

Research Article



AN OVERVIEW AND UPDATE OF CHEMICAL COMPOSITION AND  
MEDICINAL IMPORTANCE OF PLANT SEEDS

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**ABSTRACT:**

Plant seeds are giving vital role in our life. Their unlimited sources of fibre, saturated fats like mono and poly unsaturated fats and numerous chief minerals, vitamins and antioxidants play major role in fight against disease. Whenever consumed seeds as part of a healthy diet in our daily life, seeds is very useful to reduce saturated fat, blood sugar and blood pressure and many more effect on our body part. Many types of seeds are edible and chock-full of important nutrients and health benefits. Chia seeds, Pumpkin Seeds, Flax seeds, Sunflower seeds and Hemp seeds are few examples of nutritious seeds that can easily be appreciated as part of a healthy diet. This review is exceptional in its wide-ranging nature. By this paper we compile the beneficial and nourishing values of few plant seed.

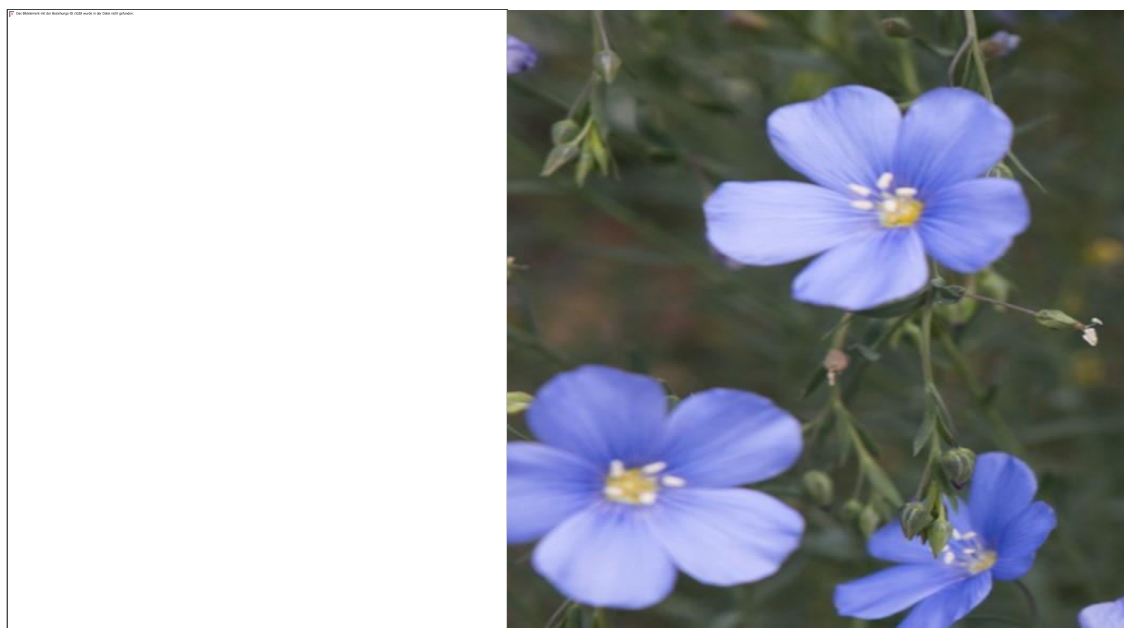
**KEYWORDS:** Seed, Flax seed, Pumpkin seed, Chia seed, Plant seeds

**INTRODUCTION:**

Plant seeds considered as super food. The seeds have an opulent nutritional profile and provide a variety of health benefits. The seeds are fit for human consumption and the common calories come from seeds as well as protein, fat, beverages, cooking oils and flavouring material and some important food additives. The storage proteins of the embryo and endosperm differ in their amino acid content and physical properties. There are different plant seeds having nutritional value including Flax seed (*Linum usitatissimum*), Chia seed (*Salvia hispanica*), Pumpkin seed (*Cucurbita maxima*), Hemp seed (*Cannabis sativa*) and Sunflower seed (*Helianthus annuus*) etc.

**Flax seed (*Linum usitatissimum*):**

Flax seed also known as alsi seed and linseed. It is unique of the most vital oilseed crops for foods as well as industrial, cattle feed, and fiber requirement. Almost every part of this utilized commercially, either directly or indirectly after processing [1]. It belongs to family *Lineaceae* and blue flowering annual herb. It is present in plant as a small flat seeds varying from golden yellow to reddish brown color. It possesses crusty feel and nutty taste (Fig 1)[2].

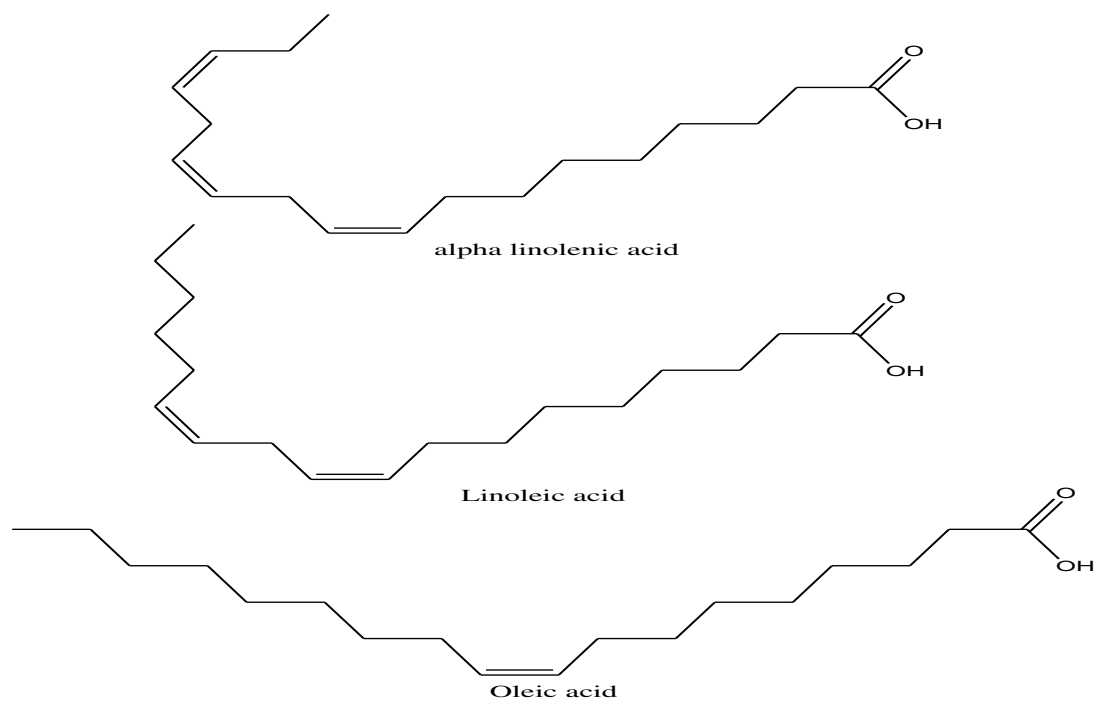


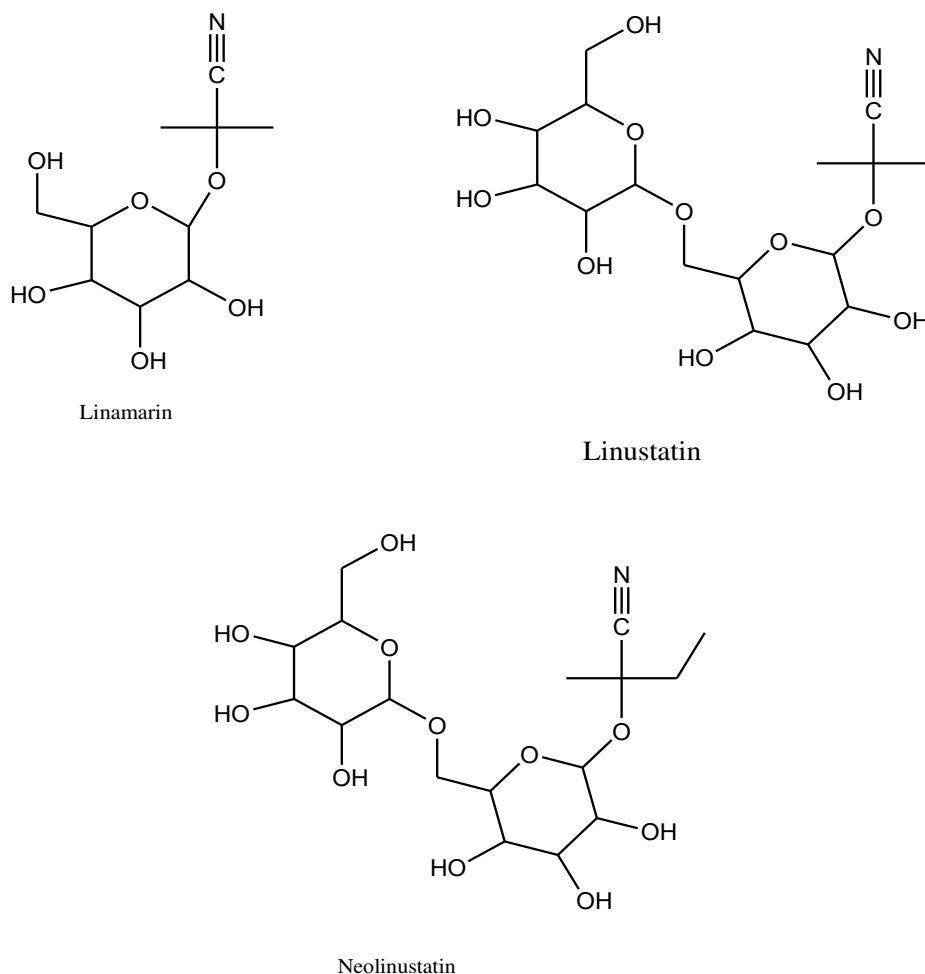
**Figure 1: Flax seed plant and seed**

**Chemical composition of Flax seed (*Linum usitatissimum*):** Flax seed contain polyunsaturated fatty acids (PUFA) which comes in omega-3 family, having soluble dietary fibers, lignans, proteins and carbohydrates (Table:1) (Fig:2) [3].

**Table 1: Composition of component in flax seed**

Compound	Percentage Content	Compound	Percentage content
$\alpha$ -linolenic acid (ALA)	53%	Palmitic acid	5%
Linoleic acid (LA)	17%	Fat	41%
Oleic acid	19%	Protein	20%
Stearic acid	3%	Total dietary fibre	28%
Vitamins and minerals as magnesium, phosphorous and calcium. The most copious vitamins founding in flax seed are tocopherols ( $\alpha$ -, $\beta$ -, and $\gamma$ - forms) and niacin.	30g portion of the seed constitutes 7% to 30%	Cyanogenic Glycoside (linamarin, linustatin and neolinustatin)	Contain significant quantity of cyanogenic glycosides.





**Figure 2: Chemical structure of component in flax seed**

**Therapeutics potential of Flax seed:**

The flax seed oil-induced diarrhoea, formaldehyde and Complete Freund's Adjuvant (CFA)-induced arthritis, turpentine oil-induced joint oedema in Wistar albino rats by Gaurav Kaithwas et.al. [4]. Fixed oil was obtained by crushing the seed and used cold-maceration process by petroleum ether (40–60°C) as a solvent and kept for one week. After Completion of one week evaporate the Petroleum ether from the extract and remaining oil was filtered. 17.50% v/w yield of fixed oil was obtained by dried seeds. The oil density was 0.952 gm/ ml. The oil when given intraperitoneally, considerably inhibition by the turpentine oil-induced exudative joint oedema and castor oil-induced diarrhea in a dose-dependent manner. It also exhibited significant inhibitory effect of flax seed fixed oil in formaldehyde-induced

proliferative world-wide oedematous arthritis. Flax seed fixed oil found to be effective in inflammatory disorders like rheumatoid arthritis.

35% oil contain in a Flax seed, in which 55% is  $\alpha$ -linolenic acid (ALA). Flax meal, which is devoid of oil, contains the lignan secoisolariciresinol diglucoside (SDG). Flax seed, flax seed with very low ALA, flax seed oil, flax lignan complex (FLC), and SDG reduce the development of hypercholesterolemic atherosclerosis by 46%, 69%, 0%, 73%, and 34%, respectively, in the rabbit model by Kailash Prasad et al [5]. Flax seed with very low ALA ( $\alpha$ -linolenic acid), FLC (flax lignan complex), and SDG (secoisolariciresinol diglucoside), but not flax seed oil, suppress the development of atherosclerosis. FLC and SDG decrease progression of atherosclerosis but do not revert atherosclerosis. Suppression of atherosclerosis by flax seed is not the result of ALA, but is the result of the lignan content of flax seed. The lipid-lowering effects of flax seed are variable. However, flax seed with very low ALA, SDG, and FLC significantly reduce serum lipids. SDG and FLC raise serum HDL-C. In general, flax seed oil does not affect serum lipids. SDG is a very potent antioxidant and hypertensive agent. Flax seed oil in high doses suppresses inflammatory mediators. Flax seed oil decreases platelet aggregation and increases bleeding time. SDG is a potent angiogenic and antiapoptotic agent. Because of these attributes of flax seed and its components, they may be effective in improving cardiovascular health.

*In vitro*, animal, observational, and clinical studies on Flax seed (FS) and its lignan and flax seed oil components by Julie K Mason [6]. The majority of studies in various rodent models show that 2.5%-10% FS diet or the equivalent amount of lignan or oil reduces tumour growth. Ten percent FS and equivalent lignans do not interfere with but rather increase the efficacy of tamoxifen (80 mg/day) while the 4% FS oil increases trastuzumab/Herceptin (2.5 mg/kg) efficacy. Lignans reduce breast cancer and all-cause mortality by 33%-70% and 40%-53%, respectively, without reducing tamoxifen effectiveness. Clinical trials show that FS (25 g/day with 50 mg lignans; 32 days) reduces tumour growth in breast cancer patients and lignans (50 mg/day; 1 year) reduces risk in premenopausal women. The possible Mechanisms comprise decreased cell proliferation and angiogenesis and increased apoptosis through modulation of estrogen metabolism and estrogen receptor and growth factor receptor signaling pathways. The outcome of this work confirms that FS and its components are effective in the risk reduction and treatment of breast cancer and safe for consumption by breast cancer patients.

Total 11 studies (14 trials) in the systematic review and meta-analysis done by Saman Khalesi et al [7]. The objective of that work is to find out the effect of Flax seed on blood

pressure by clinical trial. Random-effects meta-analyses were conducted for the mean difference in blood pressure. Results confirmed that consumption of flax seed may lower blood pressure somewhat. The valuable prospective of flax seed is to reduce blood pressure (especially diastolic blood pressure) when it is consumed as an entire seed for a duration of >12 wk.

### Chia seed (*Salvia hispanica* L):

Chia seed is small in size that originates from a yearly herbaceous plant. Chia seeds has tremendously grown due to their curative values and high nourishing value. It is belonging to mint family native and edible having flowering plant. It is present in central and southern Mexico, or of the related Mexico and *Salvia columbariae* of the southwestern US. It belongs to the order Lamiales, mint family *Labiata*, subfamily *Nepetoideae*, and genus *Salvia* (Fig:3).



**Figure 3: Chia seed plant and seed**

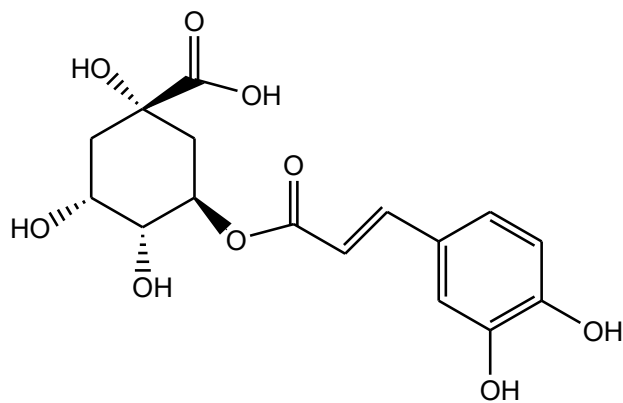
**Chemical composition and Nutritive values of Chia seed:** Chia seeds contain high nutritive value due to presence of high contents of dietary fibre and fat (Table: 2) (Fig: 4). [9]

**Table 2: Composition of component in chia seeds**

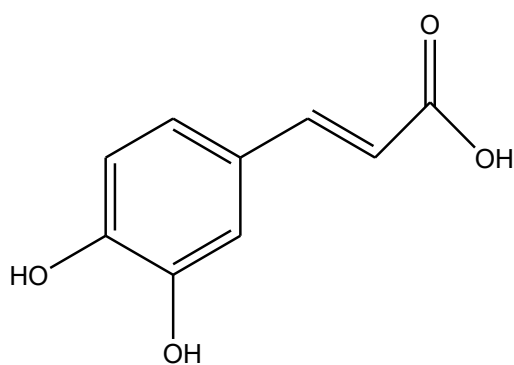
Nutrients	Value	Nutrients	Value
Energy	486 kcal	Thiamine	0.6
Protein	16.5 g/100ml	Riboflavin	0.2
Total lipid	30.7	Niacin	8.8
Carbohydrate	42.1	Vitamin E	0.5
Dietary fiber	34.4	Omega 3 fatty acid	18g/100g
Calcium	631mg/100g	Omega 6 fatty acid	6g/100g
Iron	7.7	Linoleic acid	20.37
Magnesium	335	Lenolenic acid	59.76

Folate	49 $\mu\text{g}/100\text{g}$	SFA	8.65
Phosphorous	860	MUFA	10.95
Potassium	407	PUFA	80.4
Sodium	16	Poly phenols (Kaempferol)	0.013
Zinc	4.6	Poly Phenols (p- Coumaric Acid)	0.24
Copper	0.9	Poly phenols (Chlorogenic acid)	4.68
Manganese	2.7	Polyphenols (Caffeic acid)	27-30.89 $\mu\text{g}/\text{g}$
Vitamin C	1.6	Polyphenols (Quercetin)	0.17 $\mu\text{g}/\text{g}$

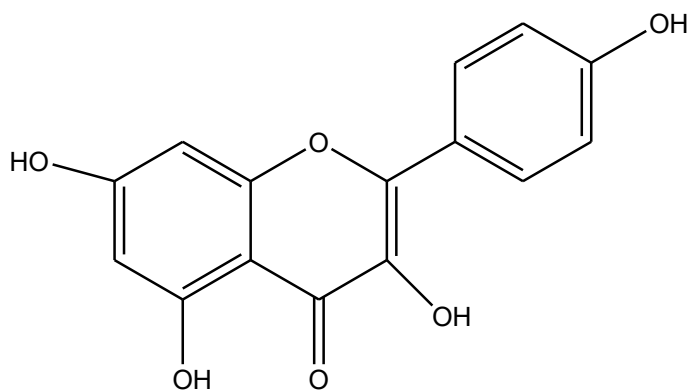




Chlorogenic Acid



Caffeic acid



Kaempferol

**Figure 4: Chemical component structure present in chia seed.**

**Therapeutics potential of Chia seed:**

E. Reyes-Caudillo et al [10] used chia seeds (fig.3) from two different places in the states of Sinaloa and Jalisco for detection of soluble and insoluble fiber and evaluated for antioxidant activity of phenolic complexes. The soluble and insoluble fiber content of the Jalisco and Sinaloa seeds was similar. The major compounds recognized in hydrolyzed and crude extracts were quercetin and kaempferol, while caffeic and chlorogenic acids were existing in low concentrations. Screening of antioxidant activity using 2, 2'-azino-bis(3-ethylbenzothiazoline-6-sulphonic acid radical cation (ABTS<sup>+</sup>), b-carotene linoleic acid model system (b-CLAMS) and *in vitro* liposome peroxidation system assays, showed that the crude extract of the Jalisco seed has having an antioxidant activity comparable to the commercial antioxidant Trolox used as a reference. The isolation and preparation of bioactive compounds from chia seeds could be used to produce powerful natural antioxidants and efficient elements with viable importance.

Katarzyna Marcinek et al [11] reported that Chia seed is a good source of polyunsaturated fatty acids: omega-3 and omega-6, soluble dietary fiber. It also comprises substantial amount of proteins and phytochemicals. It is effective in the prophylaxis of numerous diseases such as obesity, hypertension, cardiovascular disease, Cancer and Diabetes.

Vuksan V et al [12] investigated the effect of chia seed on postprandial glycemia in healthy subjects. The study used acute, randomized, double-blind, controlled design. This study includes 11 healthy individuals (6 males and 5 females; body mass index 22.3±2.8 kg/m<sup>2</sup>) received 0, 7, 15 or 24 g of chia seeds baked into white bread. The result concluded that chia seed reduces postprandial glucose level after 12-week chia seed supplementation in type II diabetes

Luciana Tavares Toscano et al [13] investigate the effect of chia seed supplementation in body composition, lipid profile and blood glucose in overweight or obese individuals. For this study men and women were randomly allotted in groups that ingested 35 g of chia flour/day (CHIA; n=19; 48.8±1.8 years) or placebo (PLA; n=7; 51.4±3.1 years) for 12 weeks. After consumption of chia for 12 weeks promotes significant but distinct reduction in weight and waist circumference, and enriches HDL lipid profile. Triglycerides, blood glucose and LDL-C exhibited no changes for either group.

Evelyn M. Montes Chañi et al [14] reported that due to presence of large amount of  $\alpha$ -linolenic acid in chia seeds (*Salvia hispanica*), It is accompanying with relief of various health complications. In his Research work he has done experiment on Sprague- Dawley rat having diet with 10% intake of Chia seeds versus Sprague- Dawley rat having conventional isocaloric diet for 10 and 13 months. In the first 10 months weight and Body parameters are

equal. But at 13 month Bone mineral content, body weight, Skin weight of chia seed having rat is greater than the rats having conventional isocaloric diet. Liver and intestinal investigations showed improved morphology related with minor lipid deposit in hepatocytes and enlarged intestinal muscle layers and crypt size in the chia seed fed group The outcome of this Study is that chia seed are beneficial on long term intake

### **Pumpkin seed (*Curcubita pepo*):**

Pumpkin having the thick shell and it contains the seeds and pulp. It is commonly said Cucurbita pepo and Cucurbita maxima.(Fig:5)



**Figure 5: Pumpkin plant and seed**

Chemical composition and nutritive value of pumpkin seed (Table:3)(Fig:6) [15]

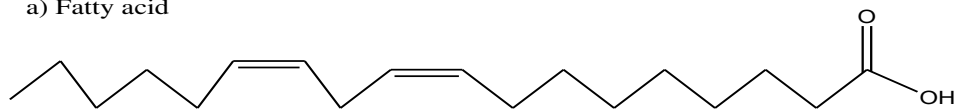
**Table 3: Composition of component in Pumpkin seed**

Nutrients	Value	Nutrients	Value
Alanine	17.76 ± 0.03	Myristic acid	0.23 ± 0.06
Arginine	63.99 ± 0.88	Palmitic acid	12.97 ± 0.72
Aspartic acid	29.95 ± 0.25	Stearic acid	4.67 ± 0.15
Glutamic acid	60.26 ± 0.04	Oleic acid	32.40 ± 0.56
Glycine	18.70 ± 0.36	Linoleic acid	36.40 ± 0.82
Histidine	18.37 ± 0.08	Arachidic acid	0.39 ± 0.06
Isoleucine	13.96 ± 0.74	SFA	18.62 ± 0.64
Leucine	24.14 ± 0.96	MUFA	32.40 ± 1.66
Lysine	13.14 ± 0.48	PUFA	36.40 ± 0.82
Methionine	4.20 ± 0.37	α-Tocopherol	21.33 ± 3.65
Phenylalanine	15.52 ± 0.53	γ-Tocophero	61.65 ± 17.66
Valine	17.43 ± 0.69	β-Carotene	17.46 ± 18.29

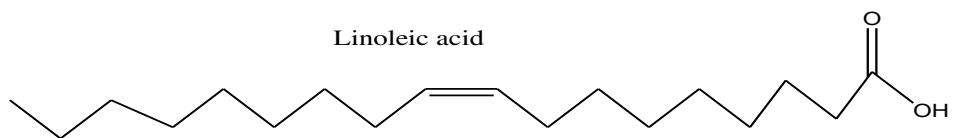
		$\beta$ -sitosterol	$383.89 \pm 48.15$
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Values were mean  $\pm$  SD.

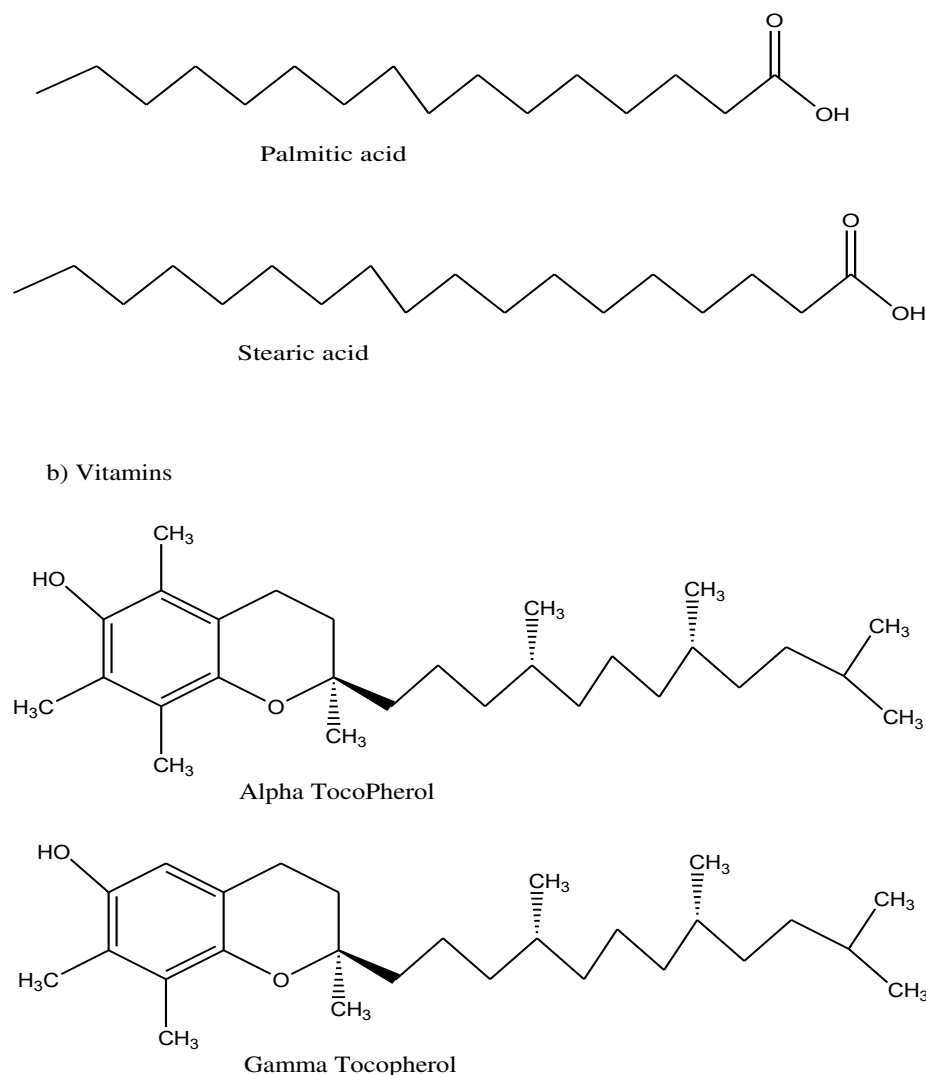
a) Fatty acid



Linoleic acid



Oleic acid



**Figure 6: Chemical component structure present in pumpkin seed**

#### Therapeutic potential of Pumpkin seed:

The extracted oil of pumpkin seed is an attention-grabbing seed, as it is associated with noticeable pharmacological activity to possible wound healing treatments. It contains high content of tocopherols (280 ppm), polyunsaturated fatty acids (Linoleic acid:  $50.88 \pm 0.106$  g/100 g of total fatty acids) and sterols ( $2086.5 \pm 19.092$  ppm). Presence of these essential constituents helpful in effective wound healing activity. The wound healing activity in rats treated with pumpkin oil extract was better than untreated or reference groups. Pumpkin seed oil extract is emerged as excellent medicine in drug and cosmetics which would offer potential safety against skin problem, e.g. dermatological wound [16].

The biological activity of hydroethanolic extract of Pumpkin seed of Styrian pumpkin by Svjetlana Medjakovic et al [17]. Pumpkin seed extract by hydroalcoholic method mainly block the growth of cancer cells also hyperplastic cells but the effects on non-hyperplastic cells were much less. Crude pumpkin seed extract block the cell generation in all cancer cell lines, being both prostate cancer cell lines, the estrogen-receptor positive breast cancer cell line MCF-7, the androgen-sensitive LNCaP and the androgen-insensitive DU-145 and the colorectal adenocarcinoma cell line Caco-2.

Antioxidant and anti-diabetic activity of crude protein obtained from pumpkin seeds. Pumpkin seeds were first converted in to powder form and extracted with of prechilled phosphate buffer solution by Sarah Jane Monica et al [18], then treated with ice cold acetone. Finally the resultant pellets mixed with distilled water for dialysis. After Dialysis the protein content was collected and estimated using Bradford method. The pumpkin seed protein was evaluated DPPH radical scavenging assay for antioxidant activity, ABTS radical cation,  $Fe^{3+}$  reduction and phosphomolybdenum reduction assay and anti-diabetic activity was performed by alpha amylase inhibition assay. The pumpkin seed protein content exhibit significant antidiabetic and antioxidant activity.

Anthelmintic activity of pumpkin seed (*Curcubita pepo*) done by Maciej Grzybek [19]. The extraction of Pumpkin seed was carried out in cold water, hot water and ethanolic extract. *In vitro* and *In vivo* anthelmintic activity was performed on two nematodes *Caenorhabditis elegans* (*C. elegans*) and *Heligmosoides bakeri* (*H. bakeri*). All *C. pepo* seed extracts showed *in vitro* anthelmintic activity on L1 and L2 *H. bakeri* larvae. The Ethanolic extract showed the positive effect on *H. bakeri* eggs hatching and noticeable inhibitory activity against worm motility. *In vivo* study conclude that ethanolic extract of Pumpkin exhibited anthelmintic activity against nematode *H. bakeri* present in GI tract of Mouse at a dose of 8g/kg.

#### **Hemp seed (*Cannabis sativa* L.):**

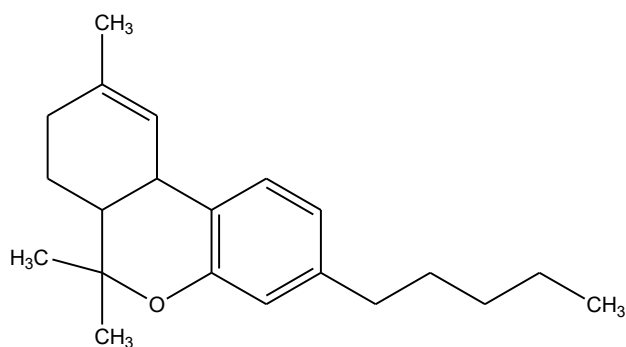
The seeds of hemp have been a chief source of nourishment for 1000 of years in Chinese and European cultures but, nowadays, in spite of the multiple clinical indication, also exhibited their vast health-promoting properties. Chemical composition of Hemp seed 30 gram contains: Calories (16.6), Protein (9.47 grams), Fat (14.6 grams), Carbohydrates (2.6 grams), Fiber (1.2 grams), Sugar (0.45 grams). It contains large amount omega-3 and omega-6 essential fatty acids with Iron, Vitamin E, Vitamins-B Manganese, Magnesium.(Fig: 7 and 8) (Table: 4)



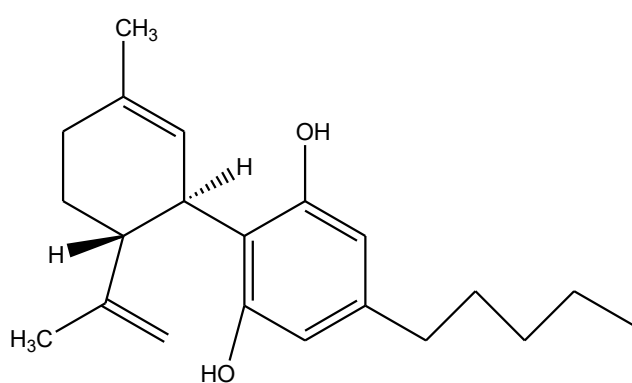
**Figure 7: Hemp plant and seed**

**Table 4: Composition of component in hemp seed**

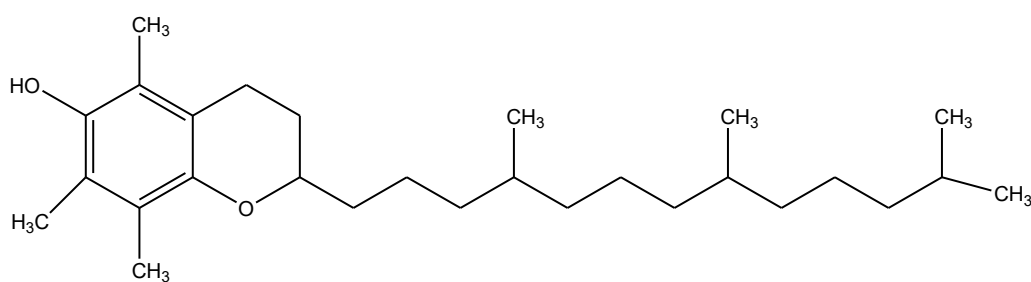
<b>Components</b>	<b>Value</b>
<b>Fatty Acids</b>	<b>(% w/w)</b>
Linoleic Acid	50-70
Linolenic Acid	15-25
Oleic Acid	10-16
Palmitic Acid	6-9
Stearic Acid	2-3
Eicosanoic Acid	0.79-0.81
Eicosenoic Acid	0.39-0.41
Eicosadienoic Acid	0.00-0.09
<b>Natural Product</b>	
Cannabidiol	4.18–243.68
tetrahydrocannabinol	50 mg/kg
Alpha-Tocopherol	7-80 ppm
Gamma- Tocopherol	710-870 ppm



Tetrahydrocannabinol



Cannabidiol



Alpha Tocopherol

*Figure 8: Chemical component structure present in Hemp seed***Therapeutics potential of Hemp seed:**

Its Clinical trial on thirty five hypertensive participants aged 18-75 years organized by Maryam Samsamikor et al. Body mass index of patient in the middle of 18.5 and 40 kg/m<sup>2</sup> with systolic blood pressure (SBP) between 130 and 160 mmHg and diastolic blood pressure (DBP) ≤ 110 mmHg. Total timings for clinical trial 22 weeks. They consumed 25 g casein,



hemp seed protein (HSP), or HSP plus HSP hydrolysate (HSP+) twice a day. A double-blind, randomized, crossover trial protocol inspecting the effective anti-hypertensive benefit of dietary hemp protein plus bioactive peptide consumption in humans.[23]

Hempseed was useful in neurodegenerative and cardiovascular disease reported by Min Jung Lee et al. The effect of Hemp seed meal on cytotoxicity, oxidative stress and neurological phenotypes, and cholesterol acceptance, using *Drosophila* models. Hemp seed meal showed antioxidant effect and defensive effect against A $\beta$ 42 cytotoxicity, durability in the Parkinson's disease model, and locomotion and eye erosion in the Huntington's disease. It is also help in the management of cardiovascular disease and Alzheimer's disease.[24]

Alline Cristina Campos investigated that Cannabidiol (CBD), phyto constituent of *Cannabis sativa* plant. *In vivo* studies of Cannabidiol (CBD) revealed that acute anxiolytic and antidepressant like effects seem to rely mainly on acceleration of 5-HT<sub>1A</sub> mediated neurotransmission in important brain parts correlated to protective responses, including the dorsal periaqueductal grey, bed nucleus of the stria terminalis and medial prefrontal cortex [22]. Anti-compulsive, increased extinction and impaired reconsolidation of aversive memories, and facilitation of adult hippocampal neurogenesis could depend on potentiation of anandamide-mediated neurotransmission [20].

Andrea M Tomko reported that cannabinoids present in cannabis plant exerted and gives anticancer effects in several models by suppressing the tumour angiogenesis, migration and/or invasion of cancer cells, as well as proliferation [21].

### **Sunflower seed (*Helianthus annuus*):**

The sunflower was considered as an decorative flower until the 19th century after that in Russia it was cultivated as an oilseed plant. Sun flower seed is obtained from sunflower *Helianthus annuus* L. Sunflower seed hull is waste of the edible oil industry. Sun flower seed is rich in linoleic acid, oleic acid monounsaturated, saturated, and polyunsaturated fats. They are very nutritious (65.42% lipids, 33.85% proteins and 18 mineral elements) [27]. Due to the rich content in lipids, they are principally used as a source for vegetable oil. In comparison to seeds, sunflower oil cakes are more affluent in and proteins and amino acids. Sunflower seeds, a nutrient dense food has been found to have a potential role in chronic inflammatory conditions, bacterial and fungal infections, cardiovascular diseases, skin diseases and even cancers.(Fig: 9 and 10)[28]

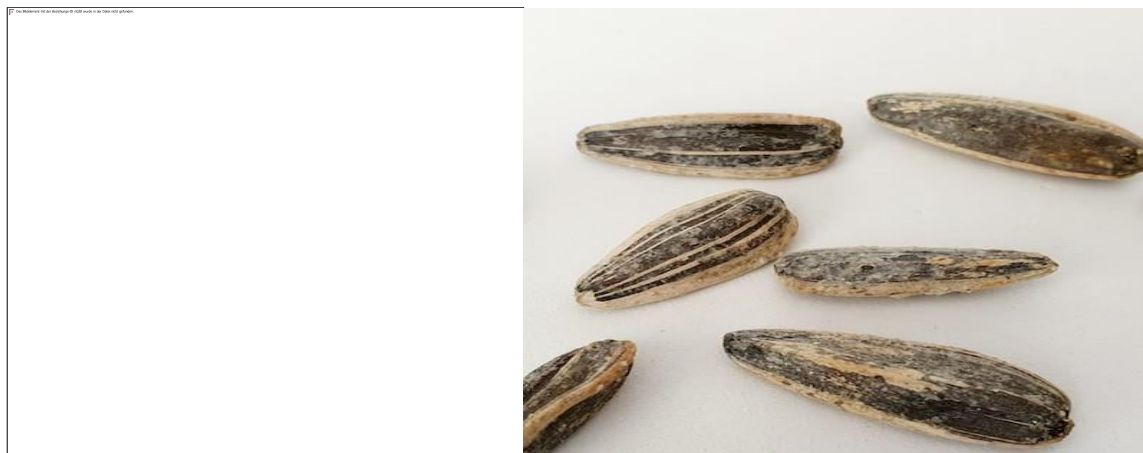


Figure 9: Sunflower plant and seed

**Chemical composition of Sunflower seed:** Shuangshuang Guo et al. by characteristic ions and contents of phenolic acids of sunflower seed (Table: 5)[26-62]

**Table 5: Composition of component in Sunflower seed**

Sr.No.	Compound name	Content (mg/100 g of DM)	
		Non-oilseed	Oilseed
1.	Ferulic Acid	7.6±3.6	12.4±2.0
2.	Caffeic Acid	20.5±1.6	26.7±1.1
3.	Non-esterified phenolic acid	28.1±4.0	39.0±2.3
4.	3-o-caffeoylquinic acid	28.1±4.0	439.9±8.6
5.	4-o-caffeoylquinic acid	58.2±0.8	87.5±4.1
6.	5-o-caffeoylquinic acid	2795.7±167.4	2467.0±13.9
7.	5-o-p-coumaroylquinic acid	11.3±2.4	112±1.0
8.	5-O-feruloquinic Acid	16.5±1.5	113±1.0
9.	Coumaric and Ferulic Acid	27.9±2.8	22.6±1.4
10.	Dicaffeoylquinic acid	196.2±7.0	360.9±1.1
11.	Caffeoylquinic acid	24.7±3.3	365±1.1
12.	Monocaffeoylquinic acid	3358.8±168.8	3030.9±17.0
13.	3,4-Di-o-caffeoylquinic acid	14.9±5.8	28.8±0.3
14.	3,5-Di-o-caffeoylquinic acid	135.0±3.0	211.2±1.1
15.	4,5-Di-o-caffeoylquinic acid	46.3±2.7	120.9±0.2

**Therapeutics potential of Sunflower seed (*Helianthus annuus*):**

One of the person had consumed significant amounts of sunflower seeds and calcium carbonate supplements, which were considered to be the cause of his hypercalcaemia.

Hypercalcaemia due to taken of sunflower seeds and calcium carbonate supplements reported by Iqra Patoli et al. in that case of a 53-year-old man with history of T-cell lymphoma and gastroesophageal reflux disease, the man was brought to the emergency room due to altered mental status, nausea, vomiting and abdominal pain. His calcium level was 3.30 mmol/l (normal value 2.23–2.58 mmol/l). The patient was hydrated with normal saline and calcium levels improved. Once he was more coherent, Conclusion of the study hypercalcaemia was common and can lead to critical illness. Although hypercalcaemia was regularly associated with endocrinological illnesses, sometimes the presentation is secondary to increased intake. The intake of sunflower seeds and antacids containing calcium carbonate can cause symptomatic hypercalcaemia. It is significant to diagnose uncommon causes of hypercalcaemia in order to treat it in a appropriate style and avoid recurrence.[25]

The effect of Sun flower seed extract on weight and body composition of healthy obese adults during twelve weeks of ingesting reported by Aurelie Leverrier et al. 500 mg Sunflower extract were given to 50 subjects per day for twelve weeks. At the completion of the work, an insignificant decrease in body weight, Body Mass Index (BMI), and waist boundary was observed, mainly for obese female subjects above 30 years. Finally it was saw that consumption of sunflower extract has a valuable effect on body weight, fat mass, and lipid profile and Sunflower extract emerged as a natural anti-obesity herbal extract.

The effect of topical use of sunflower seed oil three times daily to preterm infants <34 weeks gestational age at the Kasr El-Aini neonatal intensive care unit at Cairo University on skin condition, rates of nosocomial contaminations and mortality Gary L Darmstadt et al. At the end of randomized and controlled clinical trial, it was concluded that sunflower seed oil (n = 51) lead to in a substantial improvement in skin condition (P = 0.037) and a highly significant decrease in the incidence of nosocomial infections (adjusted incidence ratio, 0.46; 95% confidence interval, 0.26-0.81; P = 0.007) compared with infants not receiving topical prophylaxis (n = 52). By this don't get any adverse events as a result of topical therapy.

The anti-diabetic property of ethanolic extract of sunflower seeds at 250mg/kg and 500mg/kg in normal, glucose loaded hyperglycemic and streptozotocin (STZ) induced Type-2 diabetic rats by Shivani Saini et al. It was concluded that the oral administration of ethanolic extract containing polyphenols from *Helianthus annuus L.* leads to an increase in insulin secretion, the inhibition of gluconeogenesis and glycogenolysis and/or protection of pancreatic  $\beta$ -cells from streptozotocin and glucose-induced oxidative stress.

## CONCLUSION:

Plant seed are now considered as super food and provide numerous benefits when taken with diet. Flax seed is loaded with rich amount of protein, fiber and omega-3 fatty acids, vitamins and minerals. Flax seeds are valuable in control of Cholesterol and blood pressure. Flax seeds are also helpful in improving in heart health, diabetes and cancer. Chia seeds are rich source of omega-3 fatty acid. They are an excellent source of dietary fiber at 10 grams per ounce about 2 tablespoons, and having protein and minerals with iron, calcium, magnesium and zinc. Chia seeds are helpful in diabetes, cardiovascular diseases and obesity. Pumpkin seeds contain great amount of Vitamins (Vitamin K), Proteins, Minerals (Manganese, Phosphorous and Zinc), Fiber. Pumpkin seeds are very beneficial in management of diabetes, cardiovascular disease, cancer and act as antioxidant and immunity booster. Hemp seed are beneficial in skin disorder, reduce cardiovascular risk, improve digestive health and reduce menopausal symptoms. Sunflower seeds having vitamin E, flavonoids, and other plant compounds that can reduce inflammation, risk of cardiovascular disease, high cholesterol level, Support the immune System, antimicrobial, antioxidant activity, prevent cancer and Reduce weight. Hence Plant seeds are good sources of plant-based, healthy fats, fiber and minerals and boost our health when taken with diet.

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Author Anshu Dudhe, Rupesh Dudhe has compile all the work, Lata potey contributing in Hemp seed, Gayatri Katole and Md. Hassim Mansuri in Hemp seed, Vaibhav Uplanchiwar & Lalchand Devhare in Chia seed and Deepika Devnani in Sunflower seed and its composition has contributed.

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