

Chia Seed(*Salviahispanica*) – An Antioxidant Potent to Pharmacological Activities

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Abstract

Antioxidant is a substance that reduces damage due to oxygen, that caused by free radicals. The recent research focuses on searching the natural sources of antioxidant and the synthetic antioxidant are restricted due to their carcinogenicity. Chia (*Salviahispanica*) are versatile herb as well as spice, and the seeds are shine due to their high amount of antioxidant that help to protect delegate fats in the seed. In the present study, the mucilage extraction of chia seed was prepared by method of Box-Behnn experimental design and the qualitative chemical tests carried out for the identification of the nature of phyto-constituents present in chia. Free radical scavenging activity and metal chelating activity were identified and it includes Total Flavonoid Content (TFC), Total Phenolic Content (TPC), DPPH and Total Antioxidant Content (TAC) was analyzed. The total antioxidant activity was performed according to Ferrick Thiocyanate method. At the 50µg/ml concentration of chia were found to be 0.28µg/ml of phenolic, 1.23mg of orientin, 2.78mg of vicenin, 1.7mg of vitamin C respectively. The chia had effective total antioxidant activity, DPPH radical scavenging, reducing power and metal chelating activities. Chia is good antioxidant potential with enlightened total phenolic and flavonoid content in management of cholesterol reduction and heart protection. The common dosage recommendation is 20gm of chia seed per day. Based on this properties, the present study was undertaken in such a way to utilize and explore the health benefits.

Keywords: Chia seed, Antioxidant, phenolic, flavonoid, DPPH

Introduction

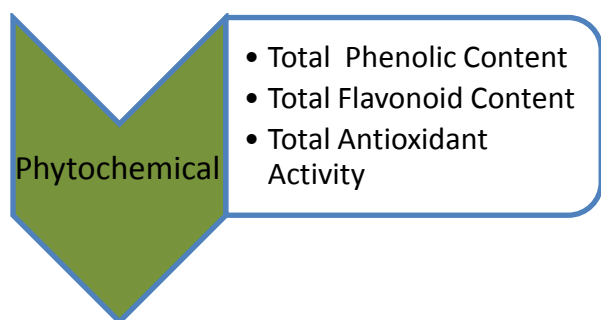
The beneficial effect of chia are generally attributed to the bioactive factors present in them such as non-digestible carbohydrates and phytochemicals. These compounds are found to

have high antioxidant activity, which may contribute many health benefits. To determine the phytochemical components such as phenolic, flavonoid and antioxidant potential of the chia. Hence this analysis was carried out for chia seed.

Methodology

Free radical scavenging activity and metal chelating activity were identified and it includes, Total Flavonoid Content (TFC), Total Phenolic Content (TPC), DPPH and Total Antioxidant activity (TAC) was analyzed

PHYTOCHEMICAL ANALYSIS OF CHIA SEED (IN VITRO)



Total Flavonoid Content (TFC)

Total flavonoid content was measured in spectrophotometrically by using Aluminium chloride colorimetric method¹. 0.1 ml of the extract was mixed with 1.5 ml of ethanol, 0.1 ml of 10 % aluminium chloride, 0.1 ml of 1M sodium acetate and 2.8 ml of distilled water. It was kept at room temperature for 30 min and absorbance of the reaction mixture was measured at 415 nm with double beam UV spectrophotometer.

Total Phenolic Content (TPC)

The amount of total phenolics was determined with the Folin- Ciocalteu reagent (FC) method². Gallic acid was used as a standard, 0.025 ml of extract were introduced into test tubes and made to one ml with distilled water then mixed with 0.1 ml Folin- Ciocalteu reagent and two ml of sodium carbonate. The tubes were allowed to stand for 30 minutes at room temperature before

the absorbance was at read at 760nm spectromerically.

Antioxidant activity

Antioxidant is a substance that reduces damage due to oxygen, such as that caused by free radicals. It is well documented that antioxidants provide protection to living organisms from damage caused uncontrolled production of Reactive oxygen species and concomitant lipid per-oxidation, protein damage and DNA stand breaking³.

DPPH Assay

DPPH radical scavenging activity of extract was determine according to the method reported by Blois⁴. An aliquot of 0.5 ml of sample solution of different concentration was mixed with 2.5 ml of 0.5 mm methanolic solution of DPPH. The mixture was shaken vigorously and incubated for 37 min in the dark at room temperature. The absorbance was measured at 517 nm using UV spectrophotometer. Ascorbic acid was used as a positive control. DPPH free radical scavenging ability (%) was calculated by using the formula.

$$\% \text{ scavenging activity} = \frac{\text{Absorbance of control} - \text{Absorbance of test}}{\text{Absorbance of control}} \times 100$$

Results and Discussion

Total Phenolic and Total Flavonoid Content

Phenolic compounds are the compound that contain one or more aromatic rings. For the present part of study, the methanol extract was used for the determination of total phenolic and

flavonoid content and the result obtained are given in the table below.

Table 1- Total Phenolic and Total Flavonoid Content of Chia Seed

Phytochemical Compound	Chia
TPC (mg/GAE/g)	238.6
TFC (mg/QE/g)	84.95

Phenolic compounds are a class of antioxidant compound which act as free radical terminators⁵. From the table, it was found that sabja and chia had total phenolic content of 396 mg GAE g⁻¹ and 89.94 GAE g⁻¹ respectively. The result of the study was similar with the study conducted by Bonali⁶ who studied the total phenolic content of sabja and chia using different solvents. Several factors such as environmental condition, agronomic practices and processing can also affect the phenolic content and its availability.

The **Flavonoid** present in sabja was 89.94mg chia 84.95mg QE/g respectively. The study was in accordance with the study conducted by Goupy⁷ by 80% methanolic extract.

Determination of Antioxidant Potential in Sabja and Chia Seed

Antioxidant directly react with the chemically active radicals to destroy and indirectly decrease their production by inhibiting

the free radical generating enzymes⁸. In the present part of study, Diphenylpicrylhydrazyl (DPPH) was evaluated for the extracted mucilage of chia to determine its scavenging potential against the free radicals. In DPPH free radical scavenging activity with ascorbic acid as a standard compound. The IC₅₀ value was calculated for both the seeds and ascorbic acid as control. The values of the DPPH assay was given below.

Table 2 - DPPH Free Radical Scavenging Activity for Chia and Ascorbic Acid

Concentration µg/ml	Ascorbic Acid (Positive Control)	DPPH
		Chia
25	6.97	0.88
50	14.2	1.01
100	34.47	1.07
250	81.37	1.14
500	86.31	1.26
IC₅₀mg/ml	0.24	0.36

The scavenging effect (DPPH) was increased with the increasing concentration of the test compound. In DPPH assay, at the concentration of 25µg/ml the test compound of chia 0.88% of inhibition against the free radical. At 100 and 250µg/ml concentration the test compound had higher activity. At the maximum concentration of 500µg/ml, DPPH scavenging effect was maximum, when compared to the standard ascorbic acid. The IC₅₀ value of test compound was low than DPPH free radical scavenging activity. The higher antioxidant

activity was reflected with lower IC₅₀ value⁹. Higher the DPPH values give higher the antioxidant capacity. Overall the removal of free radical by scavenging activity and by metal binding ability of chia seed makes it a super molecule – bioactive substance.

The various acidic to alkaline conditions proved to have high scavenging activity than various polymers that are used as food additives¹⁰.

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