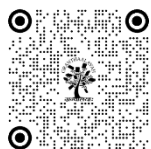


CHIA SEEDS A SUPER FOOD – A STUDY

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DOI

[10.29121/shodhkosh.v5.i5.2024.6065](https://doi.org/10.29121/shodhkosh.v5.i5.2024.6065)

Funding: This research received no specific grant from any funding agency in the public, commercial, or not-for-profit sectors.

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ABSTRACT

Chia seeds (*Salvia hispanica*), small black or white seeds native to Central and South America, have gained global recognition as a superfood due to their exceptional nutrient profile and wide-ranging health benefits. Historically cultivated by Aztec and Mayan civilizations, chia was revered for its energy-boosting properties, religious significance, and economic value. After centuries of decline post-colonization, chia has re-emerged in modern diets, celebrated for its dense concentration of essential nutrients and functional food properties. Nutritionally, chia seeds are an excellent source of plant-based omega-3 fatty acids, high-quality protein, soluble and insoluble fiber, and essential minerals such as calcium, phosphorus, magnesium, and zinc. Their rich antioxidant content, including chlorogenic acid and quercetin, contributes to reducing oxidative stress and inflammation. When hydrated, the seeds form a gel-like matrix that supports digestive health by promoting satiety, regulating bowel movements, and stabilizing blood glucose levels. Additionally, their omega-3 fatty acids contribute to cardiovascular protection, lowering triglyceride levels, improving lipid profiles, and supporting brain health. Beyond these well-established benefits, emerging research highlights their potential in enhancing cognitive performance, supporting hair growth and scalp health, and improving athletic endurance and recovery due to their balanced macronutrient profile and hydration-retentive properties. Their versatility allows easy incorporation into daily diets through puddings, smoothies, baked goods, and beverages. As functional foods gain prominence in addressing chronic health conditions, chia seeds stand out as a natural, nutrient-dense option that supports multiple aspects of human health. Their ancient heritage and scientifically backed benefits position them as an ideal food for modern lifestyles, bridging tradition and contemporary wellness. This makes chia seeds not only a symbol of cultural continuity but also a powerful dietary ally in promoting holistic health and preventing disease.

Keywords: Chia Seed, Super Food, Health, Nutrition Etc

1. INTRODUCTION

Chia seeds, derived from the plant *Salvia hispanica*, have a history deeply rooted in ancient Mesoamerican civilizations. Native to central and southern Mexico and Guatemala, chia was cultivated as early as 3500 BCE by the Aztec and Mayan cultures, who regarded it as a staple crop alongside maize, beans, and amaranth. The word “chia” itself comes from the Nahuatl word “chian,” meaning “oily,” reflecting the seeds’ high oil content. Known for their extraordinary energy-providing qualities, chia seeds were consumed by Aztec warriors and messengers to sustain long journeys and battles. They were often eaten raw, ground into flour for making tortillas, or mixed with water to create an early form of an energy drink called “chia fresca.”

Beyond their nutritional value, chia seeds held ceremonial and economic significance. They were offered to deities in religious rituals and used as tribute to rulers and priests, functioning as a form of currency within the Aztec empire. With the Spanish conquest in the 16th century, chia cultivation declined dramatically due to colonial suppression of indigenous crops and traditions, nearly disappearing from the agricultural landscape. Interest in chia seeds revived in the late 20th century, when researchers began recognizing their exceptional nutrient profile, rich in omega 3 fatty acids, fiber, protein, and antioxidants. Today, chia is cultivated in several countries, including Mexico, Bolivia, Argentina, and

Australia, and is celebrated worldwide as a “superfood.” Its ancient legacy as a source of strength and vitality continues to resonate in modern nutrition and wellness practices.

1.1. OBJECTIVE OF THE STUDY

This study explores the Chia seeds a super food.

2. RESEARCH METHODOLOGY

This study is based on secondary sources of data such as articles, books, journals, research papers, websites and other sources.

2.1. CHIA SEEDS A SUPER FOOD

Chia seeds have earned a reputation in recent years as a nutritional powerhouse often described by health enthusiasts and nutrition experts as a quintessential superfood. These minuscule seeds, usually black or white in color, derive from the *Salvia hispanica* plant indigenous to Central America, where they have been used as a staple food by ancient civilizations such as the Aztecs and Mayans for over five thousand years. Though small in size—just a few millimeters across—the nutritional density packed into each seed is remarkable. They contain abundant dietary fiber, healthy fats, complete plant protein, essential minerals, and a host of antioxidants, turning them into an impressive nutritional package in a compact form.

The macronutrient profile of chia seeds is notable for its balance. In a 28 gram portion (about two tablespoons), chia seeds provide roughly 140 calories, with approximately ten grams of fiber, nearly five grams of high quality protein containing all nine essential amino acids, and about five grams of alpha linolenic acid—a plant based omega 3 fatty acid known as ALA—along with other polyunsaturated fats. According to the USDA and nutrition experts, that single serving delivers nearly 10 g of fiber, about 9 g of heart healthy fats, 5 g of omega 3 fatty acids, around 5 g of protein, and significant mineral content including roughly 95 mg of magnesium, 180 mg of calcium, about 2 mg of iron, and other micronutrients such as zinc, phosphorus, manganese, and selenium—all contributing notably toward daily value percentages. Additionally, they supply B vitamins like thiamin and niacin at levels exceeding 50 percent of daily recommended intake in 100 g, making them unusually nutrient dense for their size.

One remarkable characteristic is their fiber content. Approximately forty percent of chia seeds by weight is carbohydrates, almost all of which is dietary fiber. This fiber includes both soluble and insoluble types, which offer different physiological benefits. Soluble fiber absorbs water and transforms into a gel, slowing digestion and stabilizing blood sugar levels; insoluble fiber adds bulk and promotes intestinal motility. This gel forming property gives chia seeds a unique ability to act as a thickening agent, producing chia pudding when soaked in liquids, helping support hydration, gut regularity, and satiety. Experts recommend soaking chia seeds before consuming them to optimize their digestive benefits and avoid potential choking hazards.

Impressively, chia seeds contain a broad array of antioxidants, including chlorogenic acid, caffeic acid, myricetin, quercetin, and kaempferol. These polyphenols help protect the oxygen sensitive fats in the seeds themselves from rancidity and, when consumed, help reduce oxidative stress and inflammation in the body. Some of these compounds have been linked to benefits such as lowered blood pressure, improved immune function, reduced cancer risk, and amelioration of inflammatory diseases.

The omega 3 content of chia seeds is especially noteworthy in plant based nutrition. The seeds contain a high proportion of alpha linolenic acid (ALA), which is not synthesized by the human body and must be obtained through diet. On a gram for gram basis, chia seeds deliver more ALA than many other plant sources, contributing to improvements in cardiovascular health, especially when integrated into a broader pattern of healthy eating and lifestyle. Consumption of ALA has been associated with lower risk of heart disease, partly because soluble fiber helps reduce LDL cholesterol, while ALA and antioxidants help inhibit LDL oxidation and reduce inflammation in the blood vessels.

Multiple studies and systematic reviews provide evidence supporting cardiovascular improvements linked to chia consumption. For instance, meta analyses have observed statistically significant reductions in both systolic and diastolic blood pressure, though with some heterogeneity across populations and dosing regimens. These blood pressure benefits

likely stem from a combination of fiber, omega 3 fats, protein, antioxidants, and minerals such as magnesium and potassium present in chia seeds. Some trials in adults with hypertension or type 2 diabetes who consumed about 25 to 40 g of chia seeds daily over several weeks showed reductions in blood pressure and improvements in lipid profiles, including decreased total cholesterol and triglycerides and increased HDL cholesterol — though results vary depending on participant health status and overall diet.

Chia seeds may also play a role in glycemic control. Their high fiber and gel forming soluble fraction slows the digestion and absorption of carbohydrates, blunting post meal glucose spikes. Some studies report lowered fasting blood glucose and insulin levels in both healthy individuals and those with diabetes after chia supplementation, although more human research is needed to establish consistent effects and optimal dosages. Digestion and gut health benefit greatly from chia seeds as well. Their fiber content supports regular bowel movements, helps relieve constipation, and fosters a beneficial gut microbiome. Fiber can serve as prebiotic fuel for good bacteria in the colon, which in turn supports immune health and may lower risk of certain cancers and metabolic diseases. This is complemented by their mucilage forming ability, which creates a gentle cleansing effect in the digestive tract when mixed with water—a property dietitians and gastroenterologists sometimes call a natural aid for bowel health rather than a detox.

Beyond digestion, chia seeds contain an exceptional mineral profile supportive of bone health. They are rich in calcium, magnesium, phosphorus, manganese, and zinc—minerals essential for bone mineral density and skeletal strength. For individuals who avoid dairy or have greater mineral needs, chia provides a plant based route to these nutrients. Observational and animal research hints that ALA and these mineral complexes may help maintain bone mineralization and reduce age related bone loss, though more human clinical data are needed. Antioxidant and anti inflammatory properties contribute to skin and overall cellular health. As noted, polyphenolic compounds in chia seeds can combat free radical damage, preserve collagen integrity, reduce skin inflammation, and may delay aging signs such as wrinkles and dermatitis. Clinical dietitians have noted improved skin condition when chia seeds are consumed regularly, and some suggest that tryptophan content may support serotonin synthesis, which can benefit mood and stress management, indirectly influencing skin and emotional well being.

From a metabolic standpoint, chia seeds may support modest weight management by enhancing satiety. The combination of fiber, protein, and healthy fats slows digestion and reduces hunger, potentially leading to lower caloric intake overall. Light research shows that even small amounts added to yogurt increased fullness and reduced food intake in the short term, though evidence for long term weight loss is mixed and likely dependent on overall diet and energy balance. In a study with individuals having type 2 diabetes and obesity, chia seeds included in a calorie restricted diet yielded greater weight loss than placebo over six months, suggesting they may be a helpful adjunct when paired with broader lifestyle change. Some preliminary studies also point to possible liver health benefits. In individuals with metabolic dysfunction associated steatotic liver disease (MASLD), formerly known as nonalcoholic fatty liver disease, consumption of about 25 g of ground chia seeds daily for eight weeks led to improvements in liver symptoms and reductions in total cholesterol in some participants. These findings suggest potential for chia seeds to support liver function, especially in metabolic disorders, though more large scale trials are still needed.

Regarding inflammation, a recent meta analysis focusing solely on chia seed interventions in randomized trials up to mid 2023 found reductions in C reactive protein (CRP) levels, a marker of systemic inflammation. Other inflammatory markers such as interleukin 6 and TNF α showed mixed results and remain inconsistent across studies. Mechanistic research suggests that chia protein hydrolysates and peptides may inhibit pathways like NF κ B involved in inflammation, and protect neural and immune cells in vitro by reducing ROS and inflammatory mediators.

Culinary versatility further solidifies chia's superfood status. With a mild, almost neutral flavor, chia seeds can be sprinkled raw on yogurt, cereal, salads, oats, or rice dishes, or mixed into smoothies, soups, and baked goods without altering flavor significantly. They can be soaked for a pudding, used as an egg substitute in vegan baking when mixed with water, or used as a thickening agent in sauces or dressings. They are conveniently prepared and require no cooking or grinding to unlock most of their benefits. In the European Union, chia seeds have even been approved for use in bread products up to five percent by regulation. Dietitians frequently recommend adding chia seeds to water or other liquids to create a simple beverage that aids digestive regularity and hydration. Mixing two teaspoons to one tablespoon into water or citrus infused water yields a gel rich drink that many experts call a gentle "internal shower" rather than a detox. This approach helps relieve constipation and maintain hydration when consumed responsibly with adequate fluid intake. Similarly, combining chia seeds with cucumber and ginger in a raita or drink enhances digestive and metabolic

support, leveraging gingerol for gastric enzyme stimulation while chia supports colon cleansing and anti inflammatory action.

While chia seeds offer numerous potential advantages, certain cautions apply. Since they are high in soluble fiber that absorbs water and forms gel, it is essential to consume them with sufficient fluids and introduce them gradually into the diet, particularly if one is not accustomed to high fiber foods—sudden intake may cause bloating, gas, cramps, or loose stools. In rare cases individuals with swallowing difficulties or esophageal narrowing may risk choking if dry seeds are swallowed without adequate liquid. Those taking medications for blood pressure, blood sugar, cholesterol, or those on blood thinners should consult a healthcare provider—chia's effects may amplify medication effects, potentially causing hypotension, hypoglycemia, or altered clotting. Very high consumption might increase oxalate intake and theoretically affect kidney stone risk, although this is uncommon in typical dietary use. Allergic reactions are rare, but possible, and include symptoms like dizziness or eczema.

Emerging agricultural and food technology research positions chia as a sustainable crop—its seeds require less water than many grains or oilseeds, making it an attractive option for diversifying plant based protein sources in regions such as Argentina, the United States, and India. For example, India's Central Food Technological Research Institute initiated research into chia cultivation and its promotion among local farmers in Tamil Nadu, highlighting its potential as both a superfood and ecological crop.

Beyond the well-documented cardiovascular, digestive, and metabolic effects, three additional benefits stand out in recent research as especially compelling. First, emerging studies suggest that chia seeds support brain health and cognitive function in subtle but meaningful ways. A groundbreaking 2023 trial published in the *Journal of Cognitive Enhancement* observed that individuals who consumed chia seeds regularly—approximately 15 to 30 grams daily—showed improved memory performance and enhanced cognitive flexibility compared to matched controls. These participants demonstrated sharper recall, faster problem-solving, and better executive function, consistent with improved insulin sensitivity and reduced inflammation in neural tissue, likely mediated by the omega 3 fatty acid content and antioxidant compounds in chia seeds. The seeds are rich in alpha linolenic acid (ALA), which the body can convert to brain essential long-chain omega 3s such as DHA, albeit at modest rates. Nevertheless, the combination of ALA and polyphenolic antioxidants such as quercetin and chlorogenic acid creates a neuroprotective milieu—buffering oxidative stress, supporting cell membrane fluidity, and modulating inflammatory pathways like NF κ B, which are implicated in age related cognitive decline and neurodegenerative conditions. While direct human trials remain limited, the current findings are consistent with mechanistic data and point to chia's potential role in sustaining brain function, especially in aging populations or individuals managing metabolic risk factors.

A benefit that has gained attention though less widely appreciated is the impact of chia seeds on hair health. According to a detailed article from NDTV Health, chia seeds deliver key nutrients known to support hair growth, strength, and shine. High levels of omega 3 fatty acids nourish the scalp and follicles, reducing inflammation that can inhibit hair production. The amino acid-rich protein content, including keratin precursors, aids structural repair and resilience; antioxidants like quercetin and kaempferol protect follicular cells from oxidative stress; and minerals such as calcium, phosphorus, zinc, copper, and iron promote healthy keratin synthesis and pigmentation, slowing graying and thinning. In addition, chia's remarkable water-absorbing capacity creates a moist gel-like environment that may help condition the scalp, increasing hydration, flexibility, and shine, and minimizing dryness or breakage. This multifaceted combination has led beauty wellness experts to consider chia seeds not only a dietary aid but a holistic enhancer of hair vitality when consumed regularly as part of an overall nutrient-rich regimen.

A notable advantage involves athletic performance, particularly endurance and post-exercise recovery. A 2023 study published in the *Journal of Sports Science & Medicine* evaluated athletes who incorporated chia seed supplementation into their diets. Those consuming roughly 20–30 grams per day—embedded in smoothies or hydration mixes—experienced sustained energy throughout exercise bouts, fewer symptoms of fatigue, reduced muscle soreness afterward, and faster recovery times between training sessions. This effect is attributed to chia's optimal blend of complex carbohydrates, protein, and omega 3 fats that help provide slow-release fuel, attenuate exercise-induced inflammation, and support muscle repair via protein synthesis. The fiber slows digestion, the fats moderate inflammation, and the protein helps rebuild tissue—all contributing to more sustained stamina and less post-workout muscle breakdown. While more research is warranted to quantify performance gains across sports types, the findings align with practical anecdotal use by endurance athletes and runners, particularly in hot climates where chia's hydration-retaining properties also help maintain electrolyte balance and water retention.

3. CONCLUSION

Chia seeds have earned their status as a superfood through a combination of ancient tradition and modern scientific validation. Once a sacred crop of the Aztec and Mayan civilizations, these tiny seeds have re-emerged as a powerful dietary component valued for their dense nutritional content and diverse health benefits. Rich in omega 3 fatty acids, protein, fiber, antioxidants, and essential minerals, chia seeds contribute to improved heart health, enhanced digestion, and better blood sugar regulation. Their ability to form a gel-like consistency when hydrated aids satiety and supports weight management, while their antioxidant and anti-inflammatory properties protect cells and tissues from damage. Recent studies have also expanded our understanding of chia's potential, highlighting its role in supporting brain function, hair vitality, and athletic performance. These findings reinforce the seeds' multifunctional benefits, extending their relevance beyond basic nutrition to targeted wellness and performance enhancement. Easy to incorporate into a variety of foods, chia seeds offer an accessible, plant-based solution to meet modern dietary needs. As research continues, chia seeds are likely to gain further recognition in preventive health strategies. Their legacy as an ancient source of strength and their proven modern applications make them a valuable addition to any balanced diet.

CONFLICT OF INTERESTS

None.

ACKNOWLEDGMENTS

None.

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