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The effectiveness of cupping therapy and cucumber juice on blood pressure and total cholesterol levels among patients with hypertension

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Abstract

Background: Hypertension is a non-communicable disease that poses a growing public health concern, with its prevalence increasing annually. High levels of total cholesterol are a risk factor for hypertension because cholesterol can lead to plaque buildup in blood vessels. Over time, this plaque can thicken, harden the blood vessels, and cause blockages or atherosclerosis. Treatment and prevention of hypertension typically involve regular medication and routine health check-ups. In addition, non-medical therapies, such as a combination of cupping therapy and a high-fiber diet including cucumber juice consumption, can be employed.

Purpose: To determine the effectiveness of cupping therapy and cucumber juice in reducing blood pressure and total cholesterol levels in patients with hypertension.

Method: This quantitative study employed a quasi-experimental design using a pre-posttest control group design. The study involved 60 participants divided into four groups: the cupping therapy intervention group, the cucumber juice intervention group, the combined cupping therapy and cucumber juice group, and a control group that received the medications captopril 25 mg and simvastatin 10 mg.

Results: Administering cupping therapy three times a week and 150 ml of cucumber juice twice a week for 14 days effectively reduced the average systolic blood pressure from a pretest value of 153 mmHg to a posttest value of 125 mmHg ($p = 0.004$). The average diastolic blood pressure decreased from a pretest value of 90.6 mmHg to a posttest value of 77 mmHg ($p = 0.083$), and the average total cholesterol level dropped from a pretest value of 283 mg/dl to 188 mg/dl ($p = 0.011$).

Conclusion: Administering cupping therapy three times a week and cucumber juice twice a week for 14 days effectively reduces blood pressure and total cholesterol levels in patients with hypertension.

Keywords: Cucumber Juice; Cupping; Hypertension; Total Cholesterol Level.

INTRODUCTION

Hypertension, a non-communicable disease, has emerged as a major public health concern, arising when the heart exerts extra effort to pump blood, meeting the body's demands for oxygen and nutrients (Lainsamputty & Gerungan, 2022). Often referred to as the "silent killer," hypertension can cause sudden death, with most cases showing no symptoms (Andriani, Trisnowati, & Shafie, 2022). In 2019, the World Health Organization (WHO)

reported that 1.13 billion people worldwide suffer from hypertension, with a significant proportion of cases found in low-income countries. Currently, hypertension affects 22% of the global population, with Southeast Asia ranking third, showing a prevalence rate of 25% (World Health Organization, 2022; Nonasri, 2021).

In Indonesia, the prevalence of hypertension has risen from 25.8% to 34.1%, with an estimated

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63,309,620 cases and 427,218 deaths attributed to the condition. Among those aged 18 and above, the prevalence is 34.1%, with 31.6% in the 31-44 age group, 45.3% in the 45-54 age group, and 55.2% in the 55-64 age group (Maulidah, 2022). In 2021, the prevalence of hypertension in Riau Islands Province increased from 25.8 per thousand to 34.1 per thousand, reflecting a rise of 26.28%, while Tanjungpinang City reported a hypertension incidence rate of 24.54%. Batu recorded a total of 3,714 hypertension patient visits in 2022 (Riau Islands Provincial Health Office, 2021).

If left uncontrolled, hypertension can lead to serious complications, including stroke, coronary heart disease, diabetes, kidney failure, and blindness. Stroke (51%) and coronary heart disease (45%) are the leading causes of death, while chronic kidney failure is prevalent at 32%. Additionally, hypertension can result in hypertensive retinopathy if it affects the eyes (Wahyuni & Ibrahim, 2022). Low physical activity levels and diets high in saturated fats, which elevate cholesterol levels in the body, further contribute to the risk of cardiovascular diseases (Lainsamputty et al., 2022).

High total cholesterol levels are a risk factor for hypertension because they lead to plaque buildup in the blood vessels, which gradually thickens and hardens the arteries, causing blockages or atherosclerosis (Lolo & Sumiati, 2019). Hypertension is associated with elevated total blood lipid cholesterol, a condition known as hyperlipidemia. Previous research in the United States found that the prevalence of hypertension is linked to hypercholesterolemia, with approximately 64.9% of cases showing this connection (Meinisasti, Farizal, & Patroni, 2019). Another study on hypertensive patients aged 36-45 in the village of Jabon, Jombang Regency, indicated that most participants had hypertension accompanied by hypercholesterolemia (Setyawan & Hasnah, 2020).

The Indonesian Ministry of Health's program for preventing and treating hypertension includes not only medication but also lifestyle modifications such as avoiding caffeinated drinks, smoking, alcohol consumption, ensuring sufficient rest, managing stress, maintaining a healthy diet, reducing salt intake, and engaging in regular exercise (Ashar, Mardiyono, & Ramlan, 2022).

Non-pharmacological therapies have become popular among the public as complementary treatments for hypertension, mainly due to issues with medication adherence, concerns about the side effects of long-term medication use, affordability, fewer chemicals involved, and significant healing effects (Saputra, 2021). Research shows that cupping therapy is effective in reducing blood pressure and hypercholesterolemia because it is drug-free, simple, safe, affordable, and does not cause serious side effects (Suhaily, Ismail, & Najib, 2017). The mechanism of cupping involves puncturing the skin, which triggers the release of Heat Shock Protein (HSP 70) and the activation of Nitric Oxide (NO), leading to relaxation and vasodilation of the blood vessels, ultimately lowering blood pressure (Annisa, Rudiyanto, & Sholihin, 2021). Cupping helps reduce toxic lipid and cholesterol levels, improves blood flow to the inner endothelial layers, and aids Nitric Oxide production, which can reduce vessel blockages and improve blood supply to the heart muscle (Aleyeidi, Aseri, & Kawthar, 2015).

Nutritional therapy for hypertensive patients involves managing a hypertension-specific diet that limits salt and saturated fat intake, while ensuring high potassium, calcium, magnesium, and fiber consumption. One recommended approach for hypertension patients is the Dietary Approaches to Stop Hypertension (DASH) diet, which emphasizes consuming fiber-rich fruits and vegetables, such as cucumbers (*Cucumis sativus L*) (Antika & Mayasari, 2016). The minerals, potassium, magnesium, and flavonoids in cucumbers have been proven to treat hypertension and hypercholesterolemia (Hermawan & Novariana, 2018). Cucumbers have a diuretic effect, and their high water content helps lower high blood pressure (Thiagarajah, Ong, Teh, & Lye, 2019). One hundred grams of cucumber contain 147 mg of potassium (Putri & Anggraini, 2022). The potassium in cucumbers inhibits the Renin-Angiotensin System, leading to reduced aldosterone secretion, decreased sodium and water reabsorption in the kidney tubules, increased diuresis, and a reduction in blood volume, which in turn lowers blood pressure (Putri et al., 2022).

Cucumber skin (*Cucumis sativus L*) contains a high concentration of flavonoids (71%), along with

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saponins, steroids, and alkaloids, which can help lower cholesterol levels (Marnil, Razak, & Ardi, 2021). Consuming cucumber as juice regularly has been shown to significantly lower blood pressure and hypercholesterolemia, as evidenced by previous research that demonstrated a reduction in systolic blood pressure from 149.68 mmHg to 136.65 mmHg and a decrease in diastolic blood pressure from 95.99 mmHg to 80.09 mmHg after therapeutic cucumber juice consumption (Negara, Erna, & Anna, 2017). This study was conducted to determine the effectiveness of cupping therapy and cucumber juice in reducing blood pressure and total cholesterol level in hypertensive patients.

RESEARCH METHOD

This quantitative study employed a quasi-experimental design with a pre-post control group framework. The independent variables in this study were cupping therapy and cucumber juice, while the dependent variables were blood pressure and total cholesterol level in hypertensive patients. The sample consisted of patients with grade 1 hypertension receiving treatment at Batu 10 Health Center in Tanjungpinang City. A total of 60 participants were selected using probability sampling with a purposive sampling technique, and they were divided into four groups: the cupping intervention group, the cucumber juice intervention group, the combined cupping and cucumber juice group, and a control group receiving medical treatment with captopril 25 mg and simvastatin 10 mg.

The selection of participants for this study considered inclusion and exclusion criteria. Inclusion criteria included participants with grade 1 hypertension (blood pressure 140-160 mmHg) being

treated at Batu X Health Center in Tanjungpinang City, participants with total cholesterol level >200 mg/dl aged 30–65 years, and participants receiving medical treatment with captopril 25 mg and simvastatin 10 mg. Exclusion criteria included participants with comorbidities (chronic kidney failure, blood disorders, vascular disorders, mental disorders), participants with skin issues in the cupping area (wounds, allergies, itching, edema, and redness), and pregnant participants.

The research procedure involved several stages. Before the intervention, systolic blood pressure, diastolic blood pressure, and total cholesterol levels were measured in both the intervention and control groups. The cupping intervention group received cupping therapy at specific points according to standard operating procedures on the first, seventh, and fourteenth days. The cucumber juice intervention group was given 150 ml of cucumber juice, twice a week for two weeks. The combined cupping and cucumber juice group received cupping therapy on the first, seventh, and fourteenth days, along with 150 ml of cucumber juice, twice a week for two weeks. The control group received medical therapy with hypertension medication (captopril 25 mg and simvastatin 10 mg) as prescribed by a doctor. On the 15th day, a post-test was conducted to measure blood pressure and total cholesterol levels in each group.

The measurement tools used in this study included a questionnaire, food recall observation sheets, a sphygmomanometer, cupping SOPs, and interviews. This study was ethically approved by the Ministry of Health, Poltekkes Semarang, under the approval number KM.06.02/7.3/0613/2024, dated March 21, 2024.

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RESEARCH RESULTS

Table 1. Characteristics of the Participants (N=60)

Variables	Group			
	Cupping and Cucumber Juice	Cupping	Cucumber Juice	Control
Age (Mean±SD)(Range)(Year)	(49.5 ± 10)(35-65)	(46 ± 10)(35-65)	(54 ± 10)(35-65)	(51 ± 7)(35-65)
Occupation (n/%)				
Government Officer	4/26.7	3/20.0	3/20.0	0/0.0
Private Sector Employee	5/33.3	7/46.7	3/20.0	8/53.3
Housewife	4/26.7	5/33.3	8/53.3	7/46.7
Retired	2/13.3	0/0.0	1/6.7	0/0.0
Gender (n%)				
Male	8/53.3	7/46.7	7/46.7	7/46.7
Female	7/46.7	8/53.3	8/53.3	8/53.3
Education (n%)				
Elementary	2/13.3	1/6.6	3/20.0	2/13.3
Junior High	0/0.0	4/26.7	4/26.7	7/46.7
Senior High	5/33.4	6/40.0	6/40.0	6/40.0
Undergraduate	8/53.3	4/26.7	2/13.3	0/0.0

Table 1 shows the characteristics of the participants, with an average age of 49.5 years and a standard deviation of 10.0 in the combined cupping and cucumber juice group. In the cupping intervention group, the average age was 46 years with a standard deviation of 10, while in the cucumber juice intervention group, the average age was 54 years with a standard deviation of 10. The control group had an average age of 51 years with a standard deviation of 7, within the age range of 35-65 years.

The majority of participants in the combined cupping and cucumber juice group were private sector employees, with 5 participants (33.3%). In the cupping intervention group, 7 participants (46.7%) were private sector employees. In the cucumber juice intervention group, the majority were

housewives, with 8 participants (53.3%), while in the control group, the majority were private sector employees, with 8 participants (53.3%).

In the combined cupping and cucumber juice group, the majority of participants were male, with 8 participants (53.3%). In the cupping intervention, cucumber juice intervention, and control groups, the majority of participants were female, with 8 participants (53.3%) in each group.

The education level of participants in the combined cupping and cucumber juice group was mostly bachelor's degree holders, with 8 participants (53.3%). In the cupping and cucumber juice intervention groups, most participants had a high school education, with 6 participants (40.0%) in each group. In the control group, the majority had a middle school education, with 7 participants (46.7%).

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Tabel 2. Effectiveness of Cupping and Cucumber Juice on Blood Pressure and Total Cholesterol

Group	B	SE	t	P	95% Confidence Interval		
					Lower Bound	Upper Bound	Partial Eta Squared
Cupping and Cucumber Juice							
Systolic/Diastolic	-13.1/-6.4	4.2/3.6	-3.0/-1.8	0.004/0.083	-21.8/-13.8	-4.3/0.9	16%/6%
Cupping							
Systolic/Diastolic	-12.5/-7.2	4.4/4.0	-2.9/-1.8	0.006/0.078	-21.3/-15.1	-3.8/0.8	15%/7%
Cucumber Juice							
Systolic/Diastolic	-11.2/-7.6	4.0/3.6	-2.8/-2.1	0.007/0.042	-19.2/-14.8	-3.2/-0.3	15%/9%
Total Cholesterol Level							
Cupping + Cucumber Juice	-28.6	10.8	-2.7	0.011	-50.3	-7.0	13 %
Cupping	-21.4	10.8	-2.0	0.053	-43.0	0.3	8 %
Cucumber Juice	-8.4	9.8	-0.9	0.397	-28.1	11.3	2 %

Table 2 shows that the group receiving the cucumber juice intervention had a systolic pressure 11.2 points lower than the control group, and this reduction was statistically significant ($p < 0.007$). Similarly, the group receiving the cupping intervention experienced a systolic pressure reduction of 12.5 points lower than the control group, and this reduction was also statistically significant ($p < 0.006$). The group that received both the cupping and cucumber juice intervention experienced an even greater reduction in systolic pressure, which was 13.1 points lower than the control group, and this reduction was statistically significant ($p < 0.004$).

Additionally, Table 2 shows that the group receiving the cucumber juice intervention had a diastolic pressure 7.6 points lower than the control group, and this reduction was statistically significant ($p < 0.042$). The group receiving the cupping intervention experienced a diastolic pressure reduction of 7.2 points lower than the control group, with the reduction approaching statistical significance ($p = 0.078$). The group that received the combined cupping and cucumber juice intervention experienced a greater reduction in diastolic pressure, which was 6.4 points lower than the control group, with the reduction approaching statistical significance ($p = 0.083$).

The group receiving the cucumber juice intervention had cholesterol levels 8.4 points lower than the control group, but this reduction was not

statistically significant ($p = 0.397$). However, the group that received the cupping intervention experienced a cholesterol reduction of 21.4 points lower than the control group, with this reduction approaching statistical significance ($p = 0.053$). The group that received the combined cupping and cucumber juice intervention experienced an even greater cholesterol reduction of 28.6 points lower than the control group, and this reduction was statistically significant ($p = 0.011$).

DISCUSSION

The cupping intervention had a significant impact on reducing systolic blood pressure in hypertensive patients. Participants who received the cupping intervention experienced a decrease in systolic blood pressure, with an average blood pressure of 153 mmHg before the intervention, and 126 mmHg after the cupping therapy. The diastolic blood pressure before treatment was 90.6 mmHg, which decreased to 76.3 mmHg. Cupping therapy was proven to be effective in lowering blood pressure, showing a statistically significant effect of 12.5 points lower than the control group ($p < 0.006$).

Cupping causes damage to mast cells in the subcutaneous tissue, fascia, and muscles. As a result of this damage, several mediators such as serotonin, histamine, bradykinin, and slow-reacting substances (SRS) are released. In the arterial baroreceptor system, the inflammatory mediators

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released during wet cupping stimulate vasoconstriction and vasodilation of blood vessels, thereby improving the vessels' response and increasing sensitivity to blood pressure. This result differs from previous studies that found cupping was effective in lowering blood pressure but had not reached normal limits; the pretest systolic blood pressure of respondents was 153.13 mmHg, which decreased to 143.13 mmHg in the posttest, with the diastolic blood pressure decreasing from 99 mmHg (Safrinda & Maulana, 2021).

Participants who received the cupping intervention experienced a decrease in average cholesterol levels from 240 mg/dl to 196 mg/dl. Cholesterol levels decreased 21.4 points more than in the control group, and this reduction was statistically close to significant ($p=0.053$).

Previous studies have stated that cupping therapy is effective in reducing total cholesterol level in hypertensive patients, with cholesterol levels before cupping therapy at 254.65 mg/dl and decreasing to 173.06 mg/dl after therapy (Faizal, Nurvinanda, & Zupera, 2020). Cupping therapy can lower cholesterol levels in the blood. The mechanism behind the effect of wet cupping therapy on lowering total blood cholesterol levels involves the opening of the skin barrier, which enhances the skin's excretory function, including the removal of lipids and hydrophobic substances such as lipoproteins (Suswitha, Arindari, Saputra, Astuti, & Aini, 2022). However, other studies have shown different results, with average cholesterol levels before cupping therapy at 299.4 mg/dl and decreasing to 213.0 mg/dl after therapy (Rosaina & Saputra, 2019).

The average systolic blood pressure before the cucumber juice intervention was 153.1 mmHg, which decreased to 127.5 mmHg after the intervention. The average diastolic blood pressure before the cucumber juice intervention was 90.6 mmHg, and it dropped to 78 mmHg after the intervention. The cucumber juice intervention group had systolic pressure 11.2 points lower than the control group, with a p -value of 0.007, indicating a significant difference after the cucumber juice intervention.

Cucumber juice therapy has been proven effective in lowering blood pressure. A previous study showed that consuming 150 ml of cucumber juice for 7 days reduced systolic and diastolic blood

pressure by 12% ($p=0.000$) and 10.4% ($p=0.000$), respectively, while the control group showed a slight decrease of 2% in systolic blood pressure ($p=0.077$) and 1.1% in diastolic blood pressure ($p=0.419$) (Lovindy, 2020). Another study mentioned that cucumbers contain a variety of nutrients, including potassium, calcium, and magnesium (Aisyah & Probosari, 2014). Various studies have established a close relationship between potassium, calcium, and magnesium intake and blood pressure reduction. Lower potassium intake is associated with higher blood pressure. The sodium/potassium ratio is also related to blood pressure. Reducing sodium intake by 100 mmol per day and consuming potassium up to 70 mmol per day can predict a decrease in systolic blood pressure by 3.4 mmHg.

Cucumber juice has a significant effect on reducing total cholesterol level in hypertensive patients. Participants who received the cucumber juice intervention experienced a decrease in cholesterol levels from 232 mg/dl to 209 mg/dl. Although the cholesterol levels did not fall within the normal range, the group that received the cucumber juice intervention had cholesterol levels 8.4 points lower than the control group, although this reduction was not statistically significant ($p=0.0397$). Previous research found that after the administration of a combination of starfruit and cucumber juice, the intervention group experienced a decrease in total cholesterol level from 230 mg/dl before the intervention to 222.05 mg/dl afterward (Tiawati & Putriningtyas, 2023).

Systolic blood pressure before the cupping and cucumber juice intervention was 153 mmHg, and after the cucumber juice intervention, it dropped to 125 mmHg. The group receiving both cupping and cucumber juice therapy had a systolic pressure 13.1 points lower than the control group, with a p -value of 0.004, indicating a significant difference after the intervention. The average diastolic blood pressure before the cucumber juice intervention was 90.6 mmHg, which decreased to 77 mmHg after the intervention, with a more significant drop in diastolic pressure of 6.4 points lower than the control group.

The mechanism of cupping in lowering blood pressure begins with pricking or incisions on the skin's surface, creating negative pressure due to the suction applied to specific cupping points on the skin.

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This negative pressure accelerates capillary filtration towards the lobular area and reduces capillary absorption, causing the filtered fluid to accumulate in the lobular area. When cupping is performed, the skin (*cutis*), subcutaneous tissue (*subcutis*), fascia, and muscles are damaged by mast cells. Due to this damage, substances such as serotonin, histamine, bradykinin, and Slow Reacting Substance (SRS) are released, causing capillaries and arterioles to dilate, leading to a flare reaction in the cupped area. This results in muscle relaxation and vasodilation.

Cupping and cucumber juice intervention effectively reduce blood pressure in hypertensive patients. Previous research on the effectiveness of cupping and back acupressure found that the average pretest systolic blood pressure was 165 mmHg, and the posttest was 145 mmHg, with systolic blood pressure not within normal limits, showing only a four-point reduction compared to the control group (Ashar et al., 2022).

Participants who received the cupping and cucumber juice intervention experienced a decrease in cholesterol levels from 238 mg/dl to 188 mg/dl, with a reduction of 28.6 points lower than the control group, and this reduction was statistically significant with a p-value of 0.011. Cupping and cucumber juice therapy have been proven effective in lowering total cholesterol level, indicating a significant difference after the intervention.

The mechanism by which cupping lowers cholesterol is due to the dilation of capillary blood vessels, which facilitates the removal of toxins or free radicals from the body. Nitric oxide plays a role in dilating capillaries, resulting in lower cholesterol levels. Cupping helps reduce toxic lipid and cholesterol levels while improving blood flow to the inner endothelial layers, aiding the production of nitric oxide from the endothelium.

The mechanism by which cucumber lowers cholesterol is attributed to the presence of 71% flavonoid compounds in cucumber skin. The skin of cucumber (*Cucumis sativus L.*) also contains several active compounds besides flavonoids, including saponins and steroids, which help lower cholesterol. Flavonoids act as antioxidants by donating or releasing hydrogen ions to stabilize free radicals. This activity prevents the oxidation of low-density

lipoprotein (LDL) cholesterol, which thickens the blood and prevents fat buildup on blood vessel walls.

CONCLUSION

The combination of cupping and cucumber juice intervention was found to be more effective in lowering systolic blood pressure (16%), diastolic blood pressure (6%), and total cholesterol levels compared to the individual interventions. The cupping intervention alone reduced systolic blood pressure by 15%, diastolic blood pressure by 7%, and total cholesterol by 8%. Meanwhile, the cucumber juice intervention reduced systolic blood pressure by 15%, diastolic blood pressure by 9%, and total cholesterol by 2%.

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