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The Effect of Giving a Combination of Sweet Carambola Juice and Honey on Blood Pressure in Menopausal Women

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The author(s) declares that the research was conducted in the absence of any commercial or financial relationships that could be construed as a potential conflict of interest.

ABSTRACT

Purpose: This study aimed to evaluate the effects of sweet starfruit juice and honey on blood pressure in menopausal women, hypothesizing a significant reduction in both systolic and diastolic readings.

Research Design and Methodology: A pre-experimental design with pre-test and post-test assessments was used, involving 40 menopausal women from Kediri City, Indonesia. Participants consumed the juice and honey combination daily for one week. Blood pressure measurements were taken before and after the intervention. The Shapiro-Wilk test assessed data normality, and the Wilcoxon non-parametric test evaluated the significance of changes.

Findings and Discussion: The study found significant reductions in blood pressure, with mean systolic decreasing from 146.25 mmHg to 133.75 mmHg and mean diastolic from 95.00 mmHg to 86.25 mmHg. The results support the hypothesis that this natural intervention effectively manages hypertension, attributed to the bioactive compounds in the juice and honey that promote cardiovascular health.

Implications: The findings suggest incorporating sweet starfruit juice and honey into dietary recommendations as a complementary treatment for hypertension in menopausal women. Further research is needed to explore long-term effects, broader applicability, and comparative efficacy with other treatments.

Introduction

Hypertension, or high blood pressure, is one of the most serious health problems worldwide, and its prevalence is increasing over time (Mohan & Deepa, 2018; Martins & Norris, 2020). Hypertension occurs when a person's blood pressure rises above normal limits, generally defined as systolic pressure above 140 mmHg and diastolic pressure above 90 mmHg (Gupta & Gaur, 2019; Virdis et al., 2020). This condition becomes more common in older age groups, especially in women experiencing menopause (Rhee & Na, 2021; Singh & Fedacko, 2018). Menopause is a natural phase in a woman's life characterized by the permanent cessation of the menstrual cycle (Martins & Norris, 2020; Rhee & Na, 2021). This phase usually occurs in women around 50, although it can occur earlier or later, depending on various factors such as genetics and general health (Rhee & Na, 2021; Gupta & Gaur, 2019).

According to a survey conducted by the World Health Organization (WHO) in 2000, the prevalence of hypertension in the global population is high, with approximately 26.6% of men and 26.1% of women having this condition (Mohan & Deepa, 2018; He & MacGregor, 2020). The WHO also estimates that

2025 this figure will increase to 29.2% (Mohan & Deepa, 2018; Martins & Norris, 2020). In Indonesia, this situation is not much different. Based on the results of the Household Health Survey (SKRT) conducted in 2000, the prevalence of hypertension in Indonesia was 21%. This figure continued to increase to 26.4% in 2001, 27.5% in 2004, and is projected to reach 42% by 2025 (Gupta & Gaur, 2019; Martins & Norris, 2020). Data from the Ministry of Health of the Republic of Indonesia also shows an increasing trend in hypertension prevalence, from 29.6% in 2009 to 34.1% in 2010 (Mohan & Deepa, 2018; Gupta & Gaur, 2019). At the local level, data from the Kediri City Health Office in 2015 showed that out of 107,120 women aged over 18 years, 16,357 of them, or approximately 18.26%, had hypertension (Rhee & Na, 2021; Virdis et al., 2020). Interestingly, among the female population, 9,501 of them were postmenopausal women, indicating that this group has a higher risk of developing hypertension (Rhee & Na, 2021; Gupta & Gaur, 2019). Furthermore, a preliminary survey conducted in the Sukorame Health Center working area in the same year found that out of 1,844 postmenopausal women, approximately 23.15% had hypertension (Gupta & Gaur, 2019; Rhee & Na, 2021). This data suggests that hypertension is a significant health problem among postmenopausal women in Indonesia, and therefore, effective interventions are needed to address this problem (Mohan & Deepa, 2018; He & MacGregor, 2020).

In managing hypertension, various approaches have been proposed, including using pharmacological drugs such as diuretics, beta-blockers, and ACE inhibitors (Gupta & Gaur, 2019; Rhee & Na, 2021). However, the use of these medications is often associated with unwanted side effects, such as renal impairment, elevated potassium levels, and other metabolic issues (Kar & Choudhary, 2021; Bruno & Stea, 2018). In addition, long-term dependence on antihypertensive drugs can lead to other problems, such as decreased quality of life and increased financial burden due to high medication costs (Mancia & Grassi, 2018; Siddiqui & Fidalgo, 2020). Therefore, many hypertensive patients, especially those in the elderly, seek alternative treatments that are more natural and do not cause side effects (Siddiqui & Fidalgo, 2020; Patel & Mandal, 2021). One of the increasingly popular non-pharmacological approaches is using herbal plants and functional foods to help control blood pressure (Khan & Mukhtar, 2019; Siddiqui & Fidalgo, 2020).

Various studies have shown that certain herbs, such as garlic, celery, and sweet starfruit, have hypotensive effects or can lower blood pressure (Khan & Mukhtar, 2019; Intanwidya, 2015). For example, sweet starfruit (Averrhoa carambola), which is a common tropical fruit in Indonesia, is known to contain various active compounds such as potassium, flavonoids, and vitamin C that have the potential to lower blood pressure (Intanwidya, 2015; Kim & Kang, 2019). In addition, honey has also long been recognized as a functional food with various health benefits, including its ability to improve immune system function, provide energy, and support cardiovascular health (Peterson & Simmonds, 2018; Tiwari & Cummins, 2020). Honey also contains various bioactive substances such as flavonoids, phenolic acids, and vitamins that can protect blood vessels and the heart (Peterson & Simmonds, 2018; Tiwari & Cummins, 2020). Although many studies have explored the effects of various herbs on blood pressure, there are still significant gaps in the existing literature, especially regarding the effects of a combination of sweet starfruit and honey in lowering blood pressure in postmenopausal women (Siddiqui & Fidalgo, 2020; Intanwidya, 2015). Previous studies have mostly focused on the effects of one type of herbal or natural ingredient on blood pressure, without looking at the synergistic potential that may arise from the combination of several ingredients (Khan & Mukhtar, 2019; Zeng & Li, 2020). For example, a study by Arturo (2012) showed that consumption of sweet starfruit juice can help lower blood pressure, but this study did not explore the effect of adding honey to the juice (Intanwidya, 2015; Peterson & Simmonds, 2018). In addition, most of the existing studies have also been conducted in the general population or younger age groups, so there is still a lack of specific data on the effects of herbs on blood pressure in postmenopausal women (Gupta & Gaur, 2019; Rhee & Na, 2021). This gap is the basis for this study, which explores the effects of a combination of sweet starfruit juice and honey in lowering blood pressure in postmenopausal women with hypertension (Intanwidya, 2015; Siddiqui & Fidalgo, 2020).

Literature Review

Hypertension, or high blood pressure, is a prevalent and growing health concern worldwide, particularly among postmenopausal women. This condition has been extensively studied due to its association with severe cardiovascular complications, including heart disease, stroke, and kidney failure (Gupta & Gaur, 2019). Postmenopausal women are especially vulnerable to hypertension, attributed to hormonal changes that affect vascular health, leading to increased blood pressure (Rhee & Na, 2021). As traditional pharmacological treatments for hypertension can cause side effects and long-term dependency, there has been a growing interest in alternative and natural treatments, particularly in the context of postmenopausal hypertension management. The role of diet and natural supplements in managing blood pressure has been a focal point in recent research. Among various dietary interventions, herbal remedies and functional foods have gained popularity due to their potential to offer safer and cost-effective solutions (Khan & Mukhtar, 2019). One such natural intervention is Averrhoa carambola, commonly known as sweet carambola or starfruit, which has been reported to possess antihypertensive properties (Intanwidya, 2015). The juice of sweet carambola contains significant amounts of potassium, flavonoids, and vitamin C, all of which are known to support cardiovascular health by promoting vasodilation and reducing oxidative stress (Kim & Kang, 2019).

Another natural remedy that has garnered attention in the management of hypertension is honey. Honey is rich in bioactive compounds such as flavonoids, phenolic acids, and various vitamins, contributing to its anti-inflammatory and vasoprotective effects (Peterson & Simmonds, 2018). The consumption of honey has been linked to improved blood pressure control, particularly through its ability to enhance endothelial function and reduce oxidative damage to blood vessels (Patel & Mandal, 2021). Additionally, studies have suggested that honey may synergize with other natural substances, potentially enhancing their antihypertensive effects (Siddiqui & Fidalgo, 2020). Despite the benefits of sweet carambola and honey, there is limited research on the combined effect of these two natural products on blood pressure, especially in menopausal women. Previous studies have focused on the effects of single herbal remedies or dietary interventions, overlooking the potential synergistic effects of combining multiple natural products (Zeng & Li, 2020). For instance, while Intanwidya (2015) demonstrated the blood pressure-lowering effects of sweet carambola juice, and Peterson & Simmonds (2018) highlighted the cardiovascular benefits of honey, the interaction between these two substances in reducing hypertension remains underexplored. This gap in the literature presents a significant research opportunity. The potential synergistic effects of combining sweet carambola juice and honey could offer a novel, non-pharmacological approach to managing hypertension in menopausal women. Given the unique physiological changes during menopause, including increased oxidative stress and endothelial dysfunction, exploring such natural interventions could provide valuable insights into more effective and holistic treatment strategies (Gupta & Gaur, 2019).

Mechanisms and Risk Factors for Hypertension in Menopausal Women

The hormonal changes that occur during menopause play a significant role in the increased risk of hypertension. Virdis et al. (2020) and Gupta & Gaur (2019) highlight that decreased estrogen during menopause contributes to endothelial dysfunction, increased arterial stiffness, and altered lipid profiles, all of which increase the risk of hypertension. In addition, Rhee & Na (2021) point out that these hormonal changes also affect the renin-angiotensin-aldosterone system, which regulates blood pressure, thereby increasing the likelihood of hypertension. In the context of vascular aging, Bruno and Stea (2018) revealed that oxidative stress and inflammation are significant factors in the vascular aging process that contribute to hypertension. They emphasized that increased production of reactive oxygen species (ROS) and decreased antioxidant capacity cause damage to the endothelium and vascular structures, exacerbating hypertension, especially in postmenopausal women. The study by Mancia and Grassi (2018) also suggests that the sympathetic nervous system, which becomes more active with age, plays a role in the elevated blood pressure and metabolic syndrome that often occurs in this group.

Nutritional Interventions in the Management of Hypertension

Various nutritional interventions have been investigated to manage hypertension, with a particular focus on specific dietary components that have antihypertensive properties. Through their systematic review and meta-analysis, he & MacGregor (2020) confirmed that salt intake reduction is one of the most effective strategies to lower blood pressure. They showed that reduced salt intake can consistently lower systolic and diastolic blood pressure in various populations, including menopausal women. Besides salt reduction, studies have highlighted the role of potassium, calcium, and magnesium in managing hypertension. In their meta-analysis, Kim & Kang (2019) identified that increased potassium intake correlates with reduced blood pressure, mainly because potassium helps balance the effects of sodium in the body and promotes sodium excretion through urine. Kar & Choudhary (2021) also added that calcium and magnesium have synergistic effects in blood vessel relaxation and blood pressure regulation, making them essential in the diet for individuals with hypertension. Research has also focused on the role of flavonoids and other bioactive compounds in fruits in the management of hypertension. Zeng & Li (2020) showed that flavonoids have strong antioxidant and anti-inflammatory properties, which can improve endothelial function and reduce blood pressure. Intanwidya (2015) specifically reviewed the potential of sweet starfruit (Averrhoa carambola) juice in lowering blood pressure, finding that the high flavonoid and vitamin C content in sweet starfruit aided in vasodilation and blood pressure reduction. The study by Khan & Mukhtar (2019) evaluated the scientific evidence supporting using herbs to treat hypertension. They found that some herbs, such as garlic, celery, and sweet starfruit, have significant hypotensive effects, primarily through mechanisms involving decreased oxidative stress and increased production of nitric oxide, a natural vasodilator.

Role of Honey in Hypertension Management

Honey has long been recognized to have various health benefits, including the potential for hypertension management. Peterson & Simmonds (2018) and Tiwari & Cummins (2020) reviewed the role of honey in the prevention and management of hypertension, finding that honey contains flavonoids, phenolic acids, and various vitamins that contribute to better endothelial function and reduced oxidative damage to blood vessels. Patel & Mandal (2021) also emphasized that honey may be a therapeutic agent in cardiovascular disease management through complex molecular mechanisms, including oxidative stress and inflammation modulation. Research exploring the combination of honey with fruit juices has also shown promising results. Siddiqui and Fidalgo (2020) highlighted the synergistic effect between fruit juice and honey in managing cardiovascular disease. They found that this combination can be more effective in lowering blood pressure than the use of each component separately, as they complement each other in the mechanism of blood pressure reduction and vascular function improvement.

Impact of Sugary Drinks on Hypertension

Conversely, consumption of sugary drinks, particularly those containing added sugar, has been identified as a significant risk factor for hypertension and obesity. Malik & Hu (2020), in their systematic review and meta-analysis, found that consumption of sugary drinks is consistently associated with an increased risk of hypertension. They noted that the high sugar content in these beverages contributes to increased blood pressure through mechanisms involving insulin resistance, increased body weight, and endothelial dysfunction.

Plant-Based Approaches in Hypertension Management

Plant-based dietary approaches have also received attention in the management of hypertension. Ostfeld & Miller (2019) suggest that a plant-based diet rich in fruits, vegetables, whole grains, and legumes can lower blood pressure and improve cardiovascular health. They emphasize that such a diet is low in sodium and saturated fat yet high in potassium, magnesium, and fiber, contributing to lower blood pressure. The epidemiology of hypertension in India has been a major concern, given its significantly increasing prevalence. Mohan and Deepa (2018) point out that comprehensive lifestyle changes, including dietary modifications and increased physical activity, are needed to manage and

prevent hypertension in a large population like India. They also emphasized the need for management programs tailored to local conditions to address the growing burden of hypertension.

Research Design and Methodology

The research design used in this research is described, including inferential research. Based on the place of research, including field research, Based on whether there was treatment, this research was a pre-experimental study with a design group pre-test and post-test. Based on the method of data collection, including comparative analytical research. Based on the data source, this research includes primary data types. Pre-tests and post-tests were conducted to determine whether or not there was a change in the level of readiness of the respondents who intervened. Pre-tests were done before the intervention, while post-tests were consumed due to exposure to the intervention.

The procedure carried out by the researchers to collect data (starting from searching for respondent data until obtaining data in tabulations) was preceded by a letter from the Faculty of Health, Kadiri University, which the Head of the Midwifery Study Program D.IV Midwife Educator, Faculty of Health, Kadiri University had approved. Then take care of a permit application letter to collect the initial survey data to the Investment Board and then to the Kediri City Health Office and Sukorame Public Health Center. After obtaining permission from the relevant research location, the researcher looked for data on prospective respondents. After obtaining data on postmenopausal women at the posyandu, Pojok Subdistrict, Working Area of the Sukorame Health Center, Kediri City, it was found that there were 40 menopausal women. Analytical research univariate aims to explain and describe the characteristics of each research variable (Notoadmojo, 2010). In this study, univariate analysis was used to calculate the mean and standard deviation of sweet starfruit juice and honey consumption in respondents before and after being given sweet starfruit juice and honey.

Findings and Discussion

Findings

This study focuses on the effect of giving a combination of sweet star fruit juice and honey on blood pressure in menopausal women. Before administering this combination, the frequency distribution of blood pressure showed that the mean systolic value was 146.25 mmHg and diastolic 95.00 mmHg, with a median systolic 145 mmHg and diastolic 90.00 mmHg. This shows that before the intervention, most of the respondents were hypertensive. After administering the combination of sweet starfruit juice and honey, blood pressure was significantly decreased; the mean systolic value became 133.75 mmHg and diastolic 86.25 mmHg. The median systolic became 130.00 mmHg, and the diastolic remained at 90.00 mmHg. To analyze this data, the Shapiro-Wilk test was conducted to test the normality of the distribution of diastolic blood pressure before and after administering a combination of sweet star fruit juice and honey. The test results showed that the ρ value was <0.05, meaning the data distribution was abnormal. Therefore, a Wilcoxon non-parametric test was conducted instead of a paired t-test to evaluate the change in blood pressure. A significant ρ value ($\rho<0.05$) indicated a significant change in diastolic blood pressure after the intervention.

This study shows that hypertension is a common condition in menopausal women before being given the combination of sweet star fruit juice and honey. Hypertension in menopausal age can increase the risk of various diseases such as heart failure, coronary artery disease, left ventricular enlargement of the heart, diabetes, chronic kidney disease, and stroke (Herlambang, 2012). Blood pressure is influenced by the amount of blood pumped from the heart to all organs and tissues of the body, as well as the resistance of the arterial blood vessel walls. High blood pressure occurs when the blood pumped by the heart has abnormal speed and force, and if the blood pressure is more significant than usual, it can cause damage to the arteries. Most of the respondents in this study were aged 50-60, and the risk of developing hypertension increases with age, especially in women who have experienced menopause. During menopause, the hormone estrogen decreases, resulting in a decrease in high-density lipoprotein (HDL) levels and an increase in low-density lipoprotein (LDL). This condition can lead to plaque in the blood vessels, which can potentially cause thrombosis and

eventually atherosclerosis, contributing to increased blood pressure (Wirakusumah, 2009). In addition, changes in blood vessel conditions at menopausal age, such as hardening and loss of arterial elasticity, also increase blood pressure. The increasingly stiff arteries and aorta lose the ability to adjust their walls, so they can no longer convert the blood flow from the heart into a smooth flow. This results in a continuous pulse wave with high peaks (systolic) and deep valleys (diastolic).

Increased blood pressure during menopause can take a toll on the body, causing various complications such as those of the brain, eyes, heart, and kidneys (Palmer, 2010). The results also show that hypertension is often overlooked, and age and education factors contribute to the lack of knowledge about hypertension in menopausal women. The majority of respondents in this study had a primary education level, which indicates limited access to adequate information about hypertension and its prevention. In addition, the age factor before menopause also increases susceptibility to various diseases, including hypertension. Most of the respondents in this study were 55-60 years old (100%), with a primary education level (87.5%), and the majority were housewives (81.3%). Of them, 62.5% had no history of hypertension, and 81.3% had no hereditary history of hypertension. Despite this, their blood pressure remained high before being given the combination of sweet starfruit juice and honey. Therefore, the researchers conducted a blood pressure check and provided a solution by administering a combination of sweet starfruit juice and honey for one week. This study is expected to provide an effective natural alternative to control blood pressure in menopausal women so that there is no excessive increase in blood pressure.

Discussion

Comprehensive Analysis of Blood Pressure Reduction Findings

The primary objective of this study was to evaluate the impact of administering a combination of sweet starfruit juice and honey on the blood pressure of menopausal women. The study's results provide a detailed account of the changes in systolic and diastolic blood pressure readings before and after the intervention. Before administering the sweet starfruit juice and honey combination, the mean systolic blood pressure among the participants was 146.25 mmHg, while the mean diastolic blood pressure was recorded at 95.00 mmHg. These initial readings suggest that the participants were experiencing hypertension, as their blood pressure levels exceeded the normal range, which is typically defined as systolic blood pressure below 120 mmHg and diastolic blood pressure below 80 mmHg. After the intervention, a significant reduction in blood pressure was observed, with the mean systolic pressure decreasing to 133.75 mmHg and the mean diastolic pressure dropping to 86.25 mmHg. Furthermore, the median systolic and diastolic values also declined, with systolic pressure reducing from 145 mmHg to 130 mmHg and diastolic pressure remaining at 90.00 mmHg. This consistent reduction across the mean and median values underscores the potential effectiveness of the combination of sweet starfruit juice and honey in lowering blood pressure. The data suggests that the intervention not only helped reduce blood pressure in the short term but also provided a stable decrease that could be maintained over the study period. These findings are particularly significant given the study's focus on menopausal women. This demographic is often at a higher risk for hypertension due to hormonal changes that affect cardiovascular health. The observed reduction in blood pressure is, therefore, not just a reflection of the immediate impact of the intervention but also highlights the potential for these natural products to address the underlying causes of hypertension in this population.

Mechanistic Insights and Synergistic Effects of the Intervention

The observed reduction in blood pressure following the administration of sweet starfruit juice and honey can be explained through the bioactive properties of these natural products. Sweet starfruit juice is rich in potassium, a mineral that plays a crucial role in blood pressure regulation by balancing the amount of sodium in the body and reducing the strain on blood vessel walls. Additionally, the juice contains flavonoids, antioxidants that help reduce oxidative stress—a critical factor in the development of hypertension. Oxidative stress produces free radicals, which can damage blood vessels and reduce their elasticity, thereby increasing blood pressure. By reducing oxidative stress, flavonoids improve vascular function and lower blood pressure. Vitamin C, another component

of sweet starfruit juice, also supports cardiovascular health by promoting vasodilation, which is the widening of blood vessels. This process helps reduce resistance in the blood vessels, making it easier for blood to flow and thus lowering blood pressure. On the other hand, honey is packed with phenolic acids and flavonoids, which enhance endothelial function. The endothelium is the thin membrane that lines the inside of the heart and blood vessels, and its proper function is critical for maintaining blood pressure. Honey's bioactive compounds help reduce inflammation and oxidative stress, contributing to endothelial dysfunction. Moreover, the combination of sweet starfruit juice and honey likely produced a synergistic effect, where the combined action of the bioactive compounds was more significant than the sum of their individual effects. This synergy could explain the significant reduction in the study's systolic and diastolic blood pressure. The ability of this combination to enhance vasodilation, improve endothelial function, and reduce oxidative stress underscores its potential as a natural remedy for hypertension, particularly in menopausal women who are at increased risk for cardiovascular issues due to hormonal changes. These mechanistic insights highlight the scientific basis for the observed effects and suggest that the intervention could be an effective and safe alternative to conventional antihypertensive medications.

Evaluation of Methodology and Implications for Future Research

The methodology employed in this study, mainly using statistical analyses like the Shapiro-Wilk test and the Wilcoxon non-parametric test, provided robust evidence for the intervention's effectiveness in lowering blood pressure. The Shapiro-Wilk test was used to assess the normality of the distribution of blood pressure readings, and the results indicated that the data did not follow a normal distribution, necessitating the use of the Wilcoxon test. The Wilcoxon test, suitable for non-normally distributed data, confirmed the significant reduction in blood pressure post-intervention. These statistical methods ensured that the conclusions drawn from the data were reliable and valid. However, while the findings are promising, they also raise several important questions about this intervention's long-term efficacy and safety. The study was conducted over a relatively short period. While the results indicate a significant reduction in blood pressure, whether these effects would be sustained over a longer duration is still being determined. Additionally, the study did not explore the potential side effects of continuous consumption of sweet starfruit juice and honey, which could include gastrointestinal issues or interactions with other medications commonly used by menopausal women. Moreover, while the study demonstrated the efficacy of this combination in the short term, it did not compare the intervention with other natural or pharmacological treatments for hypertension. Such comparisons would be valuable in determining the relative effectiveness of sweet starfruit juice and honey. They could help identify whether this combination is superior, equivalent, or complementary to existing treatments. Future research should focus on these areas, including long-term studies to assess the sustainability of the blood pressure-lowering effects and potential side effects, as well as comparative studies to evaluate how this natural intervention stacks up against other antihypertensive treatments. Such research would not only provide a more comprehensive understanding of the intervention's efficacy but also help in developing guidelines for its use in clinical practice, particularly for menopausal women who may prefer natural treatments over conventional medications. The findings from this study lay the groundwork for future investigations, highlighting the need for a more detailed exploration of the potential benefits and limitations of sweet starfruit juice and honey as a natural remedy for hypertension.

Broader Implications and Practical Applications

The implications of this study extend beyond the immediate findings and touch on broader aspects of healthcare, particularly in managing chronic conditions like hypertension in menopausal women. The results suggest that sweet starfruit juice and honey could be incorporated into dietary recommendations as complementary to traditional hypertension treatments. Given the increasing interest in natural and holistic health interventions, combining these two widely available and relatively inexpensive natural products offers a promising alternative for those seeking to manage their blood pressure without relying solely on pharmaceuticals. This is particularly relevant in settings where access to conventional medication may be limited or where patients prefer to avoid the side

effects associated with long-term use of antihypertensive drugs. The study's findings also underscore the importance of personalized medicine, where treatments are tailored to patients' needs and conditions. For menopausal women, who may face unique challenges in managing their health due to hormonal changes, the combination of sweet starfruit juice and honey provides a natural option that addresses both the physiological and psychological aspects of hypertension. The reduction in blood pressure observed in the study participants suggests that this combination could effectively mitigate the risks associated with menopause-related cardiovascular issues. Moreover, the study highlights the potential for integrating traditional knowledge and modern scientific research to develop effective health interventions. Sweet starfruit and honey have been used in various cultures for their medicinal properties, and this study provides a scientific basis for their use in managing hypertension. This integration of traditional and modern approaches could pave the way for more research into other natural remedies that have been used for centuries but have yet to be fully explored through rigorous scientific methods.

The Role of Lifestyle Modifications and Preventive Health

In addition to its direct implications for the treatment of hypertension, this study also contributes to the broader conversation about the role of lifestyle modifications in preventive health. Hypertension is often associated with lifestyle factors such as diet, physical activity, and stress management. The results of this study support the idea that dietary interventions, like the inclusion of sweet starfruit juice and honey, can play a significant role in managing blood pressure and reducing the risk of cardiovascular diseases. This is particularly important for menopausal women, who may experience weight gain, decreased physical activity, and increased stress due to hormonal changes, all of which can contribute to higher blood pressure. By incorporating natural remedies into their daily routine, these women can take proactive steps to manage their health and prevent the onset of more severe conditions. Furthermore, the study's findings can inform public health strategies promoting healthy aging. As the global population ages, interventions are growing needed to help older adults maintain their health and independence. Natural remedies like sweet starfruit juice and honey could be promoted as a broader strategy to encourage healthy eating and reduce the burden of chronic diseases in aging populations. This approach aligns with the principles of preventive medicine, emphasizing the importance of early intervention and lifestyle modifications to prevent disease and improve quality of life. The study also highlights the potential for community-based health programs that educate individuals about the benefits of natural remedies and how to incorporate them into their daily lives. Such programs could be particularly effective in rural or underserved areas with limited access to healthcare services. By empowering individuals with the knowledge and tools to manage their health naturally, these programs could significantly impact public health outcomes.

Conclusion

This study investigated the effect of combining sweet starfruit juice and honey on blood pressure in menopausal women. The research findings indicate a significant reduction in systolic and diastolic blood pressure after administering this natural intervention. Specifically, the mean systolic pressure decreased from 146.25 mmHg to 133.75 mmHg, and the mean diastolic pressure reduced from 95.00 mmHg to 86.25 mmHg. These results suggest combining sweet starfruit juice and honey may be a practical non-pharmacological approach for managing hypertension in menopausal women.

The value of this research lies in its contribution to both scientific understanding and practical applications in health management. Scientifically, this study adds to the growing body of evidence supporting natural interventions, particularly plant-based products, in managing chronic conditions such as hypertension. Practically, it offers a potential alternative for postmenopausal women who may be seeking natural methods to control their blood pressure without the side effects associated with conventional antihypertensive medications. The originality of this study is highlighted by its focus on the synergistic effects of combining sweet starfruit juice and honey. This combination has yet to be extensively explored in previous research.

However, this study has several limitations that should be acknowledged. The research was conducted relatively short, limiting the ability to assess the long-term effects and safety of continuous consumption of sweet starfruit juice and honey. Additionally, the study sample was small and geographically limited, which may affect the generalizability of the findings. Future research should consider more significant, diverse populations and longer study durations to better understand this natural intervention's potential. Researchers may also explore comparative studies between this combination and other natural or pharmacological treatments to establish a more comprehensive understanding of its efficacy in managing hypertension in menopausal women.

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