

**Review Article: Systematic Review, Meta-Analysis, Integrative Review, Scoping Review**

**TISANE CELERY AS A NON-MEDICAL THERAPY IN HYPERTENSION PATIENTS**

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**Abstract**

**Background:** An increase in the number of people with hypertension in Indonesia will indirectly make the burden of health financing higher and a decrease in Indonesia's human resources itself. This is because hypertension experienced, can trigger the occurrence of other diseases and at the same time has the potential to cause disability and death in sufferers. One type of non-medical therapy that can be used to control blood pressure is to consume celery tisane.

**Objective:** This study aims to identify the potential of celery as a non-medical therapy in patients with hypertension.

**Design:** This research is a literature review. In this study the authors chose quantitative research articles with quasi experimental and case control designs.

**Data Sources (include search dates):** The author uses Google Scholar, PubMed and OneSearch databases. In searching for these sources the author uses the keywords English and Indonesian. The keywords used were hypertension, effectiveness, effect, comparison and celery to find the appropriate literature.

**Review Methods:** The author uses a systematic review method according to the PRISMA stages which include identification, screening, inclusion and feasibility of the article findings which are then analyzed. Articles that meet the criteria will be reviewed to record the potential of celery as a non-medical therapy for hypertension sufferers.

**Results:** Celery contains flavonoids, saponins, tannins, essential oils, flavo-glucosides (apiin), apigenin, phytosterols, choline, lipases, pthalides, asparagine, bitter substances, vitamins (A, B and C) and alkaloids. Antihypertension in celery comes from apigenin which is contained in celery. Apigenin itself is the main flavonoid in celery, this compound can lower blood pressure through blocking Ca<sup>2+</sup> channels (calcium antagonists). Based on the results of the explanation above, it can be concluded that celery leaves can be used as a non-medical therapy for people with hypertension.

**Conclusion:** Celery leaves have been shown to have the potential to be developed and utilized as a non-medical therapy for hypertension sufferers. The chemical content of celery leaves has been proven to be effective in helping people with hypertension control their blood pressure.

**Keywords:** Hypertension, Non-medical Therapy, Tisane Celery

## INTRODUCTION

Hypertension is still a big challenge in the field of health services both in the world and including in Indonesia. This is evidenced by conditions that are often found in primary health care in Indonesia. Although various outreach activities have been carried out and various health service measures have been developed, the incidence of hypertension in Indonesia tends to increase (Kemenkes RI, 2019).

Hypertension is a very serious health problem which requires cooperation from various related parties such as the ministry of health, health workers, hypertension sufferers themselves and their families. The World Health Organization states that hypertension is a serious medical condition and can increase the risk of heart, brain, kidney and other diseases (WHO, 2022)

Hypertension is a serious problem considering that the number of people with hypertension in the world is increasing along with the various developments in science, technology and facilities available to humans. Many people with hypertension are not aware of the hypertension they experience early on. If signs and symptoms of hypertension appear, such as feeling dizzy often, some people consider this to be normal or due to lack of rest so they don't pay more attention to the symptoms of hypertension that occur. The World Health Organization reports that almost half of adults in the world experience hypertension and only 1 in 5 people with hypertension are able to control the hypertension they experience (WHO, 2022).

According to the results of Basic Health Research conducted by the Ministry of Health of the Republic of Indonesia, in 2007, 2013 and 2018 there appears to be a tendency for an increase in the prevalence of non-communicable diseases and one of them is hypertension. This phenomenon is predicted to

continue. Nationally, the results of the 2018 Basic Health Research of the Republic of Indonesia show that the prevalence of people with high blood pressure is 34.11%. The prevalence of high blood pressure in women (36.85%) is higher than that of men (31.34%). The prevalence of hypertension is increasing with age (Kemenkes RI, 2018).

Hypertension is a medical condition when a person experiences an increase in blood pressure above normal according to the World Health Organization, hypertension when the increase in resting blood pressure persists, namely systolic blood pressure of more than 140 mmHg and diastolic pressure of more than 90 mmHg (WHO, 2022). Hypertension of unknown cause is defined as essential hypertension. Some researchers prefer the term primary hypertension to distinguish it from other secondary hypertension due to known causes. According to The Seventh Report of the Joint National Committee on Prevention, Detection, Evaluation and Treatment of High Blood Pressure (JNC VII) the classification of blood pressure in adults is divided into normal, prehypertension, grade 1 and grade 2 hypertension groups (Kandarini, 2016). Hypertension can also cause strokes by blocking or rupturing arteries that supply blood and oxygen to the brain, as well as kidney damage which can lead to kidney failure. High blood pressure causes damage to the heart by hardening the arteries and reducing the flow of blood and oxygen to the heart (WHO, 2022).

Reducing hypertension risk factors, especially modifiable risk factors, is the best solution for hypertension control. Some efforts that can be made include getting used to doing physical activity, especially light exercise, reducing salt consumption, controlling weight or losing weight so that it is within normal limits, doing good stress management, reducing alcohol and smoking consumption, and making sure to meet rest needs. This management will

help someone to avoid hypertension and for people with hypertension, the risk of recurrence due to an increase in uncontrolled blood pressure can be handled properly (Darsini, 2022).

One of the non-medical therapies that can be applied as a curative and at the same time preventive effort in overcoming the incidence of hypertension is to regularly consume celery plants either in fresh form or prepared products. One of the preparation products developed with celery as the basic ingredient is better known as celery tisane. Celery tisane besides being easy to consume, has also been scientifically proven to help hypertensive patients control their blood pressure so that it remains in optimal condition.

Celery plant has the potential as a type of non-medical therapy to be applied to people with hypertension and several other types of health problems both as a curative effort and a preventive effort. This is due to the chemical content that is owned by the celery itself. Many studies have revealed that celery can be used to prevent various health problems such as heart disease (Mans & Aburjai, 2019; Illes, 2021; Simamora et al., 2022), liver disease (Abd-Elrazek et al., 2022; El-Dashlouty et al., 2020; Mustafa et al., 2019), kidney illness (Gupta et al., 2019; Moğ et al., 2019; Shanmugalingam & Rajamanoharan, 2021), gout (Li et al., 2019; Karim et al., 2021; Nguyen Thu et al., 2020), and rheumatism (Khotimah et al., 2020; Natsir et al., 2019; Karim et al., 2021). In addition, several studies have shown that celery can also reduce blood sugar levels (Mans & Aburjai, 2019; H. Li et al., 2022; Khosrowpour et al., 2022) and blood pressure (Azizah et al., 2020; Siantar et al., 2021; Ahmad & Rahman, 2022) so that it can strengthen the condition of the heart.

## **METHODS**

This research is a literature review. In this study the authors chose quantitative research articles with cross-sectional, quasy-experimental and case-control designs that looked for the relationship of the independent

variable to the dependent variable or the influence of the independent variable to the dependent variable. The author uses several databases which are used as search sources related to research, namely Google Scholar, PubMed and OneSearch. In searching for these sources the author uses the keywords English and Indonesian. The keywords used were hypertension, effectiveness, effect, comparison and celery to find the appropriate literature.

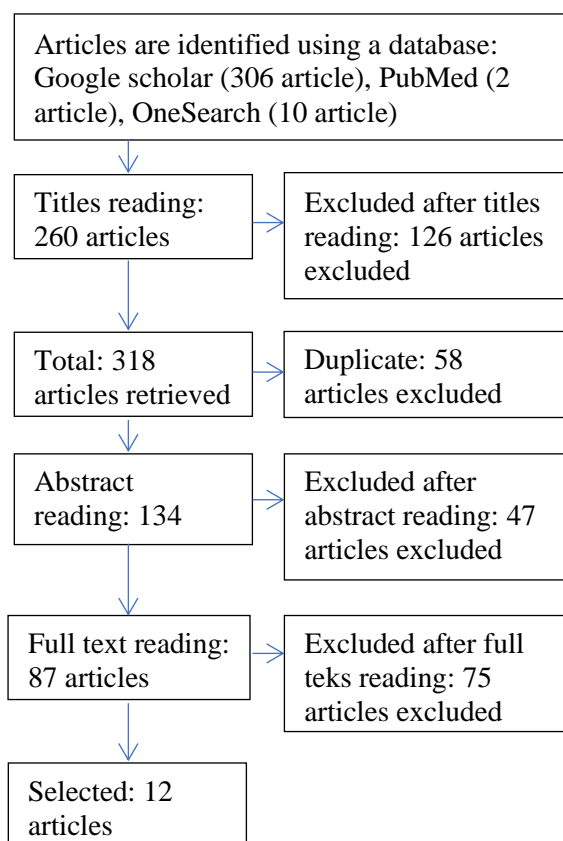
With regard to research criteria, several criteria determined by researchers so that articles that have been published can be used as data sources include :

1. The article is the result of a correlation or comparative study
2. Research is conducted by involving research subjects using both experimental animals and humans
3. Articles published in the 2018-2022 period
4. Articles are fulltext and open access
5. Articles are published in Indonesian and English

The author uses a systematic review method according to the PRISMA (Preferred Reporting Items for Systematic Review) stages which include identification, screening, inclusion and feasibility of the article findings which are then analyzed. Articles that meet the criteria will be reviewed to record the potential of celery as a non-medical therapy for hypertension sufferers. All information obtained will be analyzed and presented together with an explanation in narrative form. Conclusions were drawn by researchers after obtaining data related to the potential of celery as a non-medical therapy for hypertension sufferers.

## **RESULTS**

From the results of the literature review using the PRISMA stage to screen articles, it was found that 12 articles matched the research criteria and then an analysis of the results was carried out.



## DISCUSSION

In testing the compound formulations contained in celery, it must begin with true experiments conducted on experimental animals according to ethics in research. Research conducted Wahyuni et al (2022) in adult female Wistar rats with a body weight between 150 g and 200 g which were prepared as experimental animals, it was found that the oral administration of decoctions of herbal leaves (soursop leaves, starfruit leaves, bay leaves and celery leaves) at a dose of 200 mg/kg body weight rats for 14 days it was found that celery leaf decoction proved effective for lowering blood pressure in adult female Wistar rats (30% celery, 28% bay leaves, 25% soursop leaves and 21% starfruit leaves). The results of this study also prove that giving celery leaf decoction interventions can also be used to control blood pressure in humans who have hypertension.

Research conducted Mariyona (2020) involving two groups of respondents, it was found that there was a significant difference in

the intervention group between systolic blood pressure measurements before and after treatment (p value = 0.014) and diastolic pressure measurements before and after treatment (p value = 0.021), and there was a significant difference in the control group between systolic blood pressure before and after treatment (p value = 0.084) and diastolic pressure before and after treatment (p value = 0.555).

The results of this study concluded that giving celery leaf decoction twice a day @100cc for 5 days proved effective in reducing systolic blood pressure and diastolic blood pressure in hypertensive patients. This shows descriptively that there is a difference in the first measurement with the second. This is supported by the results of statistical tests showing that there is an effect of giving celery boiled water on reducing blood pressure. The results of this study are strengthened by research conducted by Simamora et al (2021) where from the results of a study conducted on 20 respondents with hypertension who were given an intervention to consume celery juice 2 times a day @100cc for 7 days proved effective in reducing systolic blood pressure and diastolic blood pressure in hypertension sufferers

Celery contains flavonoids, saponins, tannins, essential oils, flavo-glucosides (apiin), apigenin, phytosterols, choline, lipases, phthalides, asparagine, bitter substances, vitamins (A, B and C) and alkaloids. Antihypertension in celery comes from apigenin which is contained in celery. Apigenin itself is the main flavonoid in celery, this compound can lower blood pressure through blocking Ca<sup>2+</sup> channels (calcium antagonists). Apigenin also works actively to reduce blood vessel contraction and reduce extracellular fluid volume. Some of the potential possessed by celery include the following:

### 1. Antioxidant effect

Measurement of the biological activity of celery as an antioxidant was proven by the oxidation of liposomes using the fluorescence spectrophotometry method. The parts taken

were the leaves and roots using 5 types of extracting solutions namely ether, chloroform, ethyl acetate, n-butanol and water. All of these extracts have activity both as potential absorbers against OH radicals and DPPH and as liposomal peroxidation inhibitors, where n-butanol extract has the highest activity compared to other types of extracts (Sowbhagya, 2014). The antioxidant effect of celery is also shown by research conducted by Ud Din et al (2015) where using the FRAP method the methanol fraction of celery has antioxidant activity at a concentration equivalent to 12.48 mmolFe2SO4/Liter of extract. Meanwhile Li et al (2014) showed that the flavonoids extracted and purified from the ethanol extract of celery leaves had antioxidant activity both in vitro and in vivo in mice. The IC50 H value was 68 g/mL in the determination using DPPH, 0.39 mg/mL in O2 and 48 g/mL in OH. It was also reported in the study that apiin had excellent scavenging activity against free radicals MDA, LPF, and total antioxidant capacity (TOAC) and significantly increased the activity of SOD, GSH-PX and CAT.

## 2. Anti-inflammatory effect

It was reported that celery extract showed an anti-inflammatory effect in rats as evidenced by the suppression of carrageenan-induced leg edema in animals (Bokti & Saputri, 2018). Other researchers have also tested celery extract which shows its activity in overcoming and preventing gastrointestinal inflammation and irritation. Regarding the phytochemical content of celery which has anti-inflammatory properties. In this study, celery extract which is rich in flavones glycones and aglycones has anti-inflammatory activity by reducing TNF- $\alpha$  production and inhibiting NF-kB transcriptional activity (Hostetler et al., 2012). Powanda et al (2015) reported that the ethanol extract of celery seed (CSE: celery seed extract) showed superstitious activity against arthritis in a polyarthritis model which was as effective as the activity of aspirin, ibuprofen and naproxen. In addition, CSE can also provide a protective effect against or reduce gastric irritation caused by NSAIDs.

## 3. Anti-cancer effect

SBioactive compounds that are very important in the celery plant are ptalide compounds (phthalides) which provide various benefits such as protective effects against cancer, hypertension and cholesterol. Sedanolide is the most active ptalide in

reducing tumors in experimental animals. Sedanolide and 3-nbutyl phthalide isolated from celery seed oil showed high activity to induce the detoxification process of the glutathione S-transferase (GST) enzyme in the target tissues of female mice. After 3 days of treatment, tumor rates decreased from 68% to 30% and 11%. Reduced tumor multiplication rates of approximately 67% and 83% were observed for nbutyl phthalide and sedanolide indicating that both compounds are active in inhibiting tumors and GST and suggesting a correlation between their inhibitory activity and GST-inducing ability. These results reveal that ptalides are a class of bioactive compounds present in plants of the umbelliferae family that can be effective as chemo-preventive agents. Celery also contains a compound known as "coumarin" which can help prevent cell damage from free radicals, thereby reducing mutations that cause cancer cells. Coumarins also increase certain activity in white blood cells, as a defense of the immune system which has the potential to eliminate harmful cells including cancer cells. Coumarins can also lower blood pressure, balance the vascular system and may be effective in migraines. Celery extract containing 85% 3-n-butyl phthalid is also said to be effective in the treatment of rheumatism (a general term for arthritis and muscle aches and pains). Besides that, because celery contains acetylene compounds which function to stop the growth of tumor cells (Sowbhagya, 2014)

## 4. Anti-microbial and anti-fungal effects

Essential oil from celery has antifungal activity and is active against many bacteria including staphylococcus aureus, staphylococcus albus, Shigella dysenteriae, salmonella typhi, streptococcus faecalis, streptococcus pyogenes and pseudomonas solanacearum (Sowbhagya, 2014). In addition, celery seed extract (CSE) also has inhibitory activity against Helicobacter pylori bacteria, but is not active against Campylobacter jejuni or Escherichia coli bacteria (Powanda et al., 2015). CSE also showed antifungal activity through tests on phytopathogenic fungi, namely R. solani, F. oxysporium f. sp. vasinfectum and Alternaria alternata with inhibition values of 64.6%, 88.4% and 54.7% respectively (Liu et al., 2012)

## 5. Antiplatelet and antihyperlipidemic effects

Inhibition of blood platelet aggregation by celery has been studied by Tong (1985; Rusdiana, 2018). The compound responsible for this effect is apigenin (not the pthalid). The water extract of celery was found to lower total and LDL (low-density lipoprotein) cholesterol. Giving celery water extract for 8 weeks to the group of rats that were given a high protein diet, there was a significant reduction in serum cholesterol, LDL and triglyceride levels compared to the control rat group. In this study it was reported that celery water extract did not contain pthalides, there may be other substances that have not been discovered that have the effect of lowering cholesterol levels (Sowbhagya, 2014). Previously, Tsi et al also examined the antihyperlipidemic activity of this celery extract and concluded a significant decrease in total cholesterol, LDL and TG levels in rats induced by a high-fat diet for the occurrence of hyperlipidemia (Tsi et al; Rusdiana, 2018).

#### 6. Anti-hypertension

Tsi et al (1995) reported the antihypertensive effect of celery, where a compound contained in celery namely 3-n-butylphthalid provides a mechanism for reducing hypertension and vasorelaxants in rats. Intraperitoneal administration to rats for 13 days at doses of 2 and 4 mg/day produced an immediate hypotensive effect. The vasorelaxant effect of this pthalide can block the entry of calcium into its receptor channel thereby reducing systolic blood pressure in these rats (Sowbhagya, 2014). Besides that, other studies have shown that N-butyl pthalide contained in hexane extract of celery has the greatest reducing activity against high blood pressure. Celery extract has vasorelaxant and calcium antagonist activity so it has the potential to have antihypertensive activity (Powanda et al., 2015)

Based on the results of the explanation above, it can be concluded that celery leaves can be used as a non-medical therapy for people with hypertension. Hypertension sufferers can consume celery in fresh form or in dosage forms. One of the new breakthroughs developed to ensure that people with hypertension are able to consume celery leaves regularly is to consume celery tisane. Celery tisane is a herbal tea product developed by utilizing celery leaves as a basic ingredient. The way to consume celery tisane is to brew it

directly with warm water and without adding other sweeteners

## CONCLUSION

Celery leaves have been shown to have the potential to be developed and utilized as a non-medical therapy for hypertension sufferers. The chemical content of celery leaves has been proven to be effective in helping people with hypertension control their blood pressure. Diversification of celery leaves into celery tisane products is an effort to make it easier for people with hypertension to use celery leaves as a non-medical therapy in controlling their blood pressure.

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## DECLARATION OF CONFLICTING INTEREST

The author declares that there are no other interests or conflicts that may arise as a result of the publication of this research article.

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