

**Research Article**

# The Impact of Cucumber (*Cucumissativus*) Juice on Blood Pressure in Elderly With Hypertension

Dinda Evania, Budi Punjastuti\*, Pritta Yunitasari, and Siti Maryati

D-III Nursing Study Program, Karya Husada Health Polytechnic, Yogyakarta

**ORCID**

Budi Punjastuti: <https://orcid.org/0000-0001-9632-3696>

**Abstract.** Hypertension is a type of degenerative disease. Blood pressure increases slowly with age. In 2018, the prevalence of hypertension in people aged 65-74 years in Indonesia was 57.6% and in those over 75 years was 63.8%. Cucumber juice is a natural product that may be useful for lowering blood pressure without side effects because its potassium content may help improve blood flow and calm nerves so that blood pressure drops. This study aimed to analyze the effectiveness of cucumber juice in reducing blood pressure in elderly people with hypertension. This was a literature review. Articles were obtained using Google Scholar, PubMed and Lipi, with the keywords: hypertension, cucumber juice, elderly. 435 articles were screened and five were identified for the review. Based on the results of these studies, it was found that there was a significant decrease in blood pressure after the elderly were given cucumber juice and this decrease was as much as 100-200 mg per day. We can therefore conclude that cucumber juice can be effective in lowering blood pressure in elderly people with hypertension. These findings can be applied in daily life.

Corresponding Author: Budi Punjastuti; email: budipunjas123@gmail.com

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**Keywords:** hypertension, cucumber juice, elderly

## 1. Introduction

Hypertension is a continuous increase in systolic or diastolic blood pressure. Generally, the systolic blood pressure reaches 140 mmHg or more and the diastolic blood pressure is 90 mmHg, this have indicates pre-hypertension. Blood pressure increases slowly with age. According to World Health Organization (WHO) in 2015 showed around 1.13 billion people in the world suffer from hypertension, which means that 1 in 3 people in the world has hypertension [1]. The results of the 2018 Basic Health Research (Riskesdas) show that the prevalence of hypertension in the population in Indonesia over the age of 18 is 34.1%. Hypertension occurs in the age group 31-44 years (31.6%), age 45-54 years (45.3%), age 55-64 years (55.2%), 65-74 years old (57.6%) and more than 75 years old (63.8%). While the data in the Special Region of Yogyakarta according to the Indonesian Ministry of Health in 2019 the most hypertension sufferers were in Bantul


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Regency, which was 38,641 patients, with the elderly with hypertension as many as 1,174 people.

Treatment of hypertension, in general can be done by pharmacological and non-pharmacological treatment. Pharmacological treatment is treatment using antihypertensive drugs to lower blood pressure. Non-pharmacological treatment is treatment without drugs, by changing a healthier lifestyle and avoiding risk factors. [2]

Non-pharmacological treatment is by modifying daily lifestyles. Non-pharmacological therapy in lowering blood pressure uses natural resources, namely fruits, vegetables that are high in fiber, rich in vitamins and minerals. [3]

Fruits and vegetables that are efficacious in lowering high blood pressure include celery, cucumber, chayote, watercress, radish, tomatoes, starfruit, sweet star fruit, watermelon, carrots, bananas, apples, and kiwis.

Cucumber is one of the fruit vegetables that is very well known and quite in demand by the public. Cucumbers are also cultivated everywhere, whether in fields, yards, or greenhouses. Cucumber (*Cucumis sativus*) is quite popular in almost all countries, including Indonesia. In Indonesia, cucumbers are widely grown in Java and Sumatra. Many Indonesians like to consume cucumbers, usually for fresh vegetables, made into pickles, vegetable salads, and also consumed as fresh drinks such as juice.

In the journal from Eva Marvia, et al (2018), Cucumber contains saponins (removes mucus), protein, fat, calcium, potassium, magnesium, phosphorus, iron, sulfur, vitamins A, B1, and C. In regulating blood pressure is potassium / potassium. Potassium/potassium content can increase the concentration in intracellular fluid so that blood pressure drops, so it tends to draw fluid from the extracellular part and lowers blood pressure due to the vasodilating effect of blood vessels, potassium is the main ion in the intracellular fluid which works the opposite of sodium/salt. And also cucumber can lower blood pressure without any side effects. [4]

Based on the description of the background of the problem above, cucumber juice is very important because it can lowering blood pressure without side effect so it's safe to use especially in elderly, so the authors are interested in conducting a case study with a literature review on the effectiveness of cucumber juice (*Cucumis sativus*) in reducing blood pressure in the elderly with hypertension.

## 2. Method

### 2.1. Design

This research is a research using literature study method or literature review. A literature review is a broad overview of the research that has been done on a specific topic. The type of literature review that used in this study is the traditional literature review. Traditional literature review is a method commonly carried out by researchers, and we can find many results in existing survey papers. The reviewed scientific papers are selected by the researchers themselves on a research topic and are selected based on the knowledge and experience of a researcher [5]. And choose the study with Quasy Eksperimen design with Pre and Post-Test.

In conducting this study, the authors searched for research journals published on the internet using Google Scholar, Pubmed, and Lipi, with the keywords: Hypertension, Cucumber Juice, Elderly. The inclusion criteria of the journals to be reviewed are research journals with elderly subjects with hypertension level 1 and 2 according to JNC-VII data with the theme of giving cucumber juice to people with hypertension, full text is available with a journal publication period of 2011-2020 and exclusion criteria are subjects who are not elderly, themes other than giving cucumber juice to hypertension sufferers, full text is not available, published under 2011 and above 2020.

### 2.2. Sample

The research sample used in the five journals is 40% using Non-Probability Sampling ( At 1<sup>st</sup> and 2<sup>nd</sup> study ) and the remaining 20% using Total Sampling (4<sup>th</sup> study ), Simple Random Sampling ( 3<sup>rd</sup> study ), and Purposive Sampling ( 5<sup>th</sup> study ) . And the subjects are elderly with hypertension level 1 and level 2.

### 2.3. Data Analysis

Research journals that match the inclusion criteria are collected. A journal summary is made, including the researcher's name, year of publication, journal publisher, research location (City or State), objectives, methods, samples, and summary of results or findings. Then to further clarify the analysis of the abstract and full text of the journal, read and observe. The summary of the journal is then analyzed on the contents contained in the

research objectives and research results. The analytical method used is the contents of analysis of each journal.[6].

### 3. Result

Based on search results through Google Scholar, Pubmed, and Lipi, with the keywords: Hypertension, Cucumber Juice, Elderly. The author finds journals that match these keywords. A total of 435 journals from journals found according to these keywords were screened. A total of 233 journals were excluded because full text articles were not available. Of the 25 full text journals, they were screened again based on predetermined inclusion criteria. And as many as 20 journals were excluded, so that 5 fulltext journals were reviewed.

The five journals reviewed found significant differences between blood pressure before and after being given cucumber juice. The first study conducted by Mardiaty Barus, et al. (2019) respondents were given 100 grams of cucumber juice for 7 days. The Wilcoxon Test result  $p < \alpha$  (  $0.001 < 0.05$  ) for systolic and diastolic pressures, which means that there is a significant difference between blood pressure before and after treatment. With data on the difference in blood pressure before and after the intervention, the systolic blood pressure before the intervention was 149.13 mmHg and the systolic pressure after the intervention was 136.09 mmHg. With these results, the systolic pressure decreased by 13.04 mmHg. And for diastolic blood pressure before intervention was 97, 83 mmHg and diastolic pressure after intervention of 86.96 mmHg. With these results, the diastolic pressure decreased by 10.87 mmHg [7].

The second study conducted by Candra Kusuma, et al (2018) found that the average systolic blood pressure before treatment was 149.68 mmHg, with the lowest systolic blood pressure being 140 mmHg and the highest 160 mmHg. Before treatment, the average diastolic blood pressure was 95.88 mmHg with the lowest diastolic pressure of 90 mmHg and the highest 105 mmHg. While the average systolic blood pressure after treatment was 136.65 mmHg, with a decrease of 13.03 mmHg. The average for diastolic blood pressure after treatment was 89.08 mmHg with a decrease of 6.8 mmHg. Respondents were given cucumber juice treatment with a composition of 200 grams of cucumber with 100 ml of water, which was given for 3 days in the morning at 09.00 WITA [8].

The third study conducted by Sumirah Budi, et al (2017) found that systolic blood pressure was around 150 mmHg, had diastolic blood pressure around 90 mmHg.

After being given treatment, the most systolic blood pressure was 150 mmHg, and the diastolic blood pressure was at most 90 mmHg. And after averaging the systolic pressure from 164.86 mmHg to 148.43 mmHg with a decrease of 16.49 mmHg, and the diastolic blood pressure from 97.29 mmHg to 87.63 mmHg with a decrease of 9.66 mmHg. Respondents were given cucumber juice treatment with a composition of 100 grams of cucumber and 200 ml of water, and consumed for one week a day 2 times in the morning and evening with the same dose. And the results obtained P-Value value  $0.000 < 0.05$  which indicates a significant effect of cucumber juice [9].

The fourth study conducted by Sariaman Purba (2019) obtained the results of the analysis of the effect of cucumber juice (*cucumis sativus* linn) on reducing blood pressure in hypertensive patients in Sindang Barang, it was known that the significant value was 0.000 or P value  $< 0.05$ . Which means there is a significant difference between blood pressure before and after treatment. The systolic blood pressure before treatment was 163 mmHg to 149 mmHg with a decrease of 14 mmHg and the diastolic blood pressure before treatment was 98 mmHg to 93 mmHg with a decrease of 5 mmHg [3].

The fifth study conducted by Sri Lestari, et al (2015) found that systolic pressure decreased by 34 mmHg. The average systolic blood pressure measurement before the intervention was 165.33 mmHg and the systolic pressure after the intervention was 131.33 mmHg. While the diastolic pressure decreased by 4.67 mmHg. The average diastolic blood pressure measurement before the intervention was 98.00 mmHg and the diastolic pressure after the intervention was 95.33 mmHg. Respondents were given 100 cc of cucumber juice given for 3 times (once a day for 3 days) [10].

## 4. Discussion

The results of the analysis from 5 journal carried out that the examination of blood pressure in the elderly before giving cucumber juice was an average of more than 149.13 mmHg, for systolic blood pressure and for the average diastolic blood pressure more than 97.83 mmHg respectively. These data are supported by data from JNC-VII (2013), and with this data is hypertension level 1, namely from 140-159 mmHg for systolic blood pressure and 90-99 mmHg for diastolic, as well as level 2 hypertension with systolic 160 mmHg and diastolic 100 mm Hg.

From the results of the analysis of blood pressure before the intervention, it proves that the older a person is, the greater the risk of developing hypertension. (Prof. Suhadjono, 2018 )

This can happen because in old age there is narrowing and stiffness of blood vessels caused by changes in the structure of blood vessels, as a result of increased systolic blood pressure. With increasing age it will increase the average diastolic blood pressure, although it does not have much effect on the increase in the prevalence of hypertension for each decade of age. (Sartik, et al, 2017)

In old age, the walls of the arteries have thickened and stiffened due to arteriosclerosis. Blood with each heartbeat is forced to pass through vessels that are narrower than usual and cause pressure to rise [8].

However, after giving cucumber juice to the elderly with hypertension as much as 100-200 grams per day, will decrease systolic blood pressure of 13-34 mmHg and decrease the diastolic blood pressure of 4-10, 87 mmHg.

With the results of lowering blood pressure above, it is proven that cucumber juice can reduce blood pressure effectively. Cucumber juice is one of the recommended non-pharmacological treatments for hypertension sufferers. In addition to the potassium/potassium content in cucumbers which can lower blood pressure, there is also a magnesium mineral which also plays a role in improving blood flow and calming nerves and relaxing the heart muscle so that blood pressure drops. (Kholish, 2011). In addition, according to Khomsan (2017) that high consumption of calcium, magnesium and fiber contained in vegetables such as cucumbers can reduce systolic and diastolic blood pressure by 5.5 mmHg and 3 mmHg, respectively.

In line with research conducted by Ni Made Dwi (2017), et al., respondents were given treatment with  $\pm 200$  ml of cucumber juice given for 5 days, the results showed that systolic blood pressure decreased by 9.33 mmHg and diastolic blood pressure decreased by 3.33 mmHg.

From the discussion above, it can be concluded that the elderly (elderly) have a higher risk of developing hypertension, due to increasingly stiff blood vessels. Consuming cucumbers that are processed in the form of juice is one of the non-pharmacological techniques without side effects that can be used by the public to lower blood pressure. By giving 100-200 ml of cucumber juice per day, it can effectively lower blood pressure in hypertensive elderly. Materials that are easily available and simple manufacturing methods can be utilized by the community well.

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