-110,9	11,4-11,4
	3	97-91	124-125	108,0-106,7	9,3-10,1
	4	95-91	131-125	114,2-108,2	10,1-9,9
	5	95-89	137-136	112,6-107,6	11,7-12,2
	6	97-97	132-130	110,3-108,8	10,8-10,7
	7	99-98	135-133	109,7-108,8	10,4-10,1

Systole Blood Pressure Pretest-Posttest in Watermelon Juice Group: Based on table 6, it can be seen that the systole blood pressure pretest in the lowest average watermelon juice group was obtained on the third day, which was 108.0 mmHg, while the highest average was obtained on the second day, which was 114.7 mmHg.

Posttest systole blood pressure in the lowest average watermelon juice group was found on the third day, 106.7mmHg, while the highest average was obtained on the first day, 111.2mmHg. Data on pretest-posttest systole blood pressure in the watermelon juice group can be seen in table 6.

Diastole Blood Pressure Pretest-Posttest in Watermelon

Based on table 7, it can be seen that the lowest pretest diastole blood pressure in the watermelon juice group was found on the zero-day, which was 72.17 mmHg, while the highest average was obtained on the first day, which was 77.2 mmHg. Diastole blood pressure posttest in the lowest average watermelon juice group was obtained on the second day, which was 71.7 mmHg, while the highest average was obtained on the sixth day, which was 75.7 mmHg. Diastole blood pressure pretest-posttest data in the watermelon juice group can be seen in table 7.

Table 7 Pretest-Posttest Diastole Blood Pressure Data on Watermelon Juice Group on the Difference in Effectiveness of Blood Pressure Reduction between Coconut Water and Watermelon Juice Consumption

Group	Diastole Blood Pressure Pretest-Posttest (mmHg)				
	Days	Min	Max	Mean	SD
	0	56	89	72,17	8,3
Watermelon Juice	1	60-61	94-94	77,2-75,1	9,1-8,9
	2	60-54	88-86	73,8-71,7	8,2-8,1
	3	63-56	86-85	73,5-71,4	7,8-7,4
	4	65-60	93-94	74,8-73,1	6,8-8,1
	5	65-60	88-87	75,5-74,1	7,3-7,9
	6	66-64	92-90	77,1-75,7	8,3-8,7
	7	67-65	86-83	74,9-73,2	5,5-5,9
	8	64	85	75,1	6,4

Average Difference in Systole Blood Pressure Pretest-Posttest in the Study Group: Based on Figure 1, it was found that the average difference in systole blood pressure pretest-posttest in the control group was the eighth-most decline in the day, which was 4.78 mmHg. Whereas in the young coconut water group, the eighth-most day decrease was 4.67 mmHg. In the watermelon juice group, the fourth most decline was 6.06 mmHg. The average data of the difference between systole blood pressure pretest-posttest in the study group can be seen in Figure 1—blood Pressure Reduction between Coconut Water Consumption and Watermelon Juice.

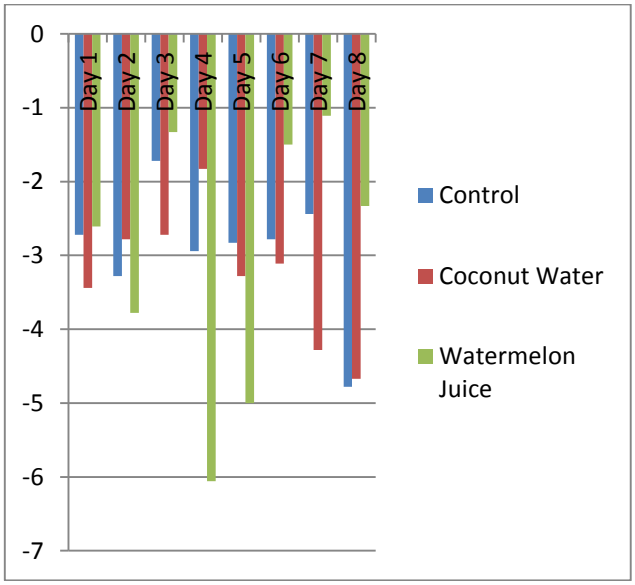

Figure 1. Average Blood Pressure of Systole Pretest-Posttest for Each Group on the Difference in Effectiveness of

Average Difference in Diastole Blood Pressure Pretest-Posttest in the Study Group

In the control group was the fourth most decrease in a day, which was 2.72 mmHg. Whereas in the group of young coconut water, the second most day decrease was 5.67 mmHg, and an increase on the eighth day was 3.33 mmHg. In the watermelon juice group, the fourth most decrease day was 6.06 mmHg, and the increase on the eighth day was 2.94 mmHg. Data on the average difference in diastole blood pressure pretest-posttest in the study group can be seen in graph 2. Based on Figure 2, it is known that the average difference in diastole pretest-posttest blood pressure.

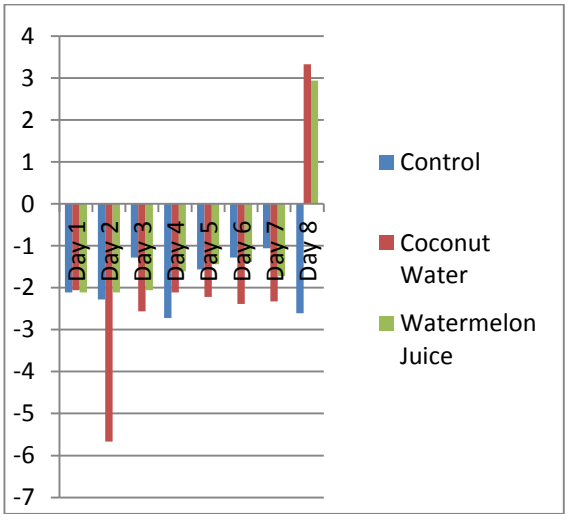

Figure 2. Average Diastole Blood Pressure Pretest-Posttest in Each Papaya Juice Group on the Difference in Effectiveness of Blood Pressure Reduction between Coconut Water and Watermelon Juice Consumption

Effect of Young Coconut Water and Watermelon Juice on Systole Blood Pressure

Table 8 shows that in the control group, the mean difference between pretest-posttest -1.8 and p-value = 0.100. Based on these values, in which the p value> 0.05, it can be concluded that there is no effect on the control group's systole blood pressure. In the young coconut water group, the mean pretest-posttest was -3.1 and p-value = 0.030. Based on this value, in which the p-value <0.05, it can be concluded that young coconut water effectively reduces the systole blood pressure of respondents. In the watermelon juice group, the mean pretest-posttest was -2.9 and p-value = 0.032. Based on these values, in which the p-value <0.05, it can be concluded that watermelon juice effectively reduces the systole blood pressure of respondents. The effect of young coconut water and watermelon juice on systole blood pressure is testing with Paired T-test, presented in Table 8.

Table 8 Effect of Coconut Water and Watermelon Juice Consumption on Systole Blood Pressure Reduction

Group	*Mean (mmHg)*	The mean difference	*P-value*
Control			
Pretest	118,9	-1,8	*0,100*
Posttest	117,1		
Coconut Water			
Pretest	113,5	-3,1	*0,030*
Posttest	110,3		
Watermelon Juice			
Pretest	111,7	-2,9	*0,032*
Posttest	108,8		

Effect of Coconut Water and Watermelon Juice on Diastole Blood Pressure

Table 9 shows that in the control group, the mean pretest-posttest -1.0 difference and p-value = 0.450. Based on these values, in which the p value> 0.05, it can be concluded that there is no effect on the control group's systole blood pressure. In the young coconut water group, the mean pretest-posttest was -2.4 and p-value = 0.194. Based on these values, in which the p value> 0.05, it can be concluded that young coconut water is not effective in reducing the diastole blood pressure of respondents. In the watermelon juice group, the mean pretest-posttest was -1.5 and p-value = 0.181. Based on these values, in which p value> 0.05, it can be concluded that watermelon juice does not effectively reduce diastole respondent's blood pressure. The effect of young coconut water and watermelon juice on diastole blood pressure is testing with Paired T-test presented in table 9.

Comparison of the Effect of Young Coconut Water and Watermelon Juice with the Control Group on Systole Blood Pressure: On these values, in which p-value <0.05, it can be concluded that young coconut water and watermelon juice effectively reduce the blood pressure of respondent systole compared to the control group. Table 10 shows that the control group's comparison with the young coconut water group and watermelon juice group on systole blood pressure obtained p values of 0.014 and 0.013. Base Comparing the effect of young coconut water and watermelon juice with the control group on systole blood pressure is testing with Independent T-test is presented in Table 10.

Table 9 Effect of Coconut Water and Watermelon Juice Consumption on Reducing Diastole Blood Pressure

Groups	Mean (mmHg)	The mean difference	P-value
Control			
Pretest	79,0	-1,0	0,450
Posttest	78,0		
Coconut Water			
Pretest	76,4	-2,4	0,194
Posttest	74,0		
Watermelon Juice			
Pretest	75,0	-1,5	0,181
Posttest	73,5		

Table 10 Comparison of the Effects of Coconut Water and Watermelon Juice Consumption on the Control Group on Decreased Systole Blood Pressure

Groups	*P-value*
Posttest Control	*0,014*
Posttest Coconut Water	
Posttest Control	*0,013*
Posttest Watermelon Juice	

Comparison of the Effect of Young Coconut Water and Watermelon Juice with the Control Group on Diastole Blood Pressure: From table 11, it is obtained that the comparison of the control group with the young coconut water group and watermelon juice group on systole blood pressure obtained a p-value of 0.157 and 0.420. Based on these values, in which the p value> 0.05, it can be concluded that young coconut water and watermelon juice are not effective in reducing respondents' diastole blood pressure. Comparing the effect of young coconut water and watermelon juice with the control group on diastole blood pressure is testing with Independent T-test presented in Table 11.

Table 11 Comparison of the Effect of Coconut Water and Watermelon Juice Consumption on the Control Group on Diastole Blood Pressure Reduction

Groups	*P-value*
Posttest Control	*0,157*
Posttest Coconut Water	
Posttest Control	*0,420*
Posttest Watermelon Juice	

DISCUSSION

Based on tables 2 and 3, it can be seen that the pretest systole blood pressure in the lowest average control group was obtained on the third day, which was 118.1 mmHg, while the highest average was obtained on the zero-day, i.e., 123.3 mmHg. Posttest systole blood pressure in the lowest average control group was obtained on the first day of 116.1 mmHg, while the highest average was obtained on the last day of 118.6 mmHg. Table 3 shows pretest diastole blood pressure in the lowest average control group obtained on the second day, 77.8 mmHg, while the highest average was obtained on the second day, which was 81.8

mmHg. Posttest systole blood pressure in the lowest average control group was obtained on the second day, which was 75.7 mmHg, while the highest average was obtained on the fifth day, which was 80.0 mmHg. The average systole and diastole blood pressure in the control group showed a normal range, while the highest average was obtained on the zero-day in the prehypertension category.

Based on tables 4 and 5, the pretest systole blood pressure in the young coconut water group was the lowest on the fourth day, 109.8 mmHg, while the highest average was zero-day was 115.7 mmHg. The lowest posttest systole blood pressure in the young coconut water group was obtained on the fourth day, which was 107.9 mmHg, while the highest average was obtained on the first day, which was 112.1 mmHg. Diastole pretest blood pressure in the young coconut water group was the lowest on the zero-day, 73.6 mmHg, while the highest average was obtained on the second day, which was 79.5 mmHg. Posttest diastole blood pressure in the young coconut water group was the lowest on the sixth day, which was 71.7 mmHg, while the highest average was obtained on the last day, which was 76.9 mmHg. These data show that the average blood pressure in all groups is in the normal category. Based on tables 6 and 7, it can be seen that pretest systole blood pressure in the lowest average watermelon juice group was obtained on the third day, which was 108.0 mmHg, while the highest average was obtained on the second day, which was 114.7 mmHg. Posttest systole blood pressure in the lowest average watermelon juice group was obtained on the third day, 106.7 mmHg, while the highest average was obtained on the first day, 111.2 mmHg. Diastole pretest blood pressure in the lowest average watermelon juice group was found on the zero-day, 72.17 mmHg, while the highest average was obtained on the first day, which was 77.2 mmHg. Diastole blood pressure posttest in the lowest average watermelon juice group was obtained on the second day of 71.7 mmHg, while the highest average was obtained on the sixth day, which was 75.7 mmHg. These data show that the average blood pressure in all groups is in the normal category.

Blood pressure is the pressure given by the blood to the arterial wall [18]. Systole blood pressure is the heart muscle's pressure when it pushes blood from the left ventricle to the aorta (pressure when the heart's ventricular muscles contract). Diastole blood pressure is the pressure on the arteries and blood vessels' walls due to the loosening of the heart's ventricular muscles (pressure when the atrial muscles of the heart contract and blood to the ventricles) [19]. Average blood pressure values according to Wizner criteria, the normal range of systole blood pressure is <119-86 mmHg, while diastole is <79-56 mmHg, while blood pressure in the study was pretest and posttest [20]. Pretest blood pressure results from blood pressure measurement of 2013 Respati Yogyakarta University nursing students on the left arm. Before the 15 minutes rest measurement, in a sitting position, blood pressure measurement is done before being given coconut water or watermelon juice. Blood pressure at the posttest was the result of the blood pressure measurement of the nursing students of the 2013 Respati Yogyakarta University on the left arm and before the measurement was 15 minutes resting, in a sitting position, blood pressure measurements were made after giving coconut water or watermelon juice for seven days.

Based on table 1, it is known that most of the sex of the control group is male, which is 12 people (55.6%). Most of the sex of the watermelon juice group and young coconut water are women, which is 12 people (66.7%). The results showed that the value of systole blood pressure and diastole pre-test in men was higher than in women. Following James' theory, the results of this study are that the factors that influence blood pressure are gender, where after puberty, women tend to have a lower blood pressure than men of the same age. Gender factors influence hypertension, where men suffer more from hypertension than women, with a ratio of about 2.29 for an increase in systole blood pressure and 3.76 for an increase in diastole blood pressure [21]. Men are suspected of having a lifestyle that tends to increase blood pressure compared to women. However, after entering menopause, the prevalence of hypertension in women is high. Even after age 65, the occurrence of hypertension in women is higher than men caused by hormonal factors.

Smoking affects blood pressure, which can increase blood pressure. Because in cigarettes, there is nicotine content. Nicotine stimulates the sympathetic nervous system so that the nerve endings release the stress hormone norepinephrine and immediately bind to the alpha receptor hormone. This hormone flows in blood vessels throughout the body. Therefore, the heart will beat faster, and the blood vessels will contract.

Furthermore, it will cause constriction of blood vessels and block the blood flow to increase blood pressure [22]. Based on Table 1, it was found that all BMI categories were typical in the control group and young coconut water (100%). In contrast, there were three respondents in the watermelon juice group (16.7%) underweight category. Most respondents in the three categories of the non-smoking category were 13 respondents (72.2%) in the control group and 16 respondents (88.8%) in the young coconut water and watermelon juice groups. Pausova (2010) states that nicotine will increase blood pressure by stimulating the release of a humoral chemical system, namely norepinephrine through adrenergic nerves and increasing catecholamines released by the adrenal medulla [22]. Blood volume is an essential factor that must be taken into account in the blood control system. Because the volume of blood and the amount of blood vessel capacity must always be the same and balanced, and if there is a change in blood vessel diameter (narrowing of blood vessels), there will be a change in the osmotic value and hydrostatic pressure in the vascular and in the interstitial spaces outside the blood vessels. Hydrostatic pressure in the vascular increases, so blood pressure will also increase.

The study results support the WHO theory (2013). Individuals who continue to use tobacco tend to increase the risk of hypertension due to tobacco use's cumulative consumption. These results are in line with the research of Kurniati entitled "Overview of Smoking Habits with Blood Pressure Profiles in 18-22 Years Old Male Smoker Students (Case Study at the Undip Faculty of Engineering, Department of Engineering", indicating that more and more

cigarettes are smoked in every day will affect the increase in systole and diastole blood pressure [23]. This is in line with the research conducted by Fauzi. The variables that are statistically significant with essential hypertension among young adults in suburban and urban areas are sex (OR: 2.6; 95% CI: 1.53-4.42), obesity (OR: 2.9; 95% CI: 1.71-4.92), smoking habits (OR: 2.29; 95% CI: 1.19-4.48), physical activity (OR: 2.06; 95% CI: 1.23-3.45), salt consumption (OR: 2.41; 95% CI: 1.37-4.27), and stress (OR: 3.22; 95% CI: 1.69-6.29) [24]. According to the literature, nicotine and carbon dioxide in cigarettes will damage the arteries' endothelial lining. The elasticity of the blood vessels is reduced, causing increased blood pressure [25].

Simultaneously, the researchers conducted research showing that systole blood pressure in respondents who smoked was higher than those who did not smoke even though blood pressure was still in the normal category. Based on graph 1, it was found that the average difference in pretest-posttest systole blood pressure in the control group was the eighth-most decline in the day, which was 4.78 mmHg. Whereas in the young coconut water group, the eighth-most day decrease was 4.67 mmHg. In the watermelon juice group, the fourth most decline was 6.06 mmHg. Whereas in graph 2, the average difference in diastole pretest-posttest blood pressure difference in the control group was the fourth most decreasing day, which was 2.72 mmHg. Whereas in the group of young coconut water, the second most day decrease was 5.67 mmHg, and an increase on the eighth day was 3.33 mmHg. In the watermelon juice group, the fourth most decrease day was 6.06 mmHg, and an increase on the eighth day was 2.94 mmHg. The results showed that all groups experienced decreased systole blood pressure, with the highest watermelon juice group decrease. Diastole blood pressure experienced variations in the study results, the highest blood pressure drop in the young coconut water group. However, the research group of young coconut water and watermelon juice experienced increased blood pressure on the last day.

Table 8 shows that in the control group, the mean difference between pretest-posttest -1.8 and p-value = 0.100. Based on these values, in which p value> 0.05, it can be concluded that there is no effect on the control group's systole blood pressure. In the young coconut water group, the mean pretest-posttest was -3.1 and p-value = 0.030. Based on this value in which a p-value <0.05 can be concluded, young coconut water effectively reduces respondents' systole blood pressure. In the watermelon juice group, the mean pretest-posttest was -2.9 and p-value = 0.032. Based on these values, in which p-value <0.05, it can be concluded that watermelon juice effectively reduces the systole blood pressure of respondents. According to Agyemang, young coconut water contains 95.5% water, 0.1% protein, less than 0.1% fat, 4.0% carbohydrate, and 0.4% ash. Young coconut water also contains vitamin C 2.2-3.4 mg / 100 ml and vitamin B complex [17]. Also, coconut water not only contains water but also contains nutrients. 30 ml coconut water contains 61 mg of potassium (potassium), 5.45 mg of sodium, and 1.3 mg of sugar. In the research of Medeiros, they explained that the administration of potassium had been proven in several previous studies to reduce blood pressure [26]. This is estimated through the mechanism of natriuresis, endothelium-dependent vasodilatation, decreases RAA activity, and sympathetic nerves. A high potassium level in young coconut water is reported to reduce blood pressure or as an antihypertensive, but the research is still rarely done in humans. According to Medeiros's research, no results have been obtained that report side effects due to the consumption of young coconut water [26]. The impact of excess potassium from food intake is almost non-existent, even though there is no upper intake (UI) value for potassium. The intake of potassium sources to achieve adequacy is rarely achieved. The mineral content of K (potassium or potassium) in coconut water is the most abundant. Eating mineral K can reduce hypertension. Based on nutritional research data compared to sports drinks, coconut water contains less sodium but has more potassium. Besides potassium can reduce hypertension, it can also help the body regulate blood pressure and heart function [27]. Watermelon has many varieties; for example, seedless watermelons are genetically modified varieties of seeded watermelons. For generations, watermelon is used for blood pressure reduction. This fruit has minerals, both macro minerals and micro minerals. The macro minerals they contain are potassium, magnesium, and sodium, while the micronutrients including zinc and manganese.

The level of potassium is 82mg / 100g, the sodium content is 1mg / 100g and the magnesium content is 10mg / 100g [28]. Potassium content in this fruit is believed to have contributed to its diuretic effect. Potassium is an intracellular ion and is associated with an exchange mechanism with sodium. Increased potassium intake in the diet has been linked to a decrease in blood pressure. Potassium triggers natriuresis (loss of sodium through urine). Sodium is the main cation in blood, and extracellular fluid covers 95% of all cations. Therefore, this mineral plays a major role in regulating body fluids, including blood pressure and acid-base balance. Normal magnesium levels can maintain smooth muscle tone and have implications for blood pressure control. Magnesium can also protect the heart muscle from damage during ischemia [29].

Watermelon also has the highest citrulline content from other citrulline sources. Besides, phenolic compounds such as carotenoids (lycopene and beta carotene), which function as antioxidants and anti-inflammatory, are also found in watermelons. Phenolic compounds function to neutralize free radicals, mostly from Nitric oxide (NO) [30]. Citrulline is a non-essential amino acid that is believed to affect VO2max. Sitrulin is an influential precursor in arginine synthesis, where arginine acts to produce nitric oxide (NO) by the enzyme NO synthase. Nitric oxide acts to increase blood flow. Increased blood flow causes an increase in the supply of oxygen and more nutrients to the muscles, so VO2max increases. Citrulline in watermelon citrulline is found in beef, dark chocolate, legumes, nuts, and fish [31].

Table 9 shows that the mean pretest-posttest in the control group was -1.0 difference and p-value = 0.450. Based on these values, in which the p value> 0.05, it can be concluded that there is no effect on the control group's systole blood pressure. In the young coconut water group,

the mean pretest-posttest was -2.4 and p-value = 0.194. Based on these values, in which the p value> 0.05, young coconut water is not effective in reducing respondents' diastole blood pressure. In the watermelon juice group, the mean pretest-posttest was -1.5 and p-value = 0.181. Based on these values, in which the p value> 0.05, it can be concluded that watermelon juice does not effectively reduce diastole respondent's blood pressure. The results support Lin's theory that factors influencing blood pressure can be influenced by age, exercise, stress, gender, race, medication, diurnal variation, disease process, and obesity [32]. While on London's research, the factors influencing blood pressure are cardiac output, vascular resistance, volume, viscosity, and blood vessel wall elasticity. In this study, several factors were not controlled by researchers so that they could influence changes in blood pressure in respondents [33].

The results of this study are supported by research conducted by [34] entitled "The Effect of Young Coconut Water Herbal Therapy on Blood Pressure Decrease in Hypertension Patients in Addrejo Village, Bandar District, Batang District", the results of research in the adult category have no effect on blood pressure reduction with systole p-value 0.389 and diastole p-value 0.738. Because in the study, only systole blood pressure decreased blood pressure, while diastole increased blood pressure. Whereas in the research conducted by [35], entitled "Effect of Coconut (CocosNucifera L.) Water Against Decreasing Blood Pressure," the results showed a decrease in blood pressure both systole and diastole after drinking 300 ml of coconut water. The study was not consistent because only systole blood pressure decreased blood pressure, while diastole increased blood pressure.

CONCLUSION

Based on the study results, it is revealed that young coconut water and watermelon juice effectively lowers blood pressure. However, it is not effective in reducing the blood pressure of diastole. It is expected that the research results can be used as a basis for utilizing young coconut water and watermelon juice to maintain blood pressure in the normal range.

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