



Proximate Analysis, Phytochemical Analysis, Antioxidant and Shelflife Analysis of Instant Chia Seeds Soup Powder

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ABSTRACT:

The purpose of the study was to produce and standardize Instant Chia Seeds Soup Powder (ICSSP) made from dried veggies, as well as to assess its nutritional (protein, carbohydrate, fat, moisture, ash, and energy) properties and determine its shelf-life over a four month period. The stressful nature of modern living and the rise in the number of nuclear families with working mothers have influenced changes in food preparation and consumption habits. This has expanded the market for Instant Food Mixes, which are crucial to everyone's day-to-day existence. Instant food is convenient cuisine that is quick, easy, and simple to prepare. A soup mix containing 2.5g chia seeds powder, 22.5g corn flour, 15g dehydrated vegetables (carrot, peas), 2.5g tomato powder, 7.5g spices (seasoning, red chili powder, black pepper and salt) and condiments (onion, garlic and ginger powder) is one of many recipes that have been optimized for the development of soup mixes. According to the nutritional analysis, instant chia seed soup powder contained more protein (26.12%), carbohydrate (56.08), fat (2.45), and energy (350.85) than instant soup mix made with corn flour and chia seeds. Instant chia seed soup powder had a pH of 6.8. The conventional spectrophotometer method was used to analyse antioxidant activity. Utilizing 1, 1-diphenyl-1-2 picrylhydrazyl (DPPH), the in-scavenging abilities of improved instant chia seed soup powder were examined. The instant soup powder increases the DPPH scavenging activity up to 71.85 g of focus other instant chia seed soup powder, making it beneficial for diabetics, patients with celiac disease, and regular people.

KEYWORDS: Instant chia seeds soup powder (ICSSP), protein, carbohydrate, fat, moisture, ash, energy, nutritional analysis, Antioxidant activity, pH.

1. INTRODUCTION:

The Spanish word "chian" or "chien," which meaning "oily," is the source of the English term "chia" (*Salvia hispanica* L.). It is also thought to be derived from the Latin word "Salvere," which means "the healer." The plant (*Salvia hispanica*) is a member of the Lamiaceae family. This plant is mature enough to produce seeds. Usually white or purple, the plant's flowers are produced. Chia flowers are tiny (3–4mm in size). The seed's colour varies somewhat and ranges from black to grey to white to gray-black. The seeds have an irregular, 1-2mm-sized shape with an associate in nursing oval shape.

Chia (*Salvia hispanica*) is an annual herbaceous plant, and its seeds have been eaten for a very long time. Recent studies have confirmed the vast health-promoting qualities of chia seeds and their excellent nutritional content. According to research, the hypotensive, hypoglycemic, antibacterial, and immunostimulatory properties of chia seed components are credited with helping to enhance blood lipid profiles. Protein (15–25%), lipids (30–33%), carbs (26–41%), dietary fibre (18–30%), and ash (4–5%) are all listed in the chemical composition. Additionally, it has significant amounts of antioxidants, vitamins, and minerals.

You can top different dishes with chia seeds, such as smoothies, breakfast cereals, granola bars, energy bars, yoghurt, tortillas, and bread. Although it is a new crop, chia seeds have a very high economic worth both domestically and abroad. India's economic situation, standard of living, and access to health care will all improve with the successful cultivation of the chia crop. With a sharp rise in production and consumption, chia is becoming a highly well-known superfood all over the world. It can be grown as a successful commercial crop due to its great demand in the Indian and international markets. Chia seeds have a significant role in the food, cosmetics, animal feed, and pharmaceutical industries today because of their nutritional value.

Chia seeds provide a wide range of health advantages since they are packed with nutrients that can boost energy levels, aid with digestion, reduce hunger, and make you feel full. The food industry have been forced to examine their own resources in order to find and utilize functional ingredients as a result of the growing customer demand for nutrient-dense, healthful meals. Indian eating habits are currently heavily impacted by western culture, and as a result, the use of these foods in homes and the catering business has increased significantly. There are numerous different instant/ready-to-eat food options on the Indian market, and many people use these in their daily lives. The benefits of using dehydrated foods as quick food mixes include flavor

stability at room temperature for lengthy periods of time (6–12 months) and protection from enzymatic and oxidative deterioration. Additionally, they don't require refrigeration and are very nutritious because to the high dietary fibre content and other health advantages. Soup is a very quick method of cooking. Given that it must have evolved around the same time as boiling was discovered to be a method of heating food, it is most likely one of man's earliest foods. To make soup, simmer vegetables in hot or boiling water or stock until the flavor is released, making a broth. In the current world, instant soups that are professionally prepared (such as canned, dried, and frozen soups) are replacing handmade soup because making soup at home takes time. Since it might meet the body's adequate energy and nutrient needs, instant soup could replace breakfast as a viable option. They are quick to prepare and serve and are highly useful.

The high fibre content of chia seeds is advantageous for a person's digestive function. As a result, the study describes how to make an instant soup mix with chia seed powder, maize flour, dried veggies, spices and salt and how to evaluate it for phytochemical qualities while it is kept for four months at room temperature.

The purpose of the study was to evaluate the nutritional quality, antioxidant potential, phytochemical qualities such tannins, flavonoids, and alkaloids, as well as the shelf life of chia seeds, which were supplemented for their high PUFA, protein, and dietary fibre content in the instant chia seeds soup powder. Omega-3 fatty acids, which the body cannot produce and must be taken from diet, are found in abundance in chia seeds, which are a great source of these beneficial polyunsaturated fats. Alpha-linolenic acid (ALA), eicosapentaenoic acid (EPA), and docosahexaenoic acid (DHA) are the three primary omega-3 fatty acids. Plants, vegetable oils, nuts, and seeds are the sources of ALA. Fish and fish oils are sources of EPA and DHA. Our bodies transform ALA into EPA and DHA, which play crucial roles in cognition and vision as well as lowering risk factors for heart disease like high cholesterol and blood pressure. These two fats also offer the most powerful health effects. Chia seeds may easily be added to smoothies or juices, which is a fantastic way to increase the nutritious value of your beverage. Chia seeds are frequently consumed by adding them to water with a squeeze of lemon or lime juice.

The prevention of numerous diseases associated with civilization, including diabetes, cardiovascular disease, and obesity, includes adequate diet. To safeguard human health, prevent the onset of specific diseases, and treat their symptoms, both governmental and non-governmental groups make nutritional advice. The importance of bioactive food ingredients in supporting health is becoming more and more significant. Biesalski and colleagues described them as nutritional components or non-nutritional substances naturally present in the raw material or created in the product during technological processes, which may improve, inhibit, or affect physiological and metabolic functions of the organism. The American Dietetic Association emphasises the significance of bioactive food's health safety in addition to this criteria.

Adequate nutrition is necessary for the prevention of many modern ailments, such as diabetes, cardiovascular disease, and obesity. Governmental and non-governmental organisations offer nutritional guidance to protect human health, delay the onset of particular diseases, and cure their symptoms. Bioactive food components are becoming more and more significant in promoting health. They are described by Biesalski and colleagues as either nutritional components or non-nutritional compounds that are naturally present in the product's raw material or are added to it through technological processes and may enhance, inhibit, or impact an organism's physiological and metabolic functions. In addition to this standard, the American Dietetic Association underlines the importance of bioactive foods' health safety. A soup is a tasty and filling liquid cuisine that is typically offered at the start of a meal or snack. Each soup ought to convey its unique personality. The primary ingredient's flavour ought to be retained. Thick soups and thin (clear) soups are the two main categories of soups. Based on the soups' textures, this is done. Other items that are frequently used to thicken soups are grains, flour, rice, lentils and maize flour. Only components with a vegetable origin are permitted in veggie soups. A large variety of value-added soup products with a homemade taste and ready-to-eat convenience are already available, and this number is constantly expanding. Soup production is a continuously evolving and inventive market on a global scale.

Chia seeds are a "powerhouse" of nutrients, containing all the essential amino acids, fibre, polyunsaturated fatty acids, protein, calcium, and a number of other minerals. Chia seeds dissolve in water to form a gel that is good at storing both water and oil while also having strong viscosity and emulsion activity. It is simple to extract and has enormous promise for use in the creation of food products as a thickening, emulsifier, and stabilizer in frozen foods. One of the richest sources of omega-3 is chia, which is also anti-inflammatory and necessary for good cholesterol levels, immune system function, and brain development. It produces a nourishing breakfast that can aid in preventing or treating diabetes by making one feel "fuller" and preventing hunger pangs till noon. Chia seeds boost metabolism, lower LDL and triglyceride levels, raise HDL cholesterol levels, and also cause tumors cells to die. They also prevent the appearance of wrinkles and skin ageing.

The purpose of this study is to give up-to-date data on chia seeds' prospective usage in the food business, with a focus on their dietary benefits and health-promoting qualities as well as the laws that govern their use in food production.

2. MATERIALS AND METHODOLOGY:

2.1 PROXIMATE ANALYSIS:

2.1.1 Determination of Moisture content:

An instant chia seed soup powder sample weighing 20 gram was placed in pre-weighed, sterilized petri plates. It was then kept in the hot air oven for three hours at a temperature of 120 OC. After cooling in a desiccators, this was weighed. This dish was placed back into the oven for an additional 30

minutes, removed, and weighed once more. Until a steady weight was attained, the procedure was repeated. The following criteria were used to assess moisture content:

Formula of moisture content-

$$\text{Moisture content} = \frac{w_1 - w_2}{\text{weight of sample}} \times 100$$

W1 = Initial weight

W2 = Final weight

2.1.2 Determination of Ash content:

Using a weighing balance, a sample of 5 gram of instant chia seed soup powder was measured. The dish should be lit and charred for 15 to 20 minutes. After that, place the crucible for three to four hours in the muffle furnace (550oC). After 10 minutes in the desiccators, weight the crucible.

$$\text{Formula - Ash \%} = \frac{(w_3 - w_1) \times 100}{w_2 - w_1} \text{ (gm)}$$

W1 = Weight of empty crucible

W2 = Weight of the sample + (before drying)

W3 = weight of crucible + sample (after ashing)

2.1.3 Determination Fat content:

A sample of 5 gram of instant chia seed soup powder was weighed, placed in thimbles with dry paper, and then cotton wool plugs were added. After drying, the thimbles were put into a Soxhlet system. Each round bottom extraction flask received 50 ml of petroleum ether as a solvent after being dried and weighed. The samples were extracted in a boiling position for 15 minutes. For three hours, the extraction was done continually. After cooling, this was reweighed. The fat content formula was as follows:

Formula of Fat

$$\text{-Fat} = \frac{\text{weight of flask after} - \text{weight of flask before}}{\text{weight of sample}} \times 100$$

2.1.4 Determination of Protein:

In the digestion flask, one gram of the instant chia seed soup powder sample was weighed. The sample was treated with Kjeldahl catalyst (10 gm potassium sulphate, 2 gram copper sulphate, and 0.25 gm selenium oxide). The sample was treated with 20 cc of strong sulfuric acid before being fixed for 8 hours in the digestion unit of the Kjeldahl apparatus in the fume cupboard (4500 C). After cooling, the pure yellow digest turned into a colorless liquid, which was put into a volumetric flask measuring 100 ml and topped off with purified water. As an indicator, 20 ml of a 4% solution of boric acid was pipette into a conical flask. The sample had been diluted with 75 cc of distilled water and was present. 20 ml of sodium hydroxide (20%) was used to make 10 ml of the digested alkaline before it was distilled. It was timed for the distillery's steam outflow to close as the boric acid solution became green. For 15 minutes, the mixture was distilled. Next, 0.1 N hydrochloric acid was used to titrate the filtrate. The quantity of protein was determined. Protein supplement -

$$\text{Nitrogen} = \frac{(\text{sample titer} - \text{blank titer}) \times N \text{ of HCl} \times 14 \times 100 \times 100}{\text{weight of sample} \times \text{Aliquot take} \times \text{for distillation}} \times 1000$$

2.1.5 Determination of Carbohydrate:

$$\text{Carbohydrate formula} - \% \text{ carbohydrate} = 100 - (\% \text{ protein} + \% \text{ ash} + \% \text{ fat} + \% \text{ moisture})$$

2.2 PHYTOCHEMICAL ANALYSIS:

2.2.1 Phytochemical screening for tannin content of instant chia seeds soup powder:

One milliliter of instant chia seed soup powder extract should be added to one milliliter of 5% FeCl₃ in a test tube. As a result, an extract's dark blue and green-black hues indicated the presence of tannin (Trease and Evans 1996).

2.2.2 Phytochemical screening for flavonoid content of instant chia seeds soup powder:

Drop by drop, add 3–4 ml of sodium hydroxide to 1 ml of extract. According to Odebiyi and Sofowara (1978), the presence of yellow colour indicates the presence of flavonoid content in instant chia seed soup powder.

2.2.3 Phytochemical screening for quinones content of instant chia seeds soup powder:

Add concentrated sulfuric acid to the volume of 1 ml in the test tube after adding 1 ml of the extract. According to G Jayapriya (2014), the red colour denotes the presence of quinone.

2.2.4 Phytochemical screening for alkaloids content of instant chia seeds soup powder:

Two milliliters of instant chia seed soup powder extract, two milliliters of 1% concentrated hydrochloric acid, and a couple of drops of Wagner's reagent were added to a test tube. Alkaloids in instant chia soup powder extract exhibit positive results whether the colour is green or white (Ogukwe et al. 2004).

2.2.5 Phytochemical screening for saponins content of instant chia seeds soup powder:

In a test tube, 5 ml of distilled water and 5 ml of instant chia seeds soup powder extract were briskly shaken. The emergence of foam, which persisted for five minutes, indicated the presence of saponins.

2.2.6 Phytochemical screening for coumarin content of instant chia seeds soup powder:

Yellow colour was seen after adding 3 mL of 10% NaOH to 2 mL of aqueous instant chia seeds soup powder extract, indicating successful results.

2.3 ANTIOXIDANT ANALYSIS:

Procedure of DPPH inhibition method:

A spectrophotometer was used to calculate the 2, 2-Diphenyl-1- Picrylhydrazyl (DPPH) antioxidant activity. Dark blue is the colour of DPPH in methanol. The antioxidant molecule turns yellow when reduced, from purple, which enables DPPH to gain electrons. When measured by the enzyme 1,1-diphenyl 1 - 2 pyridylhydroxylase (DPPH), DPPH exhibits significant absorbance at 517 nm. Briefly, 1 ml of optimized instant chia seeds soup powder was made at various concentrations (20,40,60,80,100 g/ml) and combined with 0.1 ml of DPPH solution. One milliliter of methanol was made as a control sample, and it was incubated for 30 minutes at room temperature in the darkroom. After incubation, the sample's absorbance was measured using a UV-visible spectrophotometer at 517 nm with methanol employed as a blank. A decrease in absorbance indicates a high level of free radical scavenging activity.

Note: The test tube was covered with brown paper as DPPH was very sensitive to light.

The formula for DPPH- %DPPH scavenging activity = $\frac{OD\ control - OD\ sample}{OD\ control} \times 100$

2.4 DETERMINATION OF SHELF-LIFE ANALYSIS:

2.4.1 Determination of pH:

2.4.2 Determination of Total Titratable acidity:

30 ml of water was used to dissolve a 2 gram sample. 100 ml of mixture after filtering has been created. The filtrate was pipette into a beaker with 10 ml. 3-5 drops of phenolphthalein indicator should be added. The standard 0.01 N NaOH solution was titrated against until a pale pink coloration was achieved. Burette reading was observed.

2.4.3 Determination of Antimicrobial:

The antibacterial efficacy of the extracts against three Gram-positive and two Gram-negative bacterial test pathogens was evaluated using the agar well diffusion method.

The final concentrations of the extracts were reconstituted to 100 mg/ml, 50 mg/ml, and 25 mg/ml. 100 l of the 24-hour-old bacterial inoculums were inoculated onto nutrient agar using the spread plate technique. 80 l of extracts were then added to each of the 6 mm-diameter wells that had been bored into the agar using a sterile cork borer. Following inoculation, the inoculated plates were incubated in an incubator for 24 hours at 37°C. The antibacterial activity was evaluated by determining the zone of inhibition's diameter and reporting the results on a millimeter scale. Each plate had one well that was filled with methanol as a control.

3. RESULTS AND DISCUSSION:

a. Proximate Analysis of instant chia seeds soup powder:

Table 1. Result of the proximate analysis of the of instant chia seeds soup powder

S. NO.	TESTS	RESULTS
4.	Protein	26.12
5.	Fat	2.45
6.	Moisture	12.13
7.	Ash	3.22
8.	Total energy	350.85
9.	% of total CHO content	56.08

3.2 Moisture:

The instant chia seed soup powder's moisture content was found to be 12.13 percent. This can be because the chia seed soup powder contains moisture. This can be a result of the chia seed powder's moisture level.

3.3 Ash:

The instant chia seed soup powder has 3.22 percent ash content.

3.4 Fat:

The instant chia seed soup powder has a fat level of 2.45% percent.

3.5 Protein:

The protein content of the instant chia seed soup powder is 26.12%. The product has high protein content as a result of the usage of protein-rich chia seed powder.

3.6 Carbohydrate:

Instant chia seed soup powder included 56.08% percent carbohydrates.

3.7 Phytochemical Analysis of instant chia seeds soup powder:

The phytochemical research revealed some secondary metabolism in the instant chia seed soup powder. The table displays the presence (+) and absence (-) of phytochemical components in the instant chia seed soup powder test sample. The instant chia seed soup powder displays a positive sample quionones, flavonoid, saponin, alkaloids, and coumarin result and a negative tannin result.

Table 2. Phytochemical analysis of instant chia seeds soup powder

PARAMETERS	INSTANT CHIA SOUP POWDER
TANINS	-
SAPONINS	+
FLAVONOIDS	+
ALKALOIDS	+

QUNIONES	+
COUMARIN	+

3.8 Titratable Acidity:

The instant chia seed soup powder's total acidity was 1.8%, correspondingly.

3.9 pH:

The pH of the improved instant chia seed soup powder was 6.8.

Table 3. Result of Titratable acidity in instant chia seeds soup powder

PARAMETER	INSTANT CHIA SOUP POWDER
Ph	6.8
Titratable Acidity %	1.8 %

3.10 Antimicrobial Analysis:

Table 4. Result of bacterial count in instant chia seeds soup powder

S. No.	TESTS	RESULTS
1.	Bacterial Count	1.21cfu/gm

3.11 Antioxidant Analysis of instant chia seeds soup powder:

The best method for determining an object's antioxidant capacity is DPPH. The hue of the sample changes from purple to yellow as a result of antioxidant compounds scavenging DPPH free radicals (Nirmala). Display the graph between the extract's concentration (in g) and antioxidant activity (in %). To determine the DPPH behaviour in a sample, the optical densities of the sample and the control can be computed using a spectrophotometer. A very strong antioxidant property is present if the DPPH value is less than 50 g/ml, a strong antioxidant property is present if the value is between 50 and 100 g/ml, and a weak antioxidant property is present if the value is over 150 g/ml.

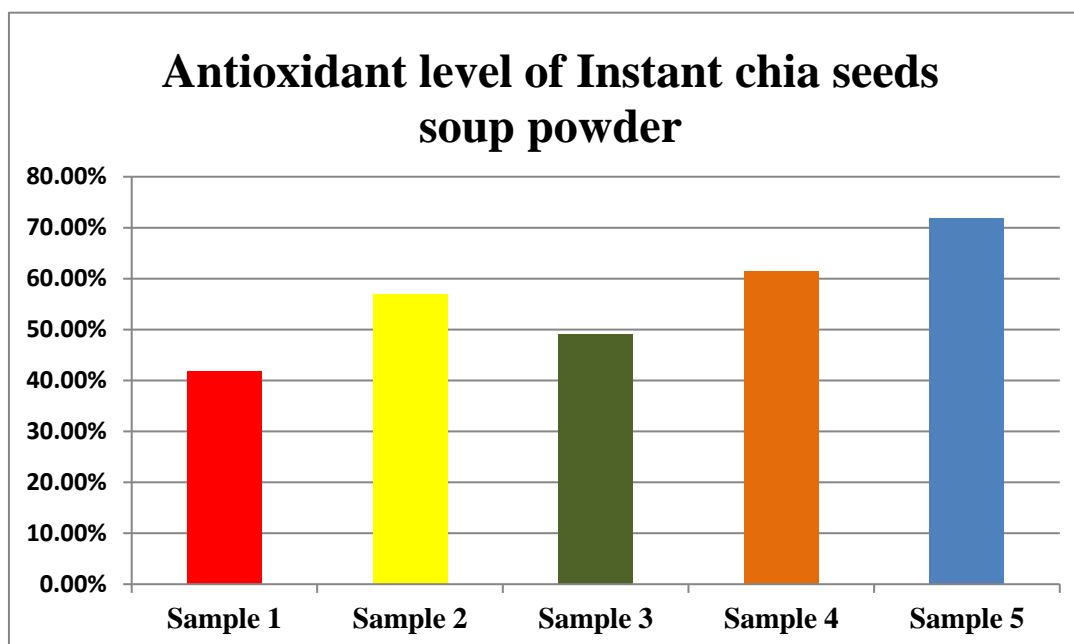
Instant chia seed soup powder's antioxidant activity was tested at various concentrations (Control, T1, T2, T3, T4, T5), and the results were presented.

These findings show an increase in instant chia seed soup powder concentration of up to 71.85 g. After that, the antioxidant's action remained unchanged..

$$\%DPPH \text{ scavenging activity} = \frac{OD \text{ control} - OD \text{ sample}}{OD \text{ control}} \times 100$$

Table 5. Result of DPPH

Sample	Result
T1	41.84 µg
T2	56.92µg
T3	49.16 µg
T4	61.47 µg
T5	71.85 µg



Cost of production of instant chia seeds soup powder: For the preparation of 50 g Instant Chia Seeds Soup Powder, the cost of production was calculated to be Rs. 100.

4. CONCLUSION:

In the study mentioned above, quick chia seed soup powder was combined with chia seeds, carrot, onion, peas, garlic, ginger, tomato, red chili, carrot, seasoning, and black pepper. possess greater concentrations of each of the nine essential amino acids as well as protein, fibre, Omega-3 fatty acids, oil, vitamins, minerals, carbohydrate, lipids, and polyphenols. For people with diabetes, it has a very low glycaemic index, which is fantastic. Chia seed powder, combined with other components in the right amounts, can be processed properly and optimised to achieve this. Additionally, it was found that even four months after it was stored, the soup mix was still more acceptable in terms of colour, flavor, and texture. The prepared soup mix just needed three to four minutes to prepare, and it was also quite inexpensive. They therefore come in quite handy in this situation when the rise in ready-to-eat food is crucial for easing the load on the working people. Many people at the party consumed soup. This item was prepared with the intention of providing each person with sustenance. However, by improving the assembly process or by utilising unique bundling, more research can be done on this product to extend the period of realistic usage with further enhanced surface attributes. The study's overall finding is that the optimised instant chia seed soup powder underwent proximate analysis. In the instant chia seed soup powder, check for the presence of protein, fat, carbohydrates, energy, moisture, ash, pH, and total titratable acidity. Investigation of the phytochemical composition of chia seed soup powder. Chia seed soup that has been optimised has good antioxidant action. Investigation of the powdered chia seed soup's antimicrobial properties. Analysis of the instant chia seed soup powder's shelf life.

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