RESEARCH ARTICLE

# The Effect of Young Coconut Water on Blood Pressure in Hypertensive Patients

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## Abstract

**Objective:** To determine the effect of young coconut water on reducing blood pressure in hypertensive patients.

**Method:** The quasi-experimental study was conducted in the work area of the Perhentian Luas Public Health Centre, Kuantan Singingi district, Riau province, Indonesia, from June 12 to 26, 2022, and comprised people aged >35 years with stage I hypertension. They were divided into intervention group A and control group B. Group A received young coconut water 150ml for 1 week once a day in the morning. Data was collected using observation sheets and blood pressure monitoring. Data was analysed using SPSS 20.

**Results:** Of the 30 subjects, 15(50%) were each in each of the two groups. All the 15(100%) respondents in group A were females, while there were 10(66.7%) males and 5(33.3%) females in group B. In both the groups, there were 8(53.3%) subjects aged 26-45 years and 7(46.7%) aged >45 years. Systolic and diastolic blood pressure before and after the intervention showed significant difference in group A ($p<0.05$), while the difference in group B was not significant ($p>0.05$).

**Conclusions:** Consuming young coconut water every day for 7 days reduced blood pressure in hypertensive patients.

**Keywords:** Cocos, Blood Pressure, Public Health, Hypertension, Diastole. (JPMA 74: S-51 [Suppl. 5]; 2024)

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## Introduction

World Health Organisation (WHO) 2021 data showed that nearly 1.28 billion people had hypertension (HTN) globally.[1] Therefore, HTN cannot be underestimated. Based on 2018 data, the average prevalence of HTN in Indonesia among those aged >18 years was 25.8%; the highest in South Kalimantan (44.1%) and the lowest in Papua (22.2%). Besides, 45% HTN patients were aged 45-54 years, and 55% were aged 55-64 years.[1] One has to be careful while treating HTN as some drugs can cause a sudden drop in blood pressure (BP), causing postural hypotension. Some HTN drugs, like beta (β)-blockers, crash alpha (α)-adrenergic receptor protein in the penile tissue, causing impotence. The decrease in BP caused by some HTN drugs, like β-blockers, cause syncope, dizziness, vertigo and weakness. Pemphigus is related to angiotensin-converting enzyme (ACE) inhibitors. Some HTN medications, like diuretics, cause the human body to lose salt and water, potentially causing gout and hyperuricaemia. Another side effect is claudication.[2] If left uncontrolled, HTN can cause complications, such as heart disease, stroke, kidney disease, retinopathy, peripheral blood vessel disease, and nerve disorders.

Treatment of HTN includes non-pharmacological and pharmacological therapies. Non-pharmacological therapy in the form of lifestyle modification includes diet, physical activity, smoking, and alcohol consumption. Pharmacological drug therapy includes single or combination antihypertensives. The selection of antihypertensive drugs can be based on special conditions, like comorbidities or complications. Treatment of HTN with non-pharmacological therapy for HTN has been carried out in various ways, including therapy with bananas, oranges, beets, berries, avocados, watermelons, kiwis and pomegranates. In addition, cucumbers, tomatoes, garlic, and young coconut water (cocos nucifera) are also some BP-lowering foods because of the potassium content in them and also increase the levels of nitrate oxidation in the body which can help dilate and relax blood vessels.[3]

One form of HTN treatment with non-pharmacological therapy for HTN is using young coconut water.[4] The water commonly found in young coconuts has a sweet taste, ad contains several ingredients, such as sugar, vitamins, calcium and potassium. Consumption of foods with high potassium and low sodium content is important to maintain BP within normal limits. Young coconut water contains a high element of potassium (about 291 mg/100 ml), and water from coconut aged 6-8 months has the highest potassium content and the lowest sodium content.[5] In addition, coconut contains ethanolic extract which has an antihypertensive effect.[3]

Young coconut water reduced systolic BP (SBP) and diastolic BP (DBP) by 3.24% and 0.33%, respectively, in a study.[3] Green coconut water can reduce SBP and DBP in people with HTN.[6] There was a blood pressure lowering effect by giving young coconut water to elderly mothers.[7]

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Besides, the suggestion that coconut oil can reduce the incidence and prevalence of coronary artery disease (CAD)[8] is related as CAD is one of the complications of HTN.

The current study was planned to determine the effect of young coconut water on reducing BP in hypertensive patients.

## Patients and Methods

The quasi-experimental study was conducted in the work area of the Perhentian Luas Public Health Centre (PHC), Kuantan Singingi district, Riau province, Indonesia, from June 12 to 26, 2022. After approval from the ethics review committee of Tengku Maharatu College of Health Science (Sekolah Tinggi Ilmu Kesehatan="STIKes" Tengku Maharatu), Pekanbaru, Indonesia, the sample was raised using purposive sampling technique. Those included were local individuals of either gender aged 35 years who had stage I HTN and were not taking any antihypertensive drug. People who were not present at the PHC at the time of enrolment were excluded. HTN stage 1 was defined as SBP 140-159 mmHg and DBP 90-99 mmHg.

After taking informed consent, the patients were divided into intervention group A and control group B. Those in group A received young coconut water 150 ml for 1 week once a day in the morning, while those in group B did not receive the intervention.

Data was collected using observation sheets. BP was measured using a standard mercury sphygmomanometer at baseline and post-intervention day 7, with the subjects sitting in a chair with the back supported, and the feet placed flat on the floor uncrossed.

Data was analysed using SPSS 20. Data normality was tested using the Shapiro-Wilk test and the distribution was found to be normal. Dependent t-test was used for intragroup comparisons, and independent samples t-test for intergroup comparisons. P<0.05 was considered significant.

## Results

Of the 30 subjects, 15(50%) were each in each of the two groups. All the 15(100%) respondents in group A were females, while there were 10(66.7%) males and 5(33.3%) females in group B. In both the groups, there were 8(53.3%) subjects aged 26-45 years and 7(46.7%) aged >45 years (Table 1). SBP and DBP showed significant decline post-intervention in group A, while the difference in group B was not significant (Tables 2-3)

**Table-1:** Respondents' characteristics.

| Respondents' Characteristics | Treatment Group n (%) | Control Group n (%) |
|---|---|---|
| **Gender** | | |
| Male | 0 0 (0) | 10 (66.67) |
| Female | 15 (100) | 5 (33.33) |
| **Total** | 15 (100) | 15 (100) |
| **Ages** (years) | | |
| 26-45 | 8 (53.3) | 8 (53.3) |
| >45 | 7 (46.7) | 7 (46.7) |
| **Total** | 15 (100) | 15 (100) |
| **Occupations** | | |
| Housewives | 10 (60.67) | 8 (53.33) |
| Farmer | 5 (33.33) | 7 (46.67) |
| **Total** | 15 (100) | 15 (100) |
| **Educations** | | |
| No School | 3 (20) | 8 (53.33) |
| Elementary School | 7 (46.67) | 6 (40) |
| Junior High School | 3 (20) | 0 (0) |
| Senior High School | 0 (0) | 1 (6.67) |
| Diploma III | 1 (6.67) | 0 (0) |
| Bachelor | 1 (6.67) | 0 (0) |
| **Total** | 15 (100) | 15 (100) |

**Table-2:** Blood pressure (BP) values before and after the intervention.

| BP | Before±SD | After±SD | *p*-value |
|---|---|---|---|
| | | **Intervention Group** | |
| Systolic | 151.87±4.26 | 126.27±3.28 | 0.000 |
| Diastolic | 94.67±3.09 | 82.07±2.31 | 0.000 |
| | | **Control Group** | |
| Systolic | 151.27±3.20 | 152.20±3.45 | 0.010 |
| Diastolic | 93.07±2.52 | 93.00±1.85 | 0.925 |

SD: Standard deviation.

**Table-3:** Mean difference in blood pressure (BP) values after the intervention.

| BP | Group | Mean±SD | *p*-value |
|---|---|---|---|
| Sistolic | Treatment | 25.60±4.939 | 0.000 |
| | Control | -0.93±1.222 | |
| Diastolic | Treatment | 12.60±1.956 | 0.000 |
| | Control | 0.06±2.685 | |

## Discussion

The majority of the subjects in the current were females, which was in line with a survey of 200 HTN patients which had 136 women and 64 males.[9] On the other hand, a study reported 17% prevalence of HTN among females.[10] The number of female respondents in the current study was higher because they were available at the study site and were willing to participate. In general, the risk of HTN is higher in males than in females. Among elderly women, the influence of menopause results in changes in the level of oestrogen which protects blood vessels from damage.[11]

The majority of current respondents were aged 26-45 years. SBP and DBP increase with age.[9] After age 40, the artery walls experience thickening caused by the buildup of collagen substances in the muscle layer, causing blood vessels to go narrow and stiff.[12]

The majority of the current respondents were housewives. A person not involved in physical work has the potential of developing HTN.[13]

The majority of current respondents had education up to elementary school. An earlier study had 36% students and 22% housewives.[9] Education influences a person's ability to obtain and use health information. One study reported a significant effect of giving young coconut water on reducing BP in HTN sufferers,[5] while another study reported significant difference only in SBP value.[3]

Young coconut water contains high potassium 149 mg/ 100 ml. Potassium has an important role in helping lower BP. The mechanism of potassium in lowering BP, among others, decreases the production of the vasoconstrictor thromboxane and increases the production of the vasodilator callidin, resulting in vasodilation of blood vessels. This vasodilation causes a decrease in peripheral resistance and increase in cardiac output. Potassium as a mineral that maintains fluid and electrolyte balance, and has a natriuretic and diuretic effect which increases sodium and fluid outflow from the body.[14] A high-potassium diet is associated with BP reduction.[15,16] In addition, people who consume coconut water regularly tend to have increased plasma potassium levels, which is a contributing factor in lowering BP.[16]

SBP in the experimental group of a study had a significant change.[17] In another study, coconut water consumption showed a significant decrease in SBP (71%), and DBP (29%).[18] One study reported higher decrease in SBP and DBP values with coconut water consumption than in the control group.[19] The effect of young coconut water on BP in hypertensive patients found a decrease in SBP after 90 days from 147.7mmHg to 129.5mmHg. DBP also decreased from 98.1mmHg to 85.5mmHg in 90 days.[20]

Other non-pharmacological HTN treatment options include herbal plants, such as garlic.[21] and Ambon bananas.[22]

Coconut water can improve BP.[23] Also, coconut water can prevent and cure high BP induced by a high fructose diet.[24] One study stated that coconut water appeared to have a protective effect on the heart, and antioxidant activity[25] and another study found that there was an effect of giving young coconut water to decrease BP in elderly mothers.[7]

**Limitations:** The sample size was not calculated which could have affected the power of the study.

## Conclusion

Consuming 150 ml of young coconut water every day for 7 days could reduce BP in hypertensive patients.

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