

Chia (*Salvia hispanica* L.) as a Super Food

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Introduction

Food is any substance consumed to provide nutritional uphold for an organism in order to maintain life and growth. The term "Super food" refers to the highly nutritional density food having maximum health benefits and packed with vitamins, minerals, and antioxidants. Chia (*Salvia hispanica* L.) is a biannually cultivated herbaceous plant that belongs to the order Lamiales, family Lamiaceae, subfamily Nepetoideae, and genus *Salvia* (Arctos Specimen Database, 2018). The *Salvia* genus is considered the most abundant in Lamiaceae family which consists of approximately 900 species widely distributed throughout several regions of the world, including Southern Africa, Central America, North America, South America, and South-East Asia (Takano, 2017). The chia plant is about 1 m tall and has simple leaves of 4 to 8 cm long and 3 to 5 cm wide, oval-elliptical shape, pubescent, and with acute apex which grows naturally in tropical and subtropical environments.



Nutritional composition:

The seed contains 25–40 % oil with 60% of it comprising omega-3 alpha linolenic acid and 20% of omega-6 linoleic acid. Both essential fatty acids are required by the human body for good health , and they cannot be artificially synthesized . Beside this , chia seed is

composed of protein (15–25%), fats (30–33%), carbohydrates (26–41%), high dietary fibre (18–30%), ash (4–5%), minerals, vitamins, and dry matter (90–93%). It also contains a high amount of antioxidants (Mohd Ali *et al.*, 2012). Moreover, chia seed contains many minerals, with phosphorus (860–919 mg/100 g), calcium (456–631 mg/100 g), potassium (407–726 mg/100g) and magnesium (335–449 mg/100 g). Many studies also confirmed the presence of some vitamins, mainly vitamin B1 (0.6 mg/100 g), vitamin B2 (0.2 mg/100 g) and niacin (8.8 mg/100 g) (Kulczyński *et al.*, 2019). Chia seeds are also a rich source of polyphenols such as gallic, caffeic, chlorogenic, cinnamic and ferulic acids, quercetin, kaempferol, epicatechin, rutin, apigenin and p-coumaric acid. Isoflavones such as daidzein, glycitein, genistein and genistin are also found in small amounts. Ciftci *et al.* (2012) reported the presence of campesterol (472 mg/kg of lipids), stigmasterol (1248 mg/kg of lipids), β -sitosterol (2057 mg/kg of lipids) and Δ^5 -avenasterol. Moreover, it was found that chia seeds also contain tocopherols such as α -tocopherol (8 mg/kg of lipids), γ -tocopherol (422 mg/kg of lipids) and δ -tocopherol (15 mg/kg of lipids).

Importance of Chia seeds in food industry:

The incorporation of chia seed in foods enhances their nutritional properties e.g. (i) chia seeds in bakery products increase their concentrations of proteins, unsaturated fatty acid, anti-oxidants, and dietary fibres, (ii) the gum present in chia seed has water and oil holding capacity as well as having emulsifier and stabiliser potential, (iii) chia seeds added to wheat bread increases its antioxidant activity, nutritional content etc. (Grancieri *et al.*, 2019). Foods such as frozen products, bakery products, beverages, sweets and pasta can be supplemented with Chia seeds. It also can be used as Pudding. Chia seeds can also be blended with fruit drinks which are serving as a refreshing beverage. Moreover, Chia seeds jam also can be prepared which is the easiest way to increase Omega-3 intake. The chia seeds act as a thickener because they absorb liquid from the fruits and offer a great jam-like texture.

Health benefits of Chia seeds:

The higher proportion of α -linolenic acid in Chia is a superb source of omega-3 fatty (about 65% of the oil content), which has been associated with a large spectrum of physiological functions in human body e.g. improve the parasympathetic tone, heart rate variability and protect ventricular arrhythmia. Chia seed is a potential source of antioxidants with the presence of chlorogenic acid, caffeic acid, myricetin, quercetin, and kaempferol

which are supposed to have crucial human health benefits such as cardiac, hepatic protective effects, anti-ageing and anti-carcinogenic properties. It is reported that the reduction of cholesterol, inhibition of blood clotting, prevention of stresses and epilepsy, development of retina and brain of foetus during pregnancy, and improvement of the immune system could be attained by the consumption of Chia seeds (Ullah *et al.*, 2016). Moreover, Chia has a number of therapeutic values e.g. (i) repair of damaged tissue as it is a potential source of several bio-active polypeptides, (ii) control of dyslipidaemia by minimising the bad LDL cholesterol, (iii) control of hypertension, (iv) relief from joint pain, kidney disorders, celiac disease and constipation, and (v) works as anti-inflammatory, laxative, antidepressant, antianxiety and analgesic.

Summary

In recent years, Chia has been exploited as a super food due its high nutritive value which aids a numerous health promoting properties. Due to the capacity of Chia seeds to absorb water and to form gels, they may be used in food technology as a substitute of emulsifiers and stabilisers. However, Chia seeds (*Salvia hispanica*) are a valuable raw material whose technological properties and health-promoting properties can be widely used in the food industry.

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