

# WIDE WORLD OF Watermelon



## A FLAVORFUL WAY TO HELP MEET NUTRIENT NEEDS

Watermelon is an all-year-round, naturally nutritious pick. Each slice, ball or bite delivers vitamins, minerals, fiber and phytonutrients.

Watermelon contains essential vitamins, minerals and antioxidants. It also contains the amino acids citrulline and arginine, polyphenols and carotenoids—particularly lycopene. According to a comprehensive review of the scientific literature<sup>1</sup> published in the journal *Current Atherosclerosis Reports*, citrulline and arginine act as a precursor to nitric oxide, a molecule that plays a role in blood pressure regulation, lipid reduction and glucose control. These benefits, coupled with the bioactivity of polyphenols and carotenoids found in watermelon, suggests that this fruit may support normal cardio-metabolic health.

### WATERMELON'S PREDOMINANT NUTRITION ATTRIBUTES<sup>2</sup>

NUTRITION ATTRIBUTE	AMOUNT IN FRESH WATERMELON (280 G)	FUNCTION
<b>Vitamin C</b>	<b>23 mg</b> (25% Daily Value)	Vitamin C is an antioxidant with numerous functions in the human body, including supporting healthy cognitive and neurologic function, collagen formation, and wound healing. In addition, it plays an important role in immune function, keeping gums and teeth healthy and increasing the absorption of non-heme iron.
<b>Vitamin A</b>	<b>78 mcg</b> (8% Daily Value)	Vitamin A is a fat-soluble vitamin that plays a role in immunity and regulates cell growth and division. It also helps to support normal vision and maintain healthy skin, teeth and bones.
<b>Vitamin B6</b>	<b>0.126 mg</b> (8% Daily Value)	Vitamin B6 is involved in immune function, plays an important role in cognitive development, helps the body maintain normal blood sugar levels, helps the body make hemoglobin and helps maintain normal nerve function.
<b>Lycopene</b>	<b>12,700 mcg</b>	Lycopene possesses potent anticancer, antioxidant, anti-inflammatory, and antidiabetic potential. In addition, numerous studies show it is a nutraceutical which protects against a wide variety of heart, liver, bone, skin, nervous, and reproductive systems diseases. However, further investigations are necessary to unveil the underlying mechanisms of actions, as well as the effective dosage. Safety concerns about its genotoxicity, maternal toxicity, and teratogenic effects should also be explored.
<b>Potassium</b>	<b>314 mg</b> (6% Daily Value)	Potassium is a mineral and type of electrolyte that helps nerves to function and muscles to contract -- including helping the heartbeat stay regular. It also helps move nutrients into cells and waste products out of cells. A diet rich in potassium helps to offset some of sodium's harmful effects on blood pressure <sup>3</sup> .
<b>Citrulline</b>	<b>1.9 mg/g</b>	Citrulline, a non-essential amino acid, increases nitric oxide production, which may maintain blood flow. Watermelon rind actually contains more citrulline (165 mg/100 g fresh weight) than the flesh alone (146 mg/100 g) <sup>4</sup> .
<b>Water</b>	<b>N/A</b>	Maintains hydration status.

# DIET QUALITY IMPROVES WITH WATERMELON CONSUMPTION

A recent study funded by the National Watermelon Promotion Board and published in *Nutrients* suggests that watermelon can increase nutrient intake and overall diet quality in both children and adults<sup>5</sup>.

The study analyzed National Health and Nutrition Examination Survey (NHANES) data and found that total diet quality was higher in watermelon consumers as compared to non-consumers. According to the study, children and adult watermelon consumers had higher intakes of dietary fiber, magnesium, potassium, vitamin C and vitamin A as well as lycopene and other carotenoids, while they had lower intakes of added sugars and total saturated fatty acids.



## CARDIOVASCULAR BENEFITS OF WATERMELON



Watermelon's content of citrulline, arginine (0.165 g) and phenolic compounds suggests a possible role in cardiovascular health.

Studies have shown that watermelon consumption may play a role in maintaining blood pressure in certain individuals with pre-hypertension, obesity and obesity with hypertension<sup>6,7,8</sup> (see below). Continued research is needed to determine the level of sufficient intake for clinical outcomes and will also need to be studied in a variety of populations. Research on the whole fruit and its products (i.e., juice) is also needed to help determine the level of sufficient intake.

**A randomized, double-blind, two-period, crossover study<sup>6</sup> published in the American Journal of Hypertension investigated the effects of watermelon supplementation on aortic blood pressure (BP), wave reflection, and carotid-femoral pulse wave velocity (PWV).**

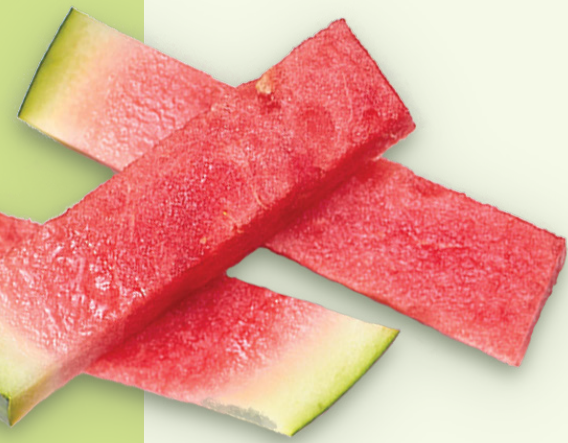
- Nine middle-aged prehypertensive men and women were randomly assigned to either a watermelon supplement powder (L-citrulline/ L-arginine: 2.7g/0.65g) two times per day for six weeks or a placebo supplement (sucrose, glucose, and fructose at 2:2:1).
- Following a four-week washout, participants repeated the six-week dietary intervention with the opposite supplement.
- Anthropometric heart rate, PWV and pulse wave analysis were conducted at baseline and throughout each six-week intervention.
- Results show that supplementation containing natural L-citrulline and L-arginine reduced brachial pulse pressure, aortic systolic BP, aortic pulse pressure and aortic wave reflection in middle-aged individuals with prehypertension.
  - o Potential limitations of this study include a small sample size and the lack of measurements of circulating L-arginine and endothelial function. Further studies are warranted to confirm these findings in a larger population.



## CARDIOVASCULAR BENEFITS OF WATERMELON



**A double-blind, crossover design study<sup>7</sup>, published in the American Journal of Hypertension, evaluated the effects of watermelon supplementation on the cold-induced alterations in aortic hemodynamics in obese hypertensive adults.**



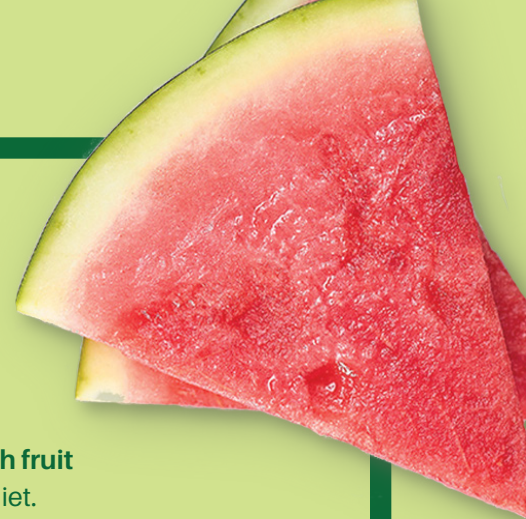
- Thirteen middle-aged obese, hypertensive, and sedentary men and women were randomly assigned to either watermelon supplementation (4 g L-citrulline and 2 g L-arginine/day divided into 3 doses) or placebo supplement (maltodextrin with sucrose, glucose, and fructose [2:2:1]) in a 1:1 ratio for 6 weeks.
- Following a two-week washout, participants repeated the six-week dietary intervention with the opposite supplement.
- The 'cold pressure test' was done by introducing the participant's right hand up to the wrist in ice-cold water (4 °C) for two minutes.
- Cardiovascular and anthropometric data were collected during both interventions.
- Findings show watermelon supplementation significantly decreased brachial systolic blood pressure (SBP), brachial diastolic blood pressure (DBP), brachial partial pressure (PP), aortic systolic blood pressure, aortic diastolic blood pressure, forward wave (P1) and reflective wave (P2) compared with no changes after placebo.
- During the cold pressure test, watermelon supplementation significantly decreased brachial SBP, brachial PP, aortic SBP; aortic PP, P1, P2; aortic augmentation pressure; and systolic time index compared with placebo.
  - o Potential limitations of this study include a small sample size, primarily women subjects, and an uncontrolled diet. Further studies are warranted to generalize the findings.

**A randomized, two-period, crossover design study<sup>8</sup>, published in the American Journal of Hypertension, investigated the relationship of watermelon extract on reductions in carotid augmentation index (cAIx) and ankle blood pressure (BP) in obese adults with normal ankle brachial index (ABI) and high brachial BP.**

- Fourteen obese and middle-aged men and women were randomly assigned to watermelon supplementation (6g of L-citrulline/L-arginine (2/1) per day) or placebo supplement (sucrose, glucose, and fructose [2:2:1]) for six weeks.
- Following a two-week washout, participants repeated the six-week dietary intervention with the opposite supplement.
- Cardiovascular and anthropometric data were collected during both interventions.
- Findings show significant decreases in ankle systolic blood pressure (SBP), diastolic BP (DBP) and mean arterial pressure (MAP) brachial SBP, DBP and MAP; and cAIx after watermelon supplementation compared to placebo.
  - o Potential limitations of this study include a relatively small simple size, a mildly elevated BP, and a population composed predominantly of obese postmenopausal women. Further studies are warranted to generalize the findings.

# WATERMELON IS THE LYCOPENE LEADER

Watermelon contains higher levels of lycopene than any other fresh fruit or vegetable (12,700 mcg per 2-cup serving) and is part of a healthy diet. Lycopene has been studied for its role in heart and blood vessel disease. There is a large and growing body of research into the mechanistic and dose-relational effects of lycopene consumption on potential human health benefits<sup>9</sup>.



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