

Blood Pressure Change After Celery Juice Ingestion in a Hypertensive Elderly Male



Jennifer D. Illes, DC, MS

ABSTRACT

Objective: The purpose of this study was to describe the response to the inclusion of celery juice in the diet of an elderly hypertensive patient with neck pain.

Clinical Features: A 74-year-old man presented with neck pain and a history of hypertension as diagnosed by his primary care provider. He had attempted different medications for his hypertension, but he reported that they gave him the side effect of chest discomfort. His initial physical examination blood pressure measurement was 150/80 mmHg.

Intervention and Outcome: Interventions included daily intake of celery juice over 6 months, which was approved by his medical doctor's nurse. For his neck pain, chiropractic grade mobilization to the restricted segments of the cervical spine was given over 14 in-office visits. There were no weight changes, addition of exercise, or other lifestyle changes reported. At the end of his care, his blood pressure measured 118/82 mmHg.

Conclusion: This elderly patient responded positively to the inclusion of celery juice and chiropractic care after 6 months. (J Chiropr Med 2021;20:90-94)

Key Indexing Terms: *Hypertension; Nutrition*

INTRODUCTION

Hypertension (HTN) is a risk factor for coronary heart disease.¹ This represents a large public health problem because coronary heart disease is the largest cause of mortality in North America.¹ Hypertension can be an asymptomatic condition that can damage blood vessels, heart, brain, and kidneys.² Ideally, wellness counseling, including weight loss and decreased dietary intake of sodium, should be considered.²

For adults 60 years and older, pharmacologic treatment should be initiated when the systolic pressure is 150 mm Hg or more or when the diastolic pressure is 90 mm Hg or more.³ Patients should be treated to a target systolic pressure of less than 150 mm Hg and a target diastolic pressure of less than 90 mm Hg.³

A combination of medications is commonly used when treating HTN.³ One of the most effective blood pressure drug combinations is an angiotensin-converting enzyme inhibitor paired with a calcium channel blocker.³ Even drugs that are effective at bringing down high blood pressure have uncomfortable, and sometimes dangerous, side effects.³ Common side effects of antihypertensive

medications include dizziness, tachycardia, feeling tired, and sexual dysfunction.⁴

A traditional weight loss regimen to reduce HTN has been one of the recommendations made by the American Heart Association.⁵ For example, the Dietary Approaches to Stop Hypertension eating plan study found that a diet rich in fruits, vegetables, milk products, whole grain foods, fish, poultry, and unsalted nuts reduced systolic and diastolic blood pressure by 5.5/3.0 mmHg compared with the regular American diet.⁵

Medical herbs play an instrumental part of traditional medicine due to their easy accessibility and low cost. These may be used in conjunction with other therapies for attenuation or treatment of HTN and other cardiovascular disorders.⁶ Herbs have reportedly been used for management of HTN include garlic, hawthorn, and cayenne pepper.⁷⁻¹⁰ Celery, also known as *Apium graveolens*, is a medical herb used as a food and in traditional medicine.¹¹ Celery contains essential oil and flavonoids and is an excellent source of vitamin K, molybdenum, folate, potassium, dietary fiber, manganese, and pantothenic acid.¹¹ Potassium within the diet has been shown to help control blood pressure levels, partially because it lessens the effects of sodium.¹² Potassium is an essential nutrient that is needed for the maintenance of total body fluid, acid and electrolyte balance, and normal cell function.¹³

Both 3-n-butylphthalide (NBP) and sedanolide have been shown to reduce blood pressure.¹⁴ They are included in the makeup of celery oil and are responsible for its taste and aroma.¹⁴ Animal studies, mainly examining rats, have demonstrated that NBP may be useful in the treatment of HTN.¹⁵⁻¹⁷ The celery seed extract has shown an

D'Youville College, Buffalo, New York.

Corresponding author: Jennifer D. Illes, DC, MS, 6743 Hannah Cove, West Palm Beach, FL.
(e-mail: jilles@keiseruniversity.edu).

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antihypertensive property that appears to be attributable to its active hydrophobic constituents effect.¹⁵ It has been hypothesized that the NBP acts as a vasodilator and diuretic agent affecting the creation of prostaglandins.¹⁸ NBP has been shown to lower blood cholesterol levels and decrease the genesis of arterial plaques within animal models.^{18,19} The antihyperlipidemic effect could represent a protective mechanism against the development of atherosclerosis.¹⁵

At present, there are no case reports about celery juice intake in the chiropractic literature. The present case describes the response to the intake of celery juice in a male with HTN.

CASE REPORT

A 74-year-old man presented to the chiropractic clinic with neck stiffness and achiness, which he had experienced for more than 2 decades. During a review of systems, he stated that he had a history of HTN as diagnosed by his primary care provider (PCP). He had attempted a trial of 3 different medications, but all caused chest discomfort and other aches throughout his body. He went to the emergency department twice while on blood pressure medication because he thought he was having a heart attack. After medical evaluation, he was told that the symptoms he was experiencing were uncommon as side effects of the medication. He decided he would no longer take blood pressure medication due to the side effects he experienced. His PCP had a full-time nurse who collaborated with the chiropractor about adding celery juice to the patient's diet. Approval from his PCP was given to seek out chiropractic care for his neck pain.

The patient was seeking care from a cardiologist due to the severe side effects from his blood pressure medication quarterly. Medical notes were received from his PCP that confirmed his elevated blood pressure. In addition, over a period of 3 different days his blood pressure was measured at the chiropractic clinic, and each time it met the diagnostic criteria for elevated high blood pressure (pre-HTN).

Conservative management for his neck discomfort consisted of chiropractic grade IV mobilization to the restricted segments of his cervical spine. A total of 14 treatment sessions were rendered in this patient's care. Initially, care was provided 2 times a week for 4 weeks and then once a month for 6 months.

The elderly male patient consumed a consistent diet, eating the same meals almost daily. In particular, when questioned whether he had added any additional fruits or vegetables to his diet, he answered that he had not. He stated that the only dietary change he had made was the juicing of 1 bunch of celery. He bought his bunches from the same grocery store and stated that he juiced the entire bunch and that most bunches contained 10 to 12 stalks of celery. He used a regular common-brand juicer to juice his

celery, which was consumed in the morning upon waking, typically between 6 and 6:30 AM. The patient documented that he juiced daily on a dietary checklist and brought the checklist in with him to every appointment. Over a period of 6 months, he stated that he had not missed 1 day of juicing. It is important to note that the patient stated that he made no additional healthy lifestyle changes or behaviors. His body mass index was 25 throughout the 6 months. He did not include more vegetables in his diet and stated that he ate the same variety and types of food at the same frequency. His water consumption also remained unchanged. He followed a strict financial budget, and celery was the only thing he wanted to try. Other preventative strategies to reduce HTN, such as exercise, were recommended, but the patient said he was "too old" and did not want to change his current routine.

During office visits, his blood pressure was measured in both arms, and the average was taken. Two different people performed the measurements on the same visit.

There was a decrease in the systolic blood pressure of approximately 10 mm Hg within the first month. Over the course of 6 months the systolic pressure decreased by approximately 32 mm Hg (Fig 1). The patient gave consent to have his personal health information published in this study.

DISCUSSION

There is minimal research about the amount of celery, whether it be the oil, the vegetable raw, or the juice, with respect for human consumption. In rat models, celery seed extracts of 300 mg/kg of body weight reduced blood pressure in hypertensive-induced rats.¹⁹ In other animal models, it has been demonstrated that apigenin, a flavone isolate of celery, blocks aortic contractions caused by cumulative calcium increases. This animal model could be hypothesized to translate to the human model to decrease vascular resistance.¹⁴ In addition, it is plausible to theorize that HTN may be reduced with celery juice due to its ability to reduce oxidative stress.²⁰ A human study demonstrated the effectiveness of decreasing HTN with the consumption of 75 mg doses of celery seed extract (85% NBP) 2 times a day for 6 weeks.¹⁹ The authors of the latter study suggested that 150 mg of celery seed extract is equivalent to approximately 530 stalks of celery.¹⁹ Using that equation, the patient in the present case report therefore was consuming only approximately 3.4 mg of celery seed oil. This equates to less than 5% of the amount of NBP that the literature has shown can help reduce blood pressure. To suggest that this patient's reduction was simply due to celery juice's NBP effects would be overextrapolating the outcomes.

The safety of this nutritional intervention for the patient always should be considered. It is unclear whether there is any toxicity in the administration of a variety of doses of

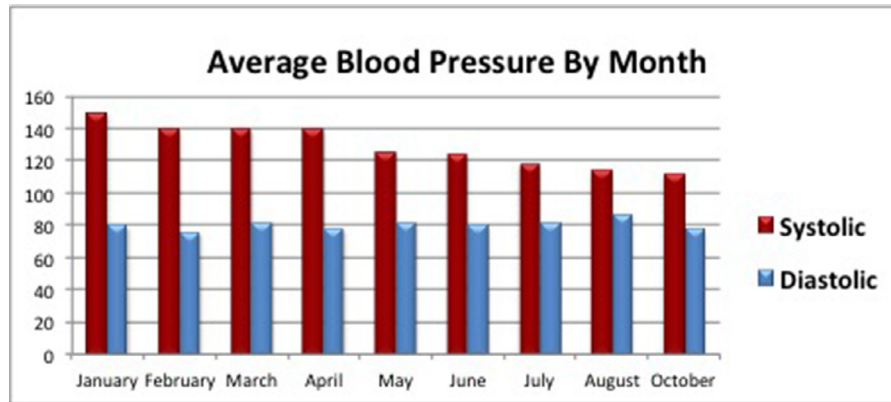


Fig 1. Blood pressure measurements (in mm Hg) over 6 months.

celery seeds.²¹ The author of this case report believed that 1 glass of celery juice seemed reasonable. It is important to note that NBP has been reported to have a diuretic effect in rat models.²² The diuretic effect could be one of the possible antihypertensive mechanisms. However, more studies are needed to clarify the mechanisms of this effect. That being stated, patients who have a difficult time with fluid retention, for example, those with congestive heart failure, should be careful with consuming celery juice.

It is not possible to determine whether celery juice reduced the blood pressure measurements of the patient described herein. It is known that potassium supplementation can lower blood pressure. The research by Cappuccio and MacGregor²³ demonstrated that oral potassium supplements significantly lower systolic blood pressure (mean -5.9 mm Hg [95% confidence interval -6.6 to -5.2 mm Hg]) and diastolic blood pressure (mean -3.4 mm Hg [95% confidence interval -4.0 to 2.8 mm Hg]). Moreover, Aburto et al.²⁴ showed that a higher potassium intake was associated with a 24% lower risk of stroke. The American Heart Association recommends that the daily intake of potassium for an average adult is about 4700 mg per day.⁵ In the present case report, the patient described herein consumed about 12 stalks of celery, which is approximately 2000 mg of potassium.¹¹

Over a period of 3 months the patient's blood pressure stayed steady around 140/80 mmHg, and then decreased. An excessive amount of snow and poor driving conditions that the patient experienced during those 3 months of unchanged blood pressure measurements could have contributed to his blood pressure remaining on the higher end by creating stress related to environmental factors.

Although this case report reflects the use of celery, it is also possible that chiropractic care and/or the combination of chiropractic care and inclusion of celery potentially could have contributed to the reduction of blood pressure. It has been documented that the biomechanical changes that follow spinal manipulation could modulate

paravertebral sensory neuron signals to potentially dampen muscle tone.²⁵ Several hemodynamic parameters (including blood pressure) have been studied with regard to cervical and thoracic spine manipulation.²⁶⁻²⁸ However, the relationship between spinal manipulation and HTN has not been clinically concluded and is poorly understood.^{29,30} In addition, a treatment effect from manipulation likely would have been noticed within 3 to 4 weeks.³¹

Study Limitations

Because a conservative chiropractic multimodal approach was taken, the individual efficacy of each component is limited. This was a single case study, thus conclusions can only be drawn in respect to this particular case. The long-lasting effects of the treatments are unknown. Subjective reporting is also a limitation; the author must believe that the patient was juicing daily and consuming his celery juice as often as he claimed.

Criticisms about office-based blood pressure measurement include observer variability and training, terminal digit bias, and white-coat HTN. There may have been errors in taking the blood pressure in the clinical setting.

The "Seventh Report of the Joint National Committee on Prevention, Detection, Evaluation and Treatment of High Blood Pressure" has outlined the recommended blood pressure measurement method in the clinic setting.³² This includes the use of an auscultatory method using a properly calibrated device on patients who have been seated still for at least 5 minutes with feet on the ground and arm supported at heart level. At least 2 separate blood pressure measurements should be made.³²

Emotional stress may cause a change in blood pressure. As explained in the Discussion section, there may have been an increase or decrease blood pressure due to environmental stressors during a specific time of the year (ie, in this case, commuting and dealing with snow). However, the author notes that it would be difficult to control for this particular stressor.

CONCLUSIONS

In the present case report, the patient responded favorably through the daily ingestion of celery juice over a period of 6 months during chiropractic care.

FUNDING SOURCES AND CONFLICTS OF INTEREST

No funding sources or conflicts of interest were reported for this study.

CONTRIBUTORSHIP INFORMATION

Concept development (provided idea for the research): J.I.
Design (planned the methods to generate the results): J.I.
Supervision (provided oversight, responsible for organization and implementation, writing of the manuscript): J.I.
Data collection/processing (responsible for experiments, patient management, organization, or reporting data): J.I.
Analysis/interpretation (responsible for statistical analysis, evaluation, and presentation of the results): J.I.
Literature search (performed the literature search): J.I.
Writing (responsible for writing a substantive part of the manuscript): J.I.
Critical review (revised manuscript for intellectual content, this does not relate to spelling and grammar checking): J.I.

Practical Applications

- The patient in this case responded to dietary modifications.
- The patient also received chiropractic care for his neck pain.
- After 6 months of care, his blood pressure was reduced.

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