University of Thi-Qar Journal of Science (UTJsci)
E-ISSN: 2709-0256, P-ISSN: 1991-8690, Vol. 11, No. 2, Dec. 2024

An Overview of Potential Benefits for General Health and Weight Management by Consuming of Chia Seeds

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Received: 2024-05-05, Revised: 2024-05-26, Accepted: 2024-07-01, Published: 2024-12-05

***Abstract*— Chia seeds (*Salvia hispanica L.*) have undoubtedly Attain Approval in current time due to their nourishing advantages. They are Famous for their huge composition of omega-3 fatty acids, which are essential for cardiac and central nervous systems. Also, chia seeds are Affluent in nutritive microfibers, which can help in assimilation and allow an affection of satiety; chia seeds have a huge content of proteins and derivatives, so considered a good origin of proteins. These proteins and derivatives are necessary for different bodily Concerns, including muscle rebuilding and development, enzyme protraction. A way from the twenty certified proteins, dozen are included in the standardized metabolism techniques of plant corpuscle, and the tarrying 8 are exactly connected to the rendering and preservation of plant fats, indicating that the huge content of fats in chia seeds, which is responsible for thirty percent of their content. Also, chia seeds are Distinctly Loaded in omega-3 fatty acids, hatch twenty percent of their fats content. The residences of these proteins are interrelated to fats generation and preservation enlighten on why chia seeds are an important origin of omega-3 fatty acids and other advantageous fats. Chia seeds are a rich nutrient because of their super content and good effects on the health. Also, Weight controlling, Chia seeds are loaded in natural or artificial substance and nitrogenous matter, which can aid in assist a feeling of satiety and decrease calories consumption.**

***Keywords*—Chia seed, Salvia hispanica, fats, omega-3, protein**

I. INTRODUCTION

Chia (Salvia hispanica L.) is a non-woody plant plant that belongs to thearrange Lamiales, family Lamiaceae, subfamily Nepetoideae, and branch spit. The spit branch is to be the presumable multifarious inside the family Lamiaceae, constituting around 900 types. These types are dispensed transverse different countries of the earth , comprise Africa, median America, and Asia [1]. dispense of Salvia types foreground their pliable to different atmospheres and Atmosphere. Chia, definitely Salvia hispanica L., has acquired significant Observation for its nutritional advantage and bioactive mixture, beneficent to its approval as an operative food. Appreciation of the herbaceous Categorization, and geomorphology dispensation of chia and other Salvia kinds can supply perspicacity into their heredity distinct and potentiality employment in different regions [2]. The chia plant is now civilized in various regions around the world. Among these nations, Mexico stands out as the world's largest producer of chia seeds. The global spread of chia cultivation reflects the increasing demand for this nutritious seed and its versatile applications in food and beverage products [3]. The historical use of chia dates back to pre-Columbian times, with indigenous populations in the 16th century consuming chia seeds for energy, endurance, and strength, Aztec soldiers, in particular, relied on chia as a nutritional source during battles and expeditions to meet their dietary requirements. Away from its dietary uses, chia seeds are also admired for their oil comfortable, which is cited and activated in the preparation of cosmetics. Chia seeds were offered as a sign of respect to the gods during religious observance and adhered to cultural norms. They were also used as a design of award for taxes, displaying the attention and assessment fixed on chia seeds in antique Mesoamerican communities [4]. The Chia plant, Salvia hispanica L., is approximately 1 meter beanstalk and appearance uncomplicated leaves that are oblong-elliptical in shape, immature, and have a smart acme. The leaves generally allotment 4 to 8 cm in height and 3 to 5 cm in width [5]. Chia seeds are appearing-oval in appearance, with a breadth ranging from 1 to 3 millimeters, a radius between 0.7 and 1.6 millimeters, and a wideness between 0.9 and 1.6 mm. They have a soft and glossy exterior shell and can come in different colors [2]. such as black, brown, gray, black-spotted, or white [6]. Sophisticated chia seeds involve glue inside their epidermal cell. When these seeds come into touch with water, the glue speedily expands, rupturing the constitutional cell sheet and composing a gel-like layer about the seed. This operation increases the bigness of the seed and permit chia seeds to have a special gel-like advent when disclosed to moisture. The largest farming of seeds from the Salvia genus, especially Salvia hispanica (chia), occurs in highland regions approaching from temperate to subtropical climates. These regions bring advisable situations for the growth and farming of chia plants, which are valued for their nutrient-wealthy seeds [7].

The synthetic content and dietary effects of chia seeds can differ according to a different points, such as ethereal Circumstances, geographic position, clay nutrients, and farming gardening horticulture planting practices. Also, as temperature, sunlight susceptibility, water presence or not, and soil content can affect the improvement of chia seeds and their comestible composition, it is of major significance to recognize these points when evaluating the salutary effect of chia seeds, as differences in flourishing setting can induce in variation in the grades of fundamental provisions such as omega-3 fatty acids, vitamins, protein, minerals, and fiber. research workers and cultivators often analyze these points to sharpen chia planting practices and reinforce the nutritional quality of the seeds.

https://doi.org/10.32792/utq/utjsci/v11i2.1243

of planting [8]. The constitution of fat acids in chia seeds can differ occupying to environmental factors such as weather and height. research workers signify that the content of omega-3 fatty acids in chia seeds tends to be higher in colder and higher-altitude places. These environmental conditions may influence the synthesis and accumulation of specific fatty acids in chia seeds, including omega-3 fatty acids [9]. Chia seeds, scientifically known as Salvia hispanica, are small, oval-shaped seeds that are rich in various nutrients and bioactive compounds. The chemical properties of chia seeds contribute to their nutritional value and potential health benefits. Some key chemical properties of chia seeds include: macronutrient composition, Chia seeds are a good source of macronutrients, including carbohydrates, protein, and fat. They contain approximately 11-12 grams of fiber per ounce, making them one of the richest plant-based sources of dietary fiber. It is rich in healthy fats, particularly omega-3 fatty acids like alpha-linolenic acid. The protein content of chia seeds is around 18 %, making them a valuable plant-based protein source (10). Micronutrient Content: Chia seeds are a good source of different essential minerals, including calcium, phosphorus, magnesium, and manganese. These minerals play essential roles in bone health, metabolism, and overall well-being. It contains significant amounts of vitamin E vitamin C, and several B vitamins, including niacin, thiamine, and riboflavin [10]. Water Absorption: Chia seeds have a good ability to absorb water and form a gel consistency when put in liquid. This ability attributed to the soluble fiber mucilage, can be beneficial for digestion, weight management and hydration [11]. Hydration Potential: Chia seeds have a good water-holding capacity due to their mucilaginous fiber content. When consumed with water or other liquids, chia seeds can help maintain hydration levels in the body and may be useful for individuals engaging in physical activity [12]. Gel-Forming Ability: Chia seeds can convert to a gel-like substance when mixed with liquid due to soluble fiber content [13]. Aim : The current review was conducted for knowledge about The chemical properties , potential benefits for general health, and weight management by consuming of chia seeds in previous article of 2019 to 2024 .

II. APPLICATIONS OF CHIA SEED

The consumption of chia seeds has indeed been increasing in recent years due to their recognized health benefits. Chia seeds are considered a super food because of their nutritional value and potential positive effects on health [14,15]. Some of the health benefits associated with chia seeds consumption including weight management, Chia seeds are high in fiber and protein, which can help promote a feeling of fullness and reduce overall calorie intake, potentially aiding in weight management, also Heart Health, Chia seeds are a good source of omega-3 fatty acids, which have been linked to reducing inflammation, lowering blood pressure, and improving overall heart health, also blood sugar control, The high fiber content in chia seeds can help regulate blood sugar levels, making them a beneficial addition to the diet of individuals with diabetes or those looking to manage blood sugar levels, also, Digestive Health, The fiber content in chia seeds can support digestive health by promoting regular bowel movements and maintaining a healthy gut microbiome [16,17]. also, Antioxidant Properties, Chia seeds contain free-radical scavengers that can assist in preserving cells from danger occurred due to these unpaired electron, conceivably decrease the danger of lifelong diseases like malignancy sickness. the dietary outline of chia seeds, Comprising their huge fiber, protein, omega-3 fatty acids, and antioxidant composition, so it is considered as a serviceable Supplement to Equitable and Salubrious comestibles [18,19]. Their promising advantages in handling lifelong diseases such as being overweight, cardiac diseases and malignancy sickness have contributed to their flourishing Fame among health-conscious consumers [20].

III. THE NUTRITIONAL POWERHOUSE OF CHIA SEEDS

Chia seeds are loaded in bioavailable combinations that offer their multitudinal health effects. Some of the crucial bioactive combination present in chia seeds include, first, omega-3 fatty Acids, Chia seeds is considered the affluent plant-based Origins of alpha-linolenic acid (ALA), an essential omega-3 fatty acid [21]. These are distinguished for their antiphlogistics, antipruritic, antirheumatic ability, and their capacity to help cardiac health. Second; Fiber, Chia seeds are loaded in alimentary fiber. Fibers is necessary for alimental health, improve blood sugar levels, and controlling fullness . Third, protein, chia seeds are an excellent origin of plant-based protein, building them a pricey Extension to fruitarian and herbivorous nourishment. Protein is fundamental for the growth and repair of muscles, also, for health and as well as. Fourth; antioxidants, Chia seeds involve different antioxidants, involving flavonoids and phenolic compounds, which assist in the protection of cells from danger that may produce by oxidants and Redox imbalance. Fifth; Minerals, Chia seeds are loaded with minerals such as manganese, phosphorus, magnesium and calcium, which are imperative for the health of bone tissue, function of muscle, and principally metabolism. Sixth; vitamins, Chia seeds offer vitamins such as B vitamins and vitamin E, which play a role in the metabolism of energy, immune functions, and the health of skin. the bioactive content present in chia seeds working interdependently to make a broad levels of health benefits, making them a valuable addition to a diet [22,23].

IV. UNVEILING THE HEALTH WONDERS OF CHIA SEEDS: EXPLORING THEIR MULTIFACETED BENEFITS

A. Anticholesterolemic Characteristics

Huge levels of high-density lipoprotein or good cholesterol are actually considered beneficial and are inversely fell in with the development of cardiac diseases in individuals. HDL cholesterol is often referred to as "good" cholesterol because it helps withdraw other forms of cholesterol from the bloodstream and carries it to the liver for elimination. This is why higher levels of HDL cholesterol are generally seen as protective against heart disease [24] Chia seeds are rich in dietary fiber and unsaturated omega-3 fatty acids, which have been associated with reducing serum cholesterol levels [25] Some of the mechanisms of action of chia seeds as antihyperlipidemic agents at the pharmacological level include: High content of fiber: Chia seeds are rich in soluble fiber, such as mucilage, which can help bind cholesterol in the gut and avoid its absorption into the blood. This can help decrease bad cholesterol levels and decrease the risk of cardiovascular disease [26]. Omega-3 fatty acids: Chia seeds are one of the richest plant sources of omega-3 fatty acids, particularly alpha-linolenic acid. Omega-3 fatty acids have been shown to have a range of beneficial effects on lipid metabolism, including reducing triglyceride levels and increasing good cholesterol levels [27] Antioxidant properties: Chia seeds contain flavonoids and phenolic compounds, which can help

reduce oxidative stress and inflammation in the body. These antioxidants can also help protect LDL cholesterol from oxidation, which can contribute to the development of atherosclerosis [28]. Regulation of lipid metabolism: Some studies have suggested that chia seeds may help regulate lipid metabolism by influencing the activity of enzymes present in cholesterol synthesis and metabolism. For example, chia seeds have been shown to inhibit the activity of an enzyme, which is involved in cholesterol production [27,28]. Anti-inflammatory effects: inflammation is closely linked to the development of hyperlipidemia and cardiovascular disease. Chia seeds' anti-inflammatory properties can help decrease inflammation in the body, which may help improve lipid profiles and reduce the risk of heart disease [29]. Some clinical studies have demonstrated that consuming chia seeds can induce in increased levels of beneficial fatty acids like ALA and EPA, while reducing total cholesterol and VLDL-c in overweight and obese adults. Additionally, chia consumption has been linked to increased levels of ALA and EPA in postmenopausal women [30]. other investigations showed that The effects of utilizing 35 g of chia flour per day on cholesterol degrees in heavy adults included a decrease in total cholesterol and very-low-density lipoprotein cholesterol (VLDL-c), as well as an enlarged in high-density lipoprotein cholesterol (HDL-c) [31]. So these some studies spotlighting the quiescent advantages of chia seed consumption on various aspects of health, particularly related to dyslipidemia, insulin resistance, and cardiovascular health. Chia seeds have been shown to improve dyslipidemia and insulin resistance induced by hyperglycemic or sucrose-rich diets in animal studies. Consumption of chia seeds induce in lower glucose concentrations, decreased triacylglycerides, LDL-c, VLDL-c, and increased HDL-c levels in rats. Animal studies have also shown that chia utilization can lead to better lipid redistribution and expiation of cardioprotective and hepatoprotective effects. These data knowledge suggest that amalgamating chia seeds into the diet may help in managing cholesterol levels and increase cardiovascular health. Another analyzing Estimated the outcomes of chia seed on rats fed a sucrose-rich diet in the Prolonged with consequent adipose tissue maladaptive. The authors observed that chia reduced epididymal fat and normalized dyslipidemia and insulin sensitivity induced by sucrose [32]. In an isolated study, the combined effect of a sucrose-rich diet and chia seed intake for three or five weeks caused reduced epididymal fat, regularized dyslipidemia, and elaborated insulin sensitivity in Wistar rats [33]. In a separate experiment, the utilisation of the animals of chia for either 3 months (prevented) or 5 months (normalized) resulted in the effects on various parameters such as prevention or normalization of dyslipidemia, liver TAG, FAS, ACC, and G-6-PDH activities, Regulation of PPARa and SREBP-1 protein levels and Increase in fatty acid oxidase (FAO) and CPT-1 activities; This indicates that chia seed consumption had a significant impact on lipid metabolism and related enzyme activities in the animals over the specified durations [34] .

Male rats fed chia seed instead of corn oil in a sucrose-rich diet showed improvements in heart lipotoxicity, increased FAT/CD36 protein levels, and M-CPT1 activity, leading to the normalization of dyslipidemia [35]. In a different investigation, male rats that were given chia seed instead of corn oil in a sucrose-rich diet exhibited the effects such as Improved heart lipotoxicity, Increased levels of FAT/CD36 (fatty acid transporter) proteins, and M-CPT1 (muscle-type carnitine palmitoyl transferase 1) activity, reduction in PPARα proteins and plasma fatty acids (FAs) levels. The authors proposed that the normalization of dyslipidemia by chia seed was attributed to the prevention of FAT/CD36 translocation, leading to a decrease in fatty acid influx. This reduction contributed to the decrease in M-CPT1 activity and lipid storage, ultimately enhancing glucose oxidation in cardiac muscles. Furthermore, In a study involving Wistar rats fed a high-fat diet, the consumption of chia seed flour for 35 days resulted in the outcomes such as: Reduction in total cholesterol (TC), low-density lipoprotein cholesterol (LDL-c), and very low-density lipoprotein cholesterol (VLDL-c), also, Increase in PPAR-α protein levels, This suggests that chia seed flour intake for 35 days had beneficial effects on lipid profiles and PPAR-α protein expression in rats on a high-fat diet. Chia seed consumption normalized dyslipidemia and insulin sensitivity induced by sucrose-rich diets, reduced epididymal fat, and improved adipose tissue dysfunction [36].

B. Antihypertensive Characteristics

Hypertension, along with dyslipidemia, is considered one of the key risk factors for cardiovascular diseases (CVDs) [37]. Some studies discuss the potential effects of chia seeds on reducing blood pressure (BP) in hypertensive adults and patients with type-2 diabetes. The mechanisms of action of chia seeds that contribute to their potential antihypertensive effects can be outlined as follows: Antihypertensive mechanisms of action: Vasodilation: The omega-3 fatty acids; present in chia seeds are known to have vasodilatory effects [38] These compounds help relax and dilate blood vessels, reducing blood pressure levels. Potassium and low sodium content: Chia seeds are rich in potassium and low in sodium, which helps regulate fluid balance and blood pressure. Potassium helps counteract the effects of sodium, a mineral that can raise blood pressure when consumed in excess. Anti-inflammatory effects: Chronic inflammation is associated with hypertension, and chia seeds' anti-inflammatory properties can help decrease inflammation in the blood vessels and allow good endothelial function, contributing to improved blood pressure control [39-40]. In raised blood pressure adults, dissipation of thirty-five grams per day of chia flour for three months led to a reduction in BP, lipid peroxidation, and plasma nitrite concentrations. This effect was attributed to the high content of n-3 fatty acids in chia, which have antioxidant and anti-inflammatory properties. Patients with type-2 diabetes experienced a reduction in both systolic and diastolic blood pressure after consuming thirty-five grams per day of chia seeds for 12 weeks [41- 43]. While some studies have shown promising results in reducing blood pressure with chia seed consumption, it is important to note that not all studies have found significant changes in blood pressure after treatment with chia seeds in individuals. The variability in study results may be due to factors such as study design, sample size, duration of treatment, and individual variability in response to chia seed consumption.

Further research is needed to fully understand the potential benefits of chia seeds in managing blood pressure and cardiovascular health [44-45]. Chia seeds exhibit a low blood pressure effect through enzymatic analysis, Chia protein hydrolysate demonstrates an obstruct ing activity similar to that of angiotensin-converting enzyme I (ACE-I) inhibitors, which are commonly used to treat hypertension. Also, the hydrophobic residues present in chia protein seem to act similarly to synthetic ACE-I inhibitors, potentially by inhibiting the production of angiotensin II, a hormone involved in raising blood pressure. also, The C-terminal amino acids in chia protein are suggested to be responsible for the observed higher inhibitory ACE activity. These findings suggest that chia seeds may have a role in blood pressure regulation through mechanisms involving ACE inhibition [45].

C. Anthropometrics Characteristics

Chia seeds have shown the Facility to Boost satiety and reduce the desire to eat, likely due to their composition high in nutritional fiber and low in carbohydrates [46]. This consideration can be companied by other results that have indicated that consuming 30 g of chia seeds per 1000 kcal over 6 months by overweight and diabetic adults leads to weight loss, downgraded waist circumference, decreased C-reactive protein levels, and increased adiponectin levels [47]. Additionally, overweight and obese adults who consumed 35 g of chia seeds daily for 12 weeks experienced reductions in weight and body fat percentage [48]. These findings suggest that incorporating chia seeds into the diet may have positive effects on weight management and metabolic health in individuals who are overweight, obese, or have diabetes [49]. Animal studies, such as the Wistar rat experiment by da Silva et al. in 2016, showed weight loss when chia flour and seeds were incorporated into the diet [50].

D. Hypoglycemic Characteristics

High levels of blood glucose can trigger pathways leading to the overproduction of reactive oxygen species, causing increased inflammation and endothelial dysfunction, which are associated with conditions like diabetes and cardiovascular problems [51]. In acute studies, robust and strong individual who consumed ground chia along with a glucose challenge experienced reduced blood glucose area under the curve over 120 minutes, decreased peak glucose levels, and delayed time to peak compared to the control group; incorporating ground and whole chia into bakery products led to Lessen blood glucose incremental areas under the curve in healthy individuals after fasting, as well as lower postprandial glycemia and postprandial glycemia [52- 53]. However, chronic studies in humans, including those involving individuals with type 2 diabetes or overweight/obese individuals, did not show significant changes in glycated hemoglobin, fasting glucose, or serum glucose levels following chia seed consumption [54]. Animal studies demonstrated that chia seeds and chia flour may have a beneficial impact on glucose regulation, particularly in the context of high-fat and high-fructose diets. The mechanisms underlying these effects may involve the upregulation of heat shock proteins and regulators of glucose metabolism in skeletal muscle [55] and Chia seeds have gained popularity in recent years for their numerous health benefits, including their potential to help manage diabetes. The mechanisms of action of chia seeds as an antidiabetic agent are still being studied, but several potential mechanisms have been proposed: Regulation of blood sugar levels: Chia seeds are high in fiber, which can help slow down the absorption of sugar into the bloodstream. This can help prevent spikes in blood sugar levels that can occur after eating a meal high in carbohydrates [56]. Insulin sensitivity: chia seeds may improve insulin sensitivity, allowing the body to use the insulin more effectively it produces to regulate blood sugar levels. This can help prevent insulin resistance, a key factor in type 2 diabetes [57]. Anti-inflammatory properties: inflammation is thought to play a role in the development of diabetes, and chia seeds are known to have anti-inflammatory properties. By decreasing inflammation in the body, chia seeds may help improve insulin sensitivity and overall blood sugar control. Antioxidant effects: Chia seeds are rich in antioxidants, which can help protect the body from oxidative damage caused by high blood sugar levels. This can help avoid complications of diabetes, such as nerve damage and cardiovascular disease. Gut health: The fiber in chia seeds can also promote a healthy gut microbiome, which is increasingly being recognized as playing a role in the development and management of diabetes. A healthy gut microbiome can help regulate blood sugar levels and improve overall metabolic health [56-58]. The dissimilarity between serious and deep-seated survey on the survey of chia seeds on glycemic control in individuals underlines the requirement for more extensive and long-term research in this area. Animality studies have found valuable insights into the potential mechanisms underlying the beneficial effects of chia seeds on glucose metabolism and insulin sensitivity. However, additional human studies are necessary to confirm these findings and elucidate the long-term effect of chia seed consumption on metabolic health [59].

E. Antioxidant Characteristics

Chia seeds are rich in antioxidants like polyphenols, vitamins, and peptides, which are distinguished to inhibit the installation of transcription factors. This inhibition is essential for mitigating inflammatory and carcinogenic pathways, thereby withstanding against the detrimental impact of reactive oxygen species (ROS) and reactive nitrogen species [60]. The antioxidant properties of chia seeds have been associated with a wide level of health advantages, such as shielding against neurological disorders, inflammation, immune system deficiencies, ischemic heart disease, strokes, Parkinson's, and Alzheimer's diseases, as well as cancer [61]. In rats, the establishment of chia seeds into a high-fat diet resulted in a reduction in thiol levels and the activities of plasma catalase and glutathione peroxidase, along with an increase in liver levels of glutathione reductase. Moreover , rats fed a sucrose-rich diet for an extended period and supplemented with chia seeds showed a restoration of antioxidant enzyme activities to ranges comparable to those of the control group, including catalase, superoxide dismutase, and glutathione reductase [62,63].

The intake of chia seed flour in conjunction with a high-fat diet in Wistar rats for 35 days prompted elevated levels of superoxide dismutase and IL-10 plasma concentrations compared to a control group receiving calcium carbonate. This suggests that chia seeds could potentially enhance antioxidant enzyme levels and anti-inflammatory cytokines within the body; studies in lively humans who spent chia seeds for 12 weeks exhibited improved plasma antioxidant activity compared to individuals with hypertension or overweight individuals. This insinuates that chia seed consumption may enhance antioxidant defenses in the body and support overall health [64]. Germinated chia seeds have been shown to possess enhanced rate of protein, as evidenced by a higher protein adequacy. Moreover, the levels of γ-aminobutyric acid (GABA), total phenolic content, and antioxidant activity were found to be elevated in the flour derived from germinated chia seeds compared to regular chia flour. Furthermore, both germinated and normal chia flour exhibited significant antiradical activity against DPPH and the efficiency of chelating ferrous ions, underscoring their potential as antioxidant sources [65].

V. Potential Benefits for Weight Management by Consuming of Chia Seeds

Studies have shown that incorporating chia seeds into the diet can have a positive impact on body weight because it is rich in dietary fiber, which can help promote feelings of fullness and reduce overall calorie intake. The fiber content in can also aid in digestion and promote gut health, also chia seeds relatively low in calories. This means that they can be included in the diet without significantly increasing caloric intake. The mechanisms of action of chia seeds in promoting weight loss and aiding weight management can be according to several things, including: High Fiber Content: Chia seeds are rich in dietary fiber, specifically soluble fiber. When exposed to liquid, the soluble fiber in chia seeds forms a gel-like substance in the gut, which can elevate satiety and promote a fullness. The fiber in chia seeds also slows down the digestion and absorption of carbohydrates, resulting in a more gradual release of glucose into the bloodstream. This helps stabilize blood sugar levels and prevent rapid spikes and subsequent crashes in energy, reducing cravings for high-calorie foods [66]. Low Caloric Density: Chia seeds are relatively low in calories. This refers to the fact that putting chia seeds into the diet can aid in increasing the volume of food consumed without significantly increasing caloric intake. This can be beneficial for weight management and weight loss by promoting a sense of fullness and satisfaction without contributing excess calories. Protein Content: Chia seeds are an excellent source of plant-based protein, containing all essential amino acids [66-67]. Omega-3 Fatty Acids: Chia seeds are one of the richest plant-based sources of omega-3 fatty acids, specifically alpha-linolenic acid . Omega-3 fatty acids have been associated with various health benefits, including improved lipid metabolism, reduced inflammation, and enhanced insulin sensitivity. These effects can contribute to weight management by promoting a healthier metabolic profile and supporting overall well-being [67-68]. Antioxidant and Anti-Inflammatory Properties: Chia seeds contain antioxidants such as flavonoids and phenolic compounds, which help reduce oxidative stress and inflammation in the body. Chronic inflammation is linked to obesity and metabolic disturbances, and by addressing inflammation, chia seeds may support weight management and metabolic health [66-68]. Chia seeds are a good source of plant-based omega-3 fatty acids, which have been linked to reduced inflammation and improved metabolic health. This can potentially contribute to weight management. Incorporating chia seeds into a balanced diet, along with regular exercise, can be a beneficial strategy for weight management [69-71]. Another systematic review focuses on randomized controlled trials that have evaluated the effects of chia seed consumption on weight loss and disease risk factors in overweight or obese adults, he results of the study suggest that incorporating chia seeds into the diet can play a beneficial role in promoting weight loss and improving obesity-related risk factors while maintaining good glycemic control, especially in individuals with diabetes. The supplementation of Salba-chia seeds may serve as a useful addition to conventional therapy for managing obesity in individuals with diabetes [72-74]. Another research explores the impact of chia seed supplementation on waist circumference, lipid profile and potentially body weight in overweight and obese individuals. This finding underscores the potential of chia seeds, as a dietary intervention to support weight management and overall health in individuals with diabetes. The study's results provide valuable insights into the role of chia seeds in managing obesity and related health conditions, highlighting their potential as a natural and nutritious addition to the treatment of diabetes and obesity.
Another study demonstrated that dozen weeks of magnification with thirty five grams of chia flour per day caused a significant reduction in body weight and waist circumference, but this reduction was observed only in the intragroup analysis and clinically discrete. also, the supplementation was capable to induce the serum concentration of TC, VLDL-C, and HDL-C, but only when considered volunteers who presented abnormal values at baseline for these variables [75-77]. Dietary fiber may improve satiety, decrease caloric intake, and promote weight loss [78-79]. The effectiveness of digested proteins from chia seeds against central obesity and its associated inflammation is an interesting finding. Chia seeds are known for their high protein content, which can help promote satiety, support muscle growth, and aid in weight management. The proteins in chia seeds, when digested, may have bioactive peptides that could potentially have anti-inflammatory properties. Inflammation is closely linked to obesity and its associated health risks, so reducing inflammation can be beneficial for overall health [79-80].

VI. Conclusions

The brief review shows that Chia seeds are considered a superfood because of their nutritional value and potential positive effects on health. Incorporating them into a balanced diet along with other healthy lifestyle choices can offer benefits in managing weight and able to enhance the serum concentration of TC, VLDL-C, and HDL-C levels.

CONFLICT OF INTEREST

The authors declare that they have no conflict of interest.

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