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Traditional Therapy of Watermelon-Starfruit Juice for Reducing Blood Pressure of Hypertension

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ABSTRACT
Hypertension prevalence in Indonesia has significantly increased from 25.8% in 2013 to 34.1% in 2018. In Banjar Datengan, Tumbakbayuh, Mengwi, and Badung, there were 57 elderly people, and 35 people (61.4%) were considered at risk of hypertension. The prevalence of hypertension in Banjar exceeds the average value in Badung Regency. The first objective was to examine whether using traditional therapy can help to lower systolic blood pressure. The second objective was to examine whether using traditional therapy lowers diastolic blood pressure. The third objective was to determine the best therapeutic juice among watermelon, starfruit, and watermelon-starfruit mixture in reducing hypertension. An experimental research design was employed in which a model of true pre-test and post-test was used. A sample of 33 people was selected by purposive sampling. The sample was divided into three equal groups, namely drinking watermelon juice, drinking star fruit juice, and drinking watermelon-star fruit juice mixture group. The mean systolic blood pressure of the three groups before and after drinking juice showed a significant difference ($p < 0.05$). Likewise, the mean diastolic blood pressure of the three groups before and after drinking juice showed a significant difference ($p < 0.05$). All three groups have the same ability to reduce blood pressure, but the watermelon-star fruit juice group can reduce high blood pressure (hypertension) to become normal (norm tension). Hypertension patients should take antihypertensive medication along with drinking watermelon-star fruit juice. Future studies should explore the side effects of watermelon-star fruit juice.
Keywords: hypertension, watermelon juice, star fruit juice, watermelon-star fruit juice.
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INTRODUCTION

Background

Hypertension is a health condition that occurs when there is a sustained blood pressure ≥ 140mmHg for systolic pressure and ≥ 90 mmHg for diastolic pressure (Kiely et al., 2013). However, systolic pressure is the best indicator for hypertension among patients older than 60 years while diastolic pressure is a good predictor for individuals below 50 years old (Kasiakogias et al., 2019). The disease is a preventable condition that is usually caused by lifestyle-related practices. The illness is mostly caused by unhealthy choices such as smoking, sedentary lifestyle, and alcohol consumption (Xu and Xue, 2016). There are various risk factors of hypertension including socio-demographics, geo-locality as well as other factors such as body weight and stress levels (Peltzer and Pengpid, 2018). Additionally, dietary choices such as consumption of fatty foods, soft drinks, fast foods and insufficient fruit and vegetable intake have also been linked to hypertension (Peltzer and Pengpid, 2018). Although the disease is preventable, there has been little effort to access natural options such as certain traditional foods in the prevention and management of the disease.

Typically, hypertension increases the risk of cardiovascular diseases such as heart failure as well as stroke and coronary artery disease (Thomas, 2007). Hypertension is more likely to affect elderly patients compared to younger patients. Globally, the rate of hypertension has continued to increase as evidence in the research conducted by Hussain et al. (2016). In Indonesia, the prevalence of hypertension has consistently risen over the years such as from 8.3% in 1995 to 26.7% in 2013 (Rahmawati & Bajorek, 2018). The highest incidence of hypertension experienced in Indonesia is among the elderly with prevalence levels of 60%-69.5% (Rizkiriani, Khomsan & Riyadi, 2014). The information means that for every 100 elderly people, there are 60-70 people who experience hypertension. The rising rates of hypertension in developing countries such as Indonesia have been attributed to increasing urbanization, reduced physical activities, an aging population (Surdharsanan, 2017).

If not handled well, hypertension can cause various kinds of complications including kidney damage (kidney failure), heart abnormalities (heart disease) and stroke (Lang et al., 2013). Fruits and vegetables have a high nutritional value and can also be used for medicinal purposes. Carotene quantities found in certain fruits are enough to provide the body with most of its nutritional needs (Erhirhie & Ekene, 2014). Watermelon contains various substances including 16.7mg of citrulline and 122mg of potassium for every 100mg. Meanwhile, star fruit contains 133mg of potassium for every 100 grams. (Prabantini, 2013).

Across the field of research, scholars have found a significant association between fruit and vegetable consumption, with reduced risk of various health-related health disorders. As mentioned earlier, watermelons are some of the recognized fruit, associated with reducing the risk of these types of disorders. Particularly, Figueroa et al. (2012) conducted a study to evaluate the effects of watermelon on carotid augmentation index (cAIx) and blood pressure (BP) in people with prehypertension and normal ABI. As illustrated by the authors, study subjects were randomly assigned to 6 weeks of watermelon extract supplementation (Figueroa et al., 2012). The results showed that watermelon extract supplementation minimizes carotid wave reflection, branchial BP and ankle BP. The reduction is mostly in middle-aged adults with the normal low ankle-brachial index (ABI) and stage 1 hypertension. Similar views were presented by Massa et al. (2016), who confirmed that indeed, watermelon extract supplementation has a positive impact on prehypertension reduction. However, Massa et al. (2016) are keen to clarify that it the supplementation does not change the cardiac autonomic modulation of hypertensive and prehypertensive individuals. From the findings in the studies by Mass et al. (2016) and Figueroa et

al. (2012), it is revealed that watermelon extracts contain both vitamins A and C, which are in the form of diseasing fighting beta-carotene. Besides, the fruits are rich in potassium, which is considered significant in blood pressure control, hence reducing hypertension.

Other than watermelon, researchers have also found that other traditional fruits also are associated with hypertension reduction (Rahmawati & Bajorek, 2018; Sulistyowati et al., 2017; Hughes et al., 2013). According to Wijaya, Farida, and Asnar (2012), star fruit is the commonly used traditional therapy for reducing hypertension, particularly in Indonesia. The authors employed an experimental research design with post-test and pre-test group design. A total of 90 individuals were grouped into two, where they were given 200 ml and 100 ml sweet star fruit juices, respectively. The study results showed a significant change in BP when traditional star fruit juice is given to hypertensive individuals. However, no significant effect was produced in dosage differences. The findings of this study resonate with that of Azzren and Khairun (2015), who indicated that in Indonesia, hypertension is one of the leading diseases, which have created critical concerns within the public health. As such, the authors enunciate that one alternative to reducing the disorder is through the use of traditional star fruit. Notably, the association between this therapy and the reduction of hypertension is that the fruits contain high fiber and potassium, which plays a critical role in lowering blood pressure and hypertension.

The underlying operation of fruits such as starfruit and watermelon that makes them suitable as a blood pressure reducing agents have also been explored (Sari, 2018; Zahron and Khasanah, 2016). Essentially, Potassium ions contained in watermelons and starfruit cause ionic imbalance when consumed thereby stimulating the movement of sodium ions in the cell. Potassium ions will push the sodium ions inside the cell so that the sodium ions exit the cell (towards the extracellular) precisely in the intravascular section. The release of sodium will also attract water that is in the intra-cell to intravascular, then excreted as urine. More urine can reduce blood pressure. In this regard, researchers such as Ardiyanto et al. (2014) and Caturwati et al. (2015) have found watermelon or starfruit juice to be capable of reducing blood pressure in hypertensive patients.

The rationale of the Study

Several existing studies have indicated watermelon and star fruit to be beneficial in reducing blood pressure (Figueroa et al., 2012; Figueroa et al., 2014; Florida State University, 2014). For instance, Figueroa et al. (2014) noted that blood pressure on the heart and aorta significantly reduced after participants consumed watermelon extracts. Meanwhile, Ismail et al. (2019) noted that star fruit *Averrhoa bilimbi* helps in lowering blood pressure by promoting vasodilatation due to its high pH value. However, there are limited studies done to compare watermelon juice and star fruit juice as therapeutic approaches to managing hypertension. In this regard, the current research is critical in revealing the best traditional therapy which can be used to manage high blood pressure.

Significance of the Study

The current study is important in providing scientific data to support or refute claims regarding the effectiveness of using watermelon juice, star fruit juice, and watermelon-star fruit juice mixture in managing hypertension. The findings of the study will empower healthcare practitioners to understand the best ways of promoting patient self-management concerning hypertension. At the same time, the finding from the study will be crucial in promoting further research on why certain traditional interventions are more effective than others in reducing high blood pressure. Besides, the results will inspire positive policy formulation regarding approaches to managing high blood pressure.

Research Questions

The main questions which the current study seeks to answer include;

- To what extent are traditional therapies effective in reducing hypertension?
- What is the best traditional therapy in the management of high blood pressure?

Research Aim and Objectives

The main aim of this research is to examine the influence of watermelon juice, star fruit juice, and watermelon-star fruit juice mixture on blood pressure in hypertensive elderly in Banjar Datengan, Tumbakbayuh, Mengwi, Badung.

The current study has three main objectives;

Objective 1: To examine whether using traditional therapy can help to lower systolic blood pressure.

Objective 2: To examine whether using traditional therapy can help to lower diastolic blood pressure.

Objective 3: To determine the best therapeutic juice among watermelon, starfruit, and watermelon-starfruit mixture in reducing hypertension.

METHODOLOGY

Research Design

The current research employed an experimental design in which a pre-test and posttest model was used. An experimental design was appropriate in the current study because it enables a researcher to assess the impact of an intervention (Notoatmodjo, 2010; Nursalam, 2014). such as by taking measurements of blood pressure before and after providing traditional therapies. The research employed a quantitative approach since it primarily consisted of gathering statistical measurements (Rahi, 2017).

Participants

For the current study, a purposive sampling technique was used to select participants who were then redistributed into three groups using simple random sampling. Purposive sampling entails selecting participants with specific qualities that are of interest to a researcher (Etikan & Bala, 2017). The technique is crucial in ensuring the researcher saves time of the sampling process. Bias was avoided by ensuring those selected met certain threshold requirements (Pannucci & Wilkins, 2010). Data were sampled from residents from Banjar Village who were over 18 years old and had a weight

between 50-80 kg. Also, the participants were only selected if they exhibited hypertension by revealing systolic pressure ≥ 140mmHg and diastolic pressure ≥ 90 mmHg. A key inclusion criterion was that the participants were not using any drugs at the time of recruitment which may affect their blood pressure. At the same time, participants who suffered from other illnesses that affected blood pressure were excluded. The three groups studied include; the watermelon juice group, the star fruit juice group, and the watermelon-star fruit juice group. The sample size for the research consisted of 33 participants distributed in the 3 groups so that each group had 11 participants.

Research Instrument

The research instrument chosen to gather data depends on the study design involving the type of data which should be collected (Gray, 2019; Suriansyah et al., 2019). For the current research, the main variable measured was the respondents' blood pressure. In this regard, the main instrument used to collect data was a sphygmomanometer which is an instrument used to measure blood pressure. Also, a blending machine was required to facilitate the preparation of different juices. Specifically, Watermelon juice was made from 100gr watermelon mixed with 100ml of water and then blended, star fruit juice was made from 100gr star fruit mixed with 100ml of water and then blended, and watermelon and star fruit mixed juice was made by 100gr watermelon plus 100gr of star fruit mixed with 100ml of water then blend the ingredients.

Data and Sources of Data

For the current study, numeric data was collected. Specifically, the researcher collected blood pressure of respondents to enable him to address the research questions. The data was gathered from participants with varying demographics in terms of age, and gender. In recording the data on blood pressure ethical principles were followed including avoiding falsification or fabrication of data to suit the researcher's expectations (Portney, 2020; Mutch, 2013). Also, the data on blood pressure was recorded to two decimal places to improve the reliability of findings (Kumar, 2019).

Data Collection and Assessment

At the beginning of the experiment, the average blood pressure (systolic and diastolic) of participants in all three groups were taken. Each participant was then offered 200ml traditional therapy juice which was either watermelon, star fruit, or watermelon-star. The participants were allowed to rest for one hour before their average blood pressure was taken again. The data collected was reliable and valid due to the high precision instruments used to measure blood pressure. Also, respondents were given an equal amount of juice to avoid bias and ensure a fair assessment of the various intervention strategies. During the data collection process, ethical principles were considered including seeking participants' consent and informing the participants about the project to ensure they willingly participate rather than become coerced or manipulated. Usually, the following ethical principles are crucial in research that involves human subjects to ensure their protection and enable participants to provide accurate information (Hoque and Rana, 2018; Harper et al., 2018).

Data Analysis Techniques

Selecting appropriate data analysis techniques is crucial in ensuring useful information is drawn from a specific group of data (Quinlan et al., 2019). Data were analyzed using one-way ANOVA statistics at a significance level of 95% (α 0.05) followed by LSD (Least Significance Different) which is used as a reference in determining whether treatment rates differ statistically or not. LSD analysis is important in comparing two groups to determine whether there is a significant difference in their outcomes (Williams & Abdi, 2010).

FINDINGS

The current chapter presents the findings related to the three main objectives of the study.

Impact of Traditional Therapy on Systolic Blood Pressure

The first result obtained is summarized in table 1 and reveals the values of systolic blood pressure before and after the provision of the three intervention

Table 1. Effect of Treatment on Systolic Blood Pressure

Group		N	Mean	Min	Max	SD	Differences
Watermelon Juice							
Systolic Pressure	Before treatment	11	153.64	140	170	11.201	13.636
	After treatment		140.00	120	160	13.416	
Star Fruit Juice							
Systolic Pressure	Before treatment	11	154.55	140	180	11.282	12.727
	After treatment		141.82	130	160	9.816	
Watermelon-Star Fruit Juice							
Systolic Pressure	Before treatment	11	152.73	130	180	16.181	16.364
	After treatment		136.36	120	160	12.863	

A key observation from Table 1 is that the average systolic blood pressure for all three groups before intervention (153.64, 154.55, & 152.73) indicated the presence of hypertension since they were greater than 140mmHg. However, after implementing the intervention strategies, the average blood pressure of watermelon juice and watermelon-star fruit juice groups reduced to 140 mmHg which was desirable. In contrast, the star fruit group

reduced the high blood to 141.82 which was still relatively higher than the recommended value of 140mm. The other crucial finding noted is that the watermelon-star fruit juice group had the highest reduction of blood pressure of 16.364 mm resulting in the minimum average blood pressure of 136.36 mm among the three groups.

Impact of Traditional Therapy on Diastolic Blood Pressure

The second result obtained was related to the effect of traditional therapies on the diastolic blood pressure. A summary of the findings is shown in table 2. From figure 2, it is noted that all three groups had average blood pressures (96.36, 100.91, & 96.36) greater than 90 mmHg which indicated the presence of hypertension.

Table 2. Effect of Treatment on Diastolic Blood Pressure

Group		N	Mean	Min	Max	SD	Differences
Watermelon Juice							
Diastolic Pressure	Before treatment	11	96.36	80	120	10.269	10.909
	After treatment		85.45	70	100	9.342	
Star Fruit Juice							
Diastolic Pressure	Before treatment	11	100.91	80	120	10.455	9.091
	After treatment		91.82	80	110	9.816	
Watermelon-Star Fruit Juice							
Diastolic Pressure	Before treatment	11	96.36	80	120	13.618	10.909
	After treatment		85.45	70	100	10.357	

After providing treatment, table 2 shows that watermelon and watermelon-star fruit juice helped in reducing blood pressure to below 90 mm. However, the star fruit juice reduced the average blood pressure to 91.82 mm revealing that the intervention was not effective in achieving its purpose. Also, table 2 shows that watermelon-star and watermelon juice had the largest drop in blood pressure of 10.909 mm underlining their effectiveness as therapies for managing hypertension.

Comparing the Effectiveness of Different Therapy Alternatives

The third objective of the current study was to compare the different treatment interventions to determine the best approach which can be used to manage hypertension. In this regard, a one-way Anova analysis was conducted and results obtained as shown in table 3. From table 3, it is noted that before treatment, the systolic blood pressure of participants in the three groups was not significantly different since the value of $p = 0.948$ ($p > 0.05$). Additionally, table 3 reveals that the diastolic blood pressure of participants in the three groups were not significantly different since $p = 0.573$ ($p > 0.05$).

Table 3. Average Blood Pressure between Groups before Treatment

Group		n	Average Blood Pressure	SB	F	P
Systolic						
	Watermelon Juice	11	153. 64	11.201	0.053	0.948
	Star Fruit Juice	11	154. 55	11.282		
	Watermelon – star fruit juice	11	152. 73	16.181		
Diastolic						
	Watermelon Juice	11	96.36	10.269	0.568	0.573
	Star Fruit Juice	11	100.91	10.445		
	Watermelon – star fruit juice	11	96.36	13.618		

The findings in table 3 imply that there was no bias in the three groups regarding the blood pressures of participants which could have affected output after the intervention. Moreover, table 4 findings were obtained and show not only the comparison of mean blood pressure of the three groups after treatment but also the significance of the impact of a specific treatment. Table 4 shows that after treatment there was a significant decrease in blood pressure $p < 0.05$ for all the groups. However, only in the watermelon-star fruit juice group was there a decrease in blood pressure until it reached normal, namely systolic <140mmHg and diastolic <90mmHg. In this regard, the results reveal that the watermelon-star fruit juice group is a better option compared to watermelon or star fruit juice in managing hypertension

Table 4. Comparing Mean Blood Pressure before and after Treatment

Group		N	Mean	Min	Max	SD	P-Value
Watermelon Juice							
Systolic							
	Before	11	153,64	140	170	11, 201	0,018
	After	11	140,00	120	160	13, 416	
Diastolic							
	Before	11	96,36	80	120	10, 269	0,017
	After	11	85,45	70	100	9, 342	
Star Fruit Juice							
Systolic							
	Before	11	154,55	140	180	11, 282	0,011
	After	11	141,82	130	160	9, 816	
Diastolic							
	Before	11	100,91	80	120	10,445	0,048
	After	11	91, 82	80	110	9, 816	
Starfruit Watermelon Juice Mixed							
Systolic							
	Before	11	152,73	130	180	16, 181	0,016
	After	11	136,36	120	160	12, 863	
Diastolic							
	Before	11	96, 36	80	120	13, 618	0,047
	After	11	85, 45	70	100	10, 357	

Although the Anova test conducted was crucial in revealing whether there was a significant change in average blood pressure for each group, it does not compare between different groups. In this respect, the Least Significance Different test (LSD) was conducted and findings in table 5 obtained.

Table 5. The Smallest Real Differences after Treatment between Three Groups

Group		Average difference	P
Watermelon juice and Star fruit juice			
	Systolic	1.81	0.728
	Diastolic	6.36	0.140
Watermelon juice and Watermelon-Star Fruit Juice			
	Systolic	3.63	0.488
	Diastolic	0.00	1.000
Star Fruit juice and Watermelon-Star Fruit Juice			
	Systolic	5.45	0.300
	Diastolic	6.36	0.140

From Table 5, three main findings are noted. Firstly, the systolic and diastolic blood pressure in the watermelon juice group did not differ significantly from star-fruit juice. Secondly, the systolic and diastolic blood pressure in the watermelon juice group did not differ significantly from watermelon-star fruit juice. Thirdly, the systolic and diastolic blood pressure in the star fruit juice group did not differ significantly from watermelon-star fruit juice.

DISCUSSION

The findings obtained in the previous chapter can be discussed based on the objectives developed for the study. In the discussion, the main emphasis is connecting the findings with the existing literature to understand the underlying reasons behind a specific trend.

Impact of Traditional Therapy on Systolic Blood Pressure

A key finding obtained was that after administering the various intervention therapies, there was a significant decrease in systolic blood pressure for all the groups. However, only the watermelon-star fruit group had the largest decrease in blood pressure thereby leading to the patients' blood pressure being regulated to less than the required 140 mmHg. The findings can be explained by Figueroa et al. (2012) and Massa et al. (2016) who both noted that after providing watermelon extract, participants exhibited lower blood pressure due to the presence of

citrulline and potassium. Also, the findings resonate with that of Wijaya et al. (2012) and Ardiyanto et al. (2014) who noted that the provision of star fruit significantly reduced blood pressure among participants due to the presence of potassium, magnesium, and calcium ions. Essentially, consuming watermelon or starfruit implies one experiences a high intake of potassium ions which helps in causing ionic imbalance at a cellular level in which sodium ion is pushed in the cells leading to a high rate of urine production in the body. However, the finding contrasts that of Sabilu et al. (2017) who noted that the highest decrease in systolic blood pressure when tomatoes were provided as intervention strategies was 8.59 mm which is lower than the minimum value of 12.727 mm noted in the current research. As such, watermelon and star fruit juices are better alternatives for managing hypertension compared to tomato juice. The other result noted was that the star fruit group revealed persistence of high blood pressure since the average blood pressure was lowered to 141.82 mm. The result can be explained by Moreira et al. (2010) who noted that star fruit can cause intoxication which implies that it should be used sparingly when seeking to consume blood pressure. The result can also be explained by several studies such as Wijayaratne et al. (2018), Abeysekera et al. (2015), and Ananna et al. (2015) who noted that high level of oxalate in star-fruits significantly contributed to acute kidney injury as well as inducing tonic-clonic seizures. Other researchers have also expressed their concern regarding the effectiveness of star fruit in regulating blood pressure based on its neurotoxic effects (Muthu et al., 2016; Aranguren et al., 2017; Chua et al., 2017). In this respect, even though the watermelon-star group exhibited better management of blood pressure compared to the other two groups, caution should be taken by limiting the amount of star fruit in the mixture to avoid kidney toxicity.

Impact of Traditional Therapy on Diastolic Blood Pressure

A crucial finding noted is that the provision of the three juices helped in significantly reducing diastolic blood pressure in the three groups. However, the largest decrease in pressure was noticed in the watermelon and watermelon-star fruit group which both managed to regulate blood pressure below the recommended 90 mmHg. The finding is similar to that by Figueroa et al. (2014) and Caturwati et al. who found that consuming star fruit and watermelon can significantly help in reducing high blood pressure. Essentially, starfruits and watermelon help in lowering high blood pressure by decreasing the amount of sodium content in body fluids thereby encouraging the release of the high volume of urine from the body. Setiyowati et al. (2012) add that potassium in watermelon and star fruit cause vasodilation which means that blood can flow smoothly without and reduce the build-up of pressure. However, the findings obtained contrast that of Sabilu et al. (2017) who noted that tomato juice is a preferred option in managing high blood pressure compared to star fruit and watermelon because it is easily obtained and inexpensive. Also, Sabilu et al. (2017) noted an average reduction of diastolic blood pressure of 6.19 mmHg after providing participants with tomato interventions which are comparatively less than the value of 9.091 mmHg noted in the current research. In this respect, watermelon and starfruit are regarded as better approaches to lowering blood pressure compared to tomatoes. Also, the findings obtained are those of Maigoda et al. (2019) who noted that regardless of the type of watermelon used (yellow or red watermelon juice), a significant decrease in diastolic and systolic blood pressure was noted. On the contrary, the star fruit group was noted to still exhibit hypertension since the blood pressure was lowered to 91.82 mm Hg which is still higher than the recommended maximum of 90 mmHg. The finding implies that when star fruit is used independently, it is ineffective in managing diastolic blood pressure. The result is also supported by Cartery et al. (2011) who note that star-fruits have high amounts of oxalate which increases the risk of kidney injury as well as chronic pancreatitis. However, there is no conventional treatment for removing oxalate in the body except by undergoing hemodialysis (Lorenz et al., 2013). In this respect, it was realized that despite the huge potential it holds, the independent use of star fruit in managing high blood pressure should be discouraged.

Comparing the Effectiveness of Different Therapy Alternatives

A key finding noted was that before treatment, the systolic and diastolic average blood pressure was not statistically different for all the three groups, although the star-fruit juice group depicted the highest values in both systolic (154.55 mm) and diastolic (100.91 mm). The finding revealed that there was no bias in the initial sample selected so that the outcome was primarily dependent on the intervention provided. The result can be explained by Smith and Noble (2014) who note that minimizing bias in research is crucial in ensuring reliable findings are obtained. The other result noted is that there was a significant decrease in blood pressure for all three groups after the provision of intervention which was either watermelon, star fruit, or a mixture of watermelon-starfruit juice. However, only the participants in the watermelon-star fruit group had their blood pressure reduced to within normal blood pressure including namely systolic <140mmHg and diastolic <90mmHg. The finding can be explained by Yankai et al. (2016) who observed that star fruit has several minerals which give it antioxidant properties as well as many bioactive compounds including vitamin A, vitamin C, and total phenol all of which improve anti-inflammatory activities in the body. In this regard, star fruit helps in lowering high blood pressure among elderly patients. Also, the finding can be explained by Prabantini (2013) who noted that the provision of watermelon helps in reducing blood pressure since it contains 16.7 mg of citrulline and 122 mg of potassium for every 100mg. When citrulline is consumed, it is converted to arginine which increases the amount of nitric oxide that is crucial in relaxing blood vessels and reducing hypertension (Gustomi and Roikha, 2014). Also, arginine facilitates the formation of urea which leads to the production of a large volume of urine. Therefore, combining the antioxidant properties of star fruit and the crucial citrulline nutrients in watermelon

significantly helped in reducing high blood pressure. The other result obtained was that although there was no significant difference among the three groups regarding the reduction of blood pressure, the decrease in systolic pressure for all the groups was relatively higher (minimum of 12.727 mmHg) than that of diastolic pressure (minimum of 9.091 mmHg). The result can be explained by Khan et al. (2018) who noted that a large reduction of diastolic blood pressure to less than 80mm Hg can increase the risk of cardiovascular disease among non-diabetic patients. The result is also explained by Okamoto et al. (2019) who note that a large decrease in diastolic blood pressure can lead to hypotension in which the blood pressure is too low. In this regard, the relatively small reduction of diastolic pressure indicates that the patients are not faced with high risks of developing other related illnesses. Therefore, watermelon and water-melon-starfruit mixture were noted to be suitable options for managing diastolic blood pressure.

CONCLUSION

Based on the results and discussions, several conclusions can be reached regarding the administration of traditional therapy to reduce high blood pressure. The conclusions can be summarized in three main topics based on the study objectives.

Impact of Traditional Therapy on Systolic Blood Pressure

The mean systolic blood pressure before treatment in all groups showed variations but was not statistically different. Therefore, there was no bias in the selection of samples. However, after providing therapeutic interventions, it was realized that only the watermelon-tar fruit group had their systolic blood pressure reduced within the normal range. It can, therefore, be concluded that a mixture of watermelon and star fruit juice is the best therapy for managing hypertension.

Impact of Traditional Therapy on Diastolic Blood Pressure

The mean diastolic blood pressure before treatment in all groups showed variations but was not statistically different. In this regard, the sample selected was realized to possess no bias. After providing treatment, it was realized that the watermelon group and watermelon-star fruit group had their diastolic blood pressure reduced to within the normal range. It can, therefore, be concluded that in case of difficulty in accessing star-fruits, watermelon can be provided to facilitate the lowering of diastolic blood pressure.

Comparing the Effectiveness of Different Therapy Alternatives

After comparing the outcomes of the various intervention strategies, a conclusion can be made that the best therapy intervention for managing systolic and diastolic blood pressure is the provision of a watermelon-star fruit juice mixture.

RECOMMENDATIONS

A key recommendation that can be made based on the scientific evidence of this study is that elderly patients should be provided with a mixture of watermelon-star fruit juice to enable them effectively to regulate their blood pressure. Additionally, a key limitation of the current research was that relatively small sample size was used due to limitations of resources and time. In this regard, future studies can employ a sample size larger than 33 participants to obtain more accurate findings concerning the effectiveness of different traditional therapy in managing blood pressure. The current research also showed that although star fruit is crucial in significantly lowering blood pressure due to the presence of potassium, calcium, and magnesium ions, it is also associated with high intoxication of the kidney due to the high levels of oxalate present in the fruit. In this respect, more studies are required to examine whether the toxicity of star fruit is minimized when used together with watermelon.

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