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REVIEW ARTICLE ON FLAXSEEDS AS A HAIR SMOOTHER AND CONDITIONER

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ABSTRACT
Interest in "Functional foods" has increased due to growing knowledge about the importance of diet and the pursuit of human wellbeing, and many traditional foods' functional qualities are being reimagined. The use of flax as a vitafood is still growing, and it has received more attention lately, mainly in relation to cardiovascular disease. Due to the fact that it is the greatest known supplier of lignans, phytoestrogen, and alpha-linolenic acid, in addition to being a beneficial origin of the soluble iron. Flax seeds contain a derivative of lignin, and lignans have a wide spectrum of biological activity. Diglucoside secoisolariciresinol, which is converted into mammalian lignans. The slack laws impact the early risk indicators in animal models of colonic and breast cancer. The review explores flaxseed's application as a hair smoother and conditioner.
KEYWORDS: *Flaxseed, Functional Foods, Lignans, Phytoestrogens, Alpha-Linolenic Acid, Cardiovascular Health, Hair Conditioner, Biological Activity.*

INTRODUCTION

Maintaining good health in the present world is difficult because of the numerous degenerative lifestyle disorders that afflict the society. The quickly evolving global health landscape, along with the swift recognition of the detrimental impacts of excessive food processing and medication, has led to a well-earned focus on plant based products. Interest in foods that have therapeutic properties has increased as wellbeing and the function of nutrition become more widely recognized. [1] Foods or dietary components classified as "functional foods" or "neutraceuticals" may offer health benefits above and beyond those of simple nourishment. Beyond what would be predicted from their typical nutrient profile, functional foods provide an additional health benefit because flaxseed is high in several phytochemicals and the necessary omega-3 fatty acid, alpha linolenic acid. In addition, flaxseed offers protein (fax primer) and dietary fiber.[2] It was identified as one of the six neutraceuticals ,because flaxseeds contain omega-3 fatty acids in high amount, more and more health-conscious consumers are included them in their diets.

Flaxseed, often called linseed, is becoming more and more popular as a functional dietary ingredient because to its abundance of lignans, fiber [3] and (ALA, omega3 fatty acid). Potential health benefits of flaxseed oil, fibers, and flax lignans include a possible lower risk of cancer, diabetes, atherosclerosis, heart diseases, osteoporosis, autoimmune diseases, and neurological disorders.[4]

In addition, flaxseed contains a wealth of fatty acids and antioxidants that aid in clearing the scalp of pollutants and dead cells. You can use flax seed gel on your head skin as a moisturizer that can strengthen already-existing hair and encourage its development. Topical formulations come as per oils, creams, ointments, pastes, and gels; among these, gels are becoming more and more well-liked these days due to their increased stability and ability to offer controlled release in comparison to other semisolid preparations. The gel formulations may offer enhanced absorption properties, improving medications bioavailability in the process.[5]Gels are the system that are semisolid and a high degree of physical or chemical cross linking has been added. A liquid phase is contained inside a three-dimensional polymeric matrix (made of synthetic or natural gums [6].

Carbohydrate content is low in flaxseed. [4]
Lax thus makes up a little portion of the overall amount of carbohydrates consumed. Research has shown that flax is a plant that has been a reliable component of agriculture for hundreds of years, and that every part of the plant is useful. Not only are the seeds edible usable to make linseed oil, which is another name for flax and is beneficial to human health and wood preservation, but the stems may also be used to make linen fiber, which is used to make clothing and other items. Commonly grown flax plants are called Linum usitatissimum, and output of flax declined as a result of the oil industry's (petroleum) removal of some of the plant's requirements, particularly following World War II.[33] In stems of cultivated flax are slender and reach up to 3 feet 11 2 inches. The leaves are 20–40 mm long, glaucous green, and thin lanceolate and 3mm broad.

The pure pale blue flowers have five petals and a diameter of 15–25 mm. Crop is a spherical, dry capsule with a diameter of 5 to 9 mm that contains many glossy brown seeds that are 4 to 7 mm long and resemble apple slices. Faxing has gained popularity over the past 10 years because of its purported health advantages. Sales of goods containing flax increased by 177% in 1999 alone, according to the American Botanical Council.

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HISTORY

Characteristics and physical-chemical attributes of the mucilage of flaxseed. The Journal of Agricultural and Food Chemistry 1994; Ricky W. Fedeniuk, Costas G. Biliaderis About 8% of the weight of the seed is made up of linseed mucilage, a gum like substance connected to the hull (Bhatty and Cherdkiatgumchai, 1990; BeMiller, 1973). It is essentially a combination of polysaccharides that hydrolyze when exposed to acid, producing glucose, rhamnose, fructose, arabinose, xylose, galactose, and galacturonic acid (Erskine and Jones, 1957). The first person to separate linseed mucilage into acidic and neutral polysaccharide fractions was Bailey (1935). Erskine and Jones (1957), Hunt and Jones (1962), performed structural analyses of the mucilage. In 1948, Mason and Hall documented the application of linseed mucilage as an ingredient in chocolate milk that emulsifies. Be Miller (1973) also came to the conclusion that linseed gum and gum Arabic are more functionally similar than any other common gums.

This reference covered the results of degrees, pH, and concentration on the rheological characteristics of solutions containing linseed mucilage. The physical and functional characteristics of linseed mucilage have drawn more attention lately. The impact of extraction and purification techniques on the yield, composition, and characteristics of this gum substance, however, is not well understood. [14]

PHARMACOGNOSY

The species of Flaxseed is Linum usitatissimum. Flaxseed is also known as Linseed. It is reddish-Brown to golden colored, oval lenticular, 4-6 mm long with a smooth and shiny surface.

Synonyms: Flax seed, Alsi (Hindi).

Biological Source: Flaxseed is the mature, dried seed obtained from Linum usitatissimum Linn. and the oil from linseed is extracted by expression of the linseeds. **Family:** Linaceae.

Geographical Source: Many subtropical areas cultivate linseeds such as India, Canada, Russia, Greece, South America, United States, Algeria, Italy, and Spain.

MACROSCOPICAL CHARACTERS

Shape – They are oval, flattened, elongated and rounded at one end. **Color –**It is Reddish-brown with minutely pitted surface.
Odour – It is Odourless.
Taste – It has Oily, bland and mucilaginous taste.
Size: - The seeds are about 4-6mm in length and 2-2.5mm in width. [7]
The species of flaxseed is Linum usitatissimum. Flaxseed is also known as linseed. Other species of flax include:
Linum flavum: Golden flax
Linum catharticum: Purging flax
Linum grandiflorum: Red flax
Linum narbonense: Spanish blue flax
Linum perenne: Perennial linseed
Flaxseed, is an oil seed crop which is loaded with phytonutrients. Primarily it consist of various types of essential fatty acids like ALA (alpha linolenic acid), ecosapentanoic acid(EPA), docosahexaenoic acid (DHA) and other omega-3 fatty acids which are obtained from fish oil. It also consists of peptides, vitamins like B1, B2, B6 and Biotin. It shows antioxidation, cardio protective, hypoglycemic and hypolipidemic activities. Functional ingredient of bakery, dairy and confectionary products. [8]

COMPOSITION

Depending upon the weather conditions the color ranges of flaxseeds changes from deep amber to reddish brown considering if it is of golden or brown variety. Approximately 15% of the seed's mucilage is found in the envelope, or testa. It is rich in nutritional fiber, protein, and fat. Flaxseed content as it may be affected by a variety of factors, including genetics, growth environment, and seed processing methods. The seed's protein content decreases as its oil content increases. [9] In sum, a study of brown Canadian flaxseed revealed 41% fat, 20% protein, 28% total dietary fiber, 7.7% moisture, and 3.4% ash. [10, 11]

Flaxseeds arewidely recognized to contain a high potency of polyunsaturated fatty acids. [12] Because of its nutritional makeup, which has a good impact on disease prevention and provides components that are beneficial to health and this is why flaxseed has gained recognition as vitafood. [13]

LIPIDS AND FATTY ACIDS

ALA is a chief constituent of linseed. It is the main source of n-3 fatty acid in vegetarian diet. [14]Compared to the limited amount of saturated fatty acids, it is primarily plentiful in total unsaturated fatty acids (87.8– 89.8%). [15] α-linolenic (C18:3, ω-3,

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42.4%), linoleic (C18:2, ω-6, 26.2%), palmitic (C16:0, 12.9%), and stearic acids (C18:0, 10.7%). These are the main constituents of flaxseed oil extracted with petroleum ether, according to an investigation. [16]

However, earlier research found somewhat higher levels of oleic (C18:1, ω-9, ca. 16– 21%) and α-linolenic (ca. 49–53%) acids combined with lower levels of linoleic acid (ca. 15– 17%), and they attributed this variance to farming practices and environmental differences. [17, 18]

However, when n-hexane was employed as the solvent for extraction by Ishag and Khalid. [19]

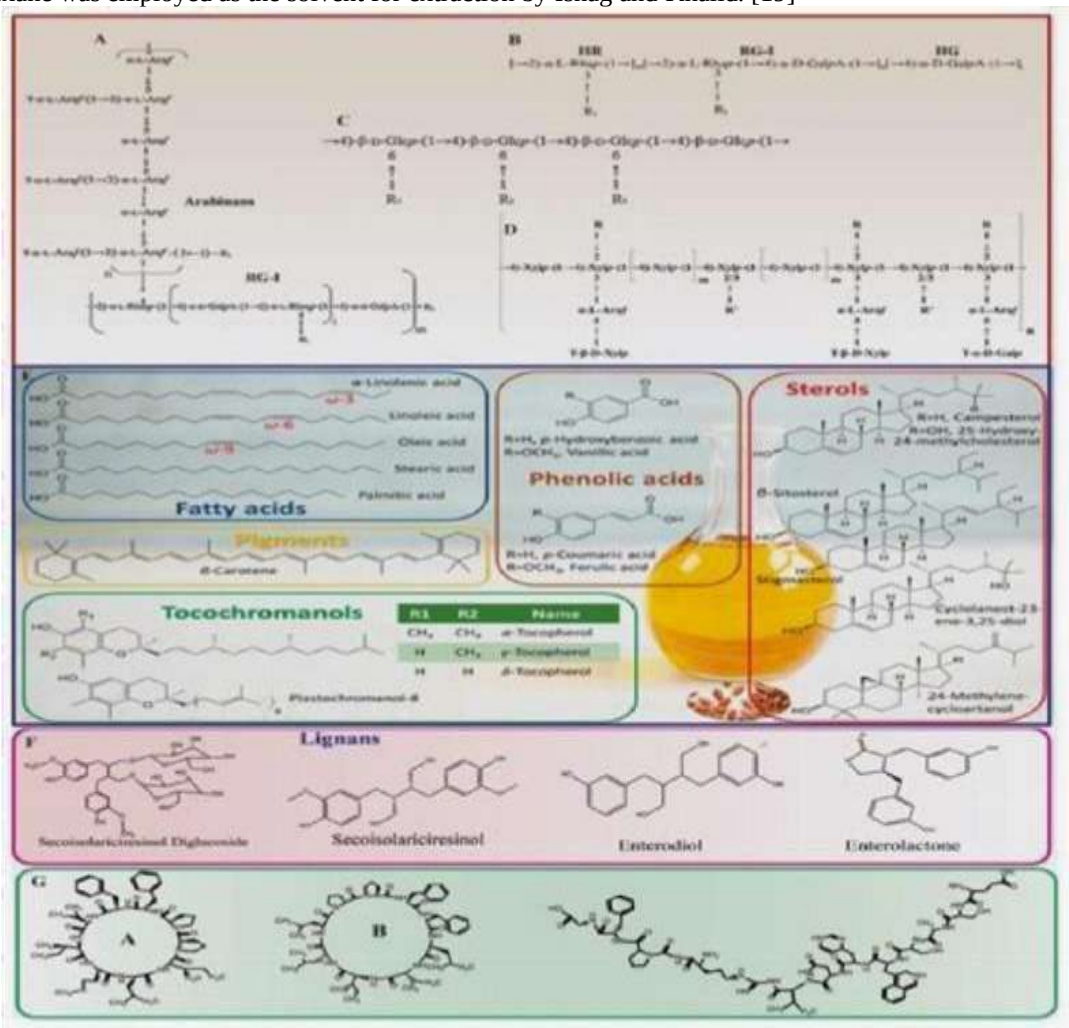


Fig no.1

Table no.1:- Fatty acid present in flaxseed. [20]

Fatty Acid	Flaxseed
Saturated	10
Monounsaturated	18.5
Polyunsaturated	71.8
Linoleic acid(n6)	16.8
Linolenic acid(n3)	55
N6/n3	0.3

VITAMINS AND MINERALS

Water-soluble and fat-soluble vitamins are both present in flaxseed.[21] Flaxseed is rich in vitamin E, which is essentially γ-tocopherol.[22] Antioxidant

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gammatocopherol protects cell proteins and fats from oxidation, controls sodium excretion in the urine, which may help lower sodium levels in the blood, and lowers the risk of heart disease, some types of cancer, and Alzheimer's disease. [23, 24]

The variety, environment, extraction technique, and location of flaxseed all affect its tocopherol content. Flaxseed contains 2-methyl-1, 4-naphthoquinone, often known as phylloquinone, which is a type of vitamin K. Vitamin K serves as a foundational part of the blood clotting system and is accompanied by other proteins that are immersed in the thrombus and regulating the amount of calcium deposited in the bones. [25] Table 2 lists the vitamins that are available in linseed and shows that it contains both water and fat soluble vitamins.

Fat soluble vitamins	Mcg/100g	Mg/tbsp./milled flax
Vitamin E • Alpha tocopherol • Delta tocopherol • Gamma tocopherol	7 10 552	0.10 0.14 7.73
Vitamin K	-	0.3
Water soluble Vitamins		
Ascorbic acid (vitamin C)	0.50	0.04
Thiamine (vit. B1)	0.53	0.04
Riboflavin (Vit.B2)	0.23	0.02
Niacin acid	3.21	0.26
Pyridoxine (Vit.B6)	0.610	0.05
Pantothenic acid	0.57 Mcg/100g	0.05 Mcg/100g
Folic acid	112	9.0
Biotin	6	0.5
Minerals		
Calcium	236	19.0
Copper	1	0.1
Iron	5	0.4
Magnesium	431	34.0
Manganese	3	0.2
Phosphorous	622	50.0
Potassium	831	66.0
Sodium	27	2.0
Zinc	4	0.3

Table No.2 Vitamins and Minerals.[26,27]

PROTEIN

Flax protein's amino acid composition is comparable to that of Glycine max protein, which is thought to be among the healthiest plant proteins. There doesn't seem to be much of a difference between the two lax protein variants listed in Table 2 in terms of amino acid concentration. Flax has no gluten. Gliadin, which is high in the polypeptides imino acid and glutamine, is the specific component in gluten that causes a condition known as “Celiac disease”.

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Amino Acid	Flax Cultivar		
	Brown flax (Nor Linn.)	Yellow flax(Omega)	Soya flour
Alanine	4.4	4.5	4.1
Arginine	9.2	9.4	7.3
Aspartic acid	9.3	9.7	11.7
Cysteine	1.1	1.1	1.1
Glutamic acid	19.6	19.7	18.6
Glycine	5.8	5.8	4.0
Histidine*	2.2	2.3	2.5
Isoleucine*	4.0	4.0	4.7
Lysine*	4.0	3.9	5.8
Methionine*	1.5	1.4	1.2
Proline	3.5	3.5	5.2
Serine	4.5	4.6	4.9
Threonine*	3.6	3.7	3.6
Tryptophan*	1.8	Not reported	Not reported
Tyrosine	2.3	2.3	3.4
Valine*	4.6	4.7	5.2
Leucine	5.8	5.9	7.7
Phenylalanine*	4.6	4.7	5.1

CARBOHYDRATE

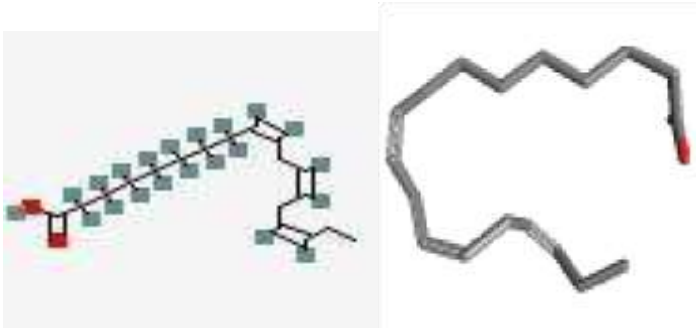
Carbohydrate content is low in flaxseed. [4] Flax thus makes up a little portion of the overall amount of carbohydrates consumed.

MUCILAGE

Naturally, mucilage is a water loving, and FM is made up of two distinct kinds of polysaccharides: an arabinoxylans, which is neutral in nature, and a pectic-like substance, which is acidic in nature. [30] It has been shown that the neutral portion of FM contains three distinct arabinoxylans families but varying galactose and fructose residues in the side chains). [31] β-1, 4-linked xylose backbones that are either unsubstituted or have 1-3 sugar residues substituted at the O-2 and/or O-3 locations make up FM's arabinoxylans. [32]

PHARMACOKINETICS OF ALPHA LINOLEINIC ACID

Structure



Molecular Formula

C 1 8 H 3 0O 2

Synonyms

- alpha-Linolenic Acid-d14
- 1622944-40-4

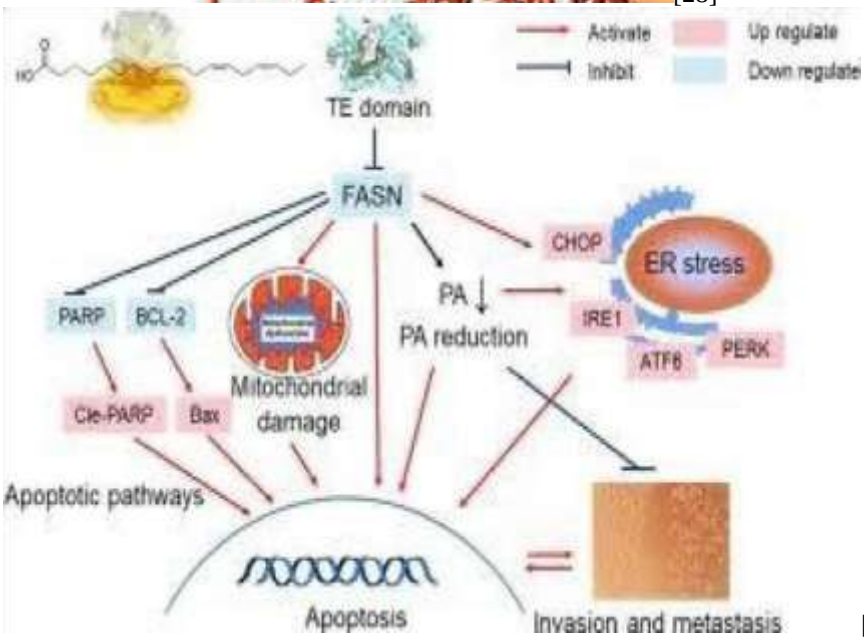
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- (9Z,12Z,15Z)-2,2,3,3,4,4,5,5,6,6,7,7,8,8tetradecadeuteriooctadeca9,12,15trienoic acid
- 9Z,12Z,15Z-octadecatrienoic-2,2',3,3',4,4',5,5',6,6',7,7',8,8'-d14acid
- alpha- linolenic-d14

Molecular Weight 292.5g/mol



[28]



[29]

HERBAL TREATMENT

India has a long tradition of using flaxseed, and preparations made from it are valued for their nutritional value and potential medical benefits. A smaller portion of the population in Southern India consumes flaxseed as flaxseed chutney. The plant that produces linseed, Linum Usitatissimum L, is comes from the Linaceae family. [34]

Flaxseed oil's vitamin E aids in the treatment of hair loss and it helps in the thickening of hair. Being potent antioxidants, lignans can promote the growth of stronger, healthier hair. Dandruff is relieved by applying flaxseed oil topically, which also nourishes the scalp internally and stops flaking. [35]

Flaxseed's vitamin E content nourishes the scalp and lessens the harm caused by free radicals. Rich in omega-3 fatty acids is flaxseed. Additionally, it can lessen inflammation.

ON HAIR

Fatty acids are known for their capacity to supply moisture, and it nourishes dry, damaged hair. Flaxseed gel feeds the hair follicles, promoting quicker and longer hair growth. Being an antioxidant, vitamin E helps your scalp feel less affected by free radicals, which encourages the creation of new hair. Stronger hair follicles may be another benefit of an adequate vitamin E diet. [36]

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One food source that has a significant amount of lignans a type of phenolic is flax seeds. Describe the antibacterial and antifungal properties of extracts from flax seeds, which have a special blend of several phenylopropanoid chemicals. The high concentration of glucosides, ferulic acid, p-coumaric acid, and Secoisolariciresinol Diglucoside (SDG) in flax seeds, along with their multidirectional activity, made the powder extract of flax seeds excellent at preventing the growth of both bacteria and fungi.

Our goal was to assess the efficacy of a powder extract of flax seeds against clinically relevant bacteria and fungi, including Escherichia coli, Saccharomyces cerevisiae, Salmonella paratyphii, Lactobacillus, and Staphylococcus aureus, as well as Proteus vulgaris and Klebsiella pneumoniae, which are known to be the source of antibioticresistant infections. Through the use of the agar diffusion method, we were able to determine the fungistatic and bactericidal actions.

Effects of an Antioxidant: Studies have demonstrated that leukotriene B4 (LTB4), interleukin-1, and tumor necrosis factor are all produced by neutrophils and monocytes when exposed to free radicals from omega-3 fatty acids. [37]

"Lignans can inhibit neutrophils' production of oxygen free radicals and function as antagonists of the platelet activating factor receptor. [38, 39]

Flaxseed contains a plant lignans called SDG, which has been shown to have antioxidant qualities. [40] According to theory, flaxseed—not flaxseed oil—may raise lipid peroxidation and consequently oxidative damage. "Diets containing defatted flaxseed continued to be associated to a reduction in protein thiol groups, indicating a rise in oxidative stress". [41]

ON ALLERGY

Known hypersensitivity or allergy to any member of the Linum genus or Linaceae plant family, including flaxseed and flaxseed oil. Anecdotal reports have indicated hypersensitivity reactions to flaxseed after occupational exposure to the powder. "Case reports have noted intense general malaise, nasal obstruction, palmar pruritus, generalized urticaria, ocular pruritus/weeping, nausea/vomiting, intestinal/abdominal pain, vomiting, diarrhea, acute dyspnea without bronchospasm, and successive sneezing after consuming linseed oil (from flaxseed or multigrain bread)".[42,43]

PROCESS OF EXTRACTION OF MUCILAGE

1)The flaxseeds utilized for the extraction were all purchased from a nearby store. Using a mechanical flaxseed preparation method was crucial for extraction. Since hull separation might be technically difficult and crushing the seeds would extract other materials, like proteins, which are mostly found in the endosperm and would reduce the quality of the mucilage extract, it was appropriate to extract the entire seed. Additionally, since this will cause protein extraction, it is not a good idea to extract the mucilage from the meal after the oil has been extracted. [44]

2)An aqueous approach was used to remove the mucilage from flaxseed using distilled water. The flaxseeds were weighed and then submerged in distilled water. This mixture should be heated and stirred using a magnetic stirrer for a minimum of 12 to 15 minutes. Next, use a fresh cotton cloth to filter the gel or extract that has been created. [44]

3)To make the flaxseed aqueous extract, add the flaxseeds to boiling water and stir continuously until a thick mucus forms. Following that, the mucilage was placed in a suitable sieve and left to rest at room temperature until needed again. [45]

HEALTH BENEFITS OF FLAX SEEDS

➢GASRO INTESTINAL BENEFITS

Research on flaxseed has demonstrated its potential to enhance intestinal health. Linseed may contribute to cure Crohn's disease and other GIT-related disorders. [46] Another study found that regular flaxseed diet can raise blood levels of enterolignans (EL) (143 Nm) and suggested that ruminococci may contribute in the synthesis of EL from the lignans in flax. [47] It is currently also clear that the activity and health of the gut flora are closely linked to the production of EL and its concentration in plasma. [48] Intestinal permeability and metabolic endotoxemia can be considerably decreased by flaxseed mucilage. Flaxseed's high levels of dietary fiber, ALA, and antioxidants can help prevent metabolic problems brought on by postmenopausal hormonal changes. Because of their oestrogenic and antioxidant properties, two metabolites of flaxseed lignan, terodiol and enterolactone, exhibit biological activities that may hold therapeutic promise. The gut flora has influence on the amounts of enterolignans in circulation, and this can vary with aging. Compared to 100% of the older persons, only 78% of the younger subjects showed detectable ENL in their plasma following flaxseed delivery. Enterolignans (END + ENL) have the potential to be especially significant in treating elderly people that are susceptible to chronic diseases. After consumption of milled flaxseed on a regular basis, healthy individuals who are younger and older can produce similar quantities of enterolignans in the blood, with the only differences being in the ratio of END:ENL.

➢HYPOGYLEMIC PROPERTY

Diabetes mellitus and hyperglycemia, or elevated blood glucose, are associated conditions that can lead to secondary issues relating to protein, carbohydrate, and lipid metabolic disorders.Numerous studies have shown the significance of supplements in preventing

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or postponing the emergence of these extra issues. It has been shown that certain functional foods have hypoglycemic and hypolipidemic properties. Low in carbohydrates, high in n-3 acids, and rich in antioxidants, flaxseed is a nutrient-dense diet. Early studies found that foods containing flaxseed had a lower glycemic index than those that didn't. Glycated hemoglobin was reduced by 15.6% and fasting blood glucose by 19.7% when flaxseed supplementation was used.

A lipoprotein B, total cholesterol (14.3%), triglycerides (17.5%), low-density lipoprotein cholesterol, and high-density lipoprotein. There was a declining trend observed in both high-density lipoprotein cholesterol (11.9%) and low-density lipoprotein cholesterol (21.8%). These results support the therapeutic potential of flaxseed in the management of diabetes mellitus. [49] After consuming 15 gm of whole flaxseed before breakfast for four weeks, postprandial hyperglycemia was significantly reduced in male patients with diabetes mellitus type II. [50] The use of lignans supplementation significantly altered the glycemia and fats levels of two diabetic patients. [51]

➢ANTICANEROUS PROPERTY

Flaxseed oil has the ability to both kill and stop the growth of malignant cells. Breast cancer cells (MCF-7) and melanoma cell lines (B16-BL6) were successfully encouraged to undergo apoptosis by their particular dose. Treating cultivated cancer cells with flax oil for one day dramatically increased sub-G1 phase, which indicates DNA damage. [52] Similarly, without harming non-cancerous cells, the cell line of a breast cancer can be treated by intake of n-3fatty acid which is present in linsed oil. [53] AML (acute myeloid leukemia) cells undergo nuclear fragmentation due to the actions of flax lignin derivatives ENL (enterolactone) and Erodiol. Because it induced phosphatidylserine migration towards the cell membrane and ROS production, which was followed by intrinsic apoptosis in AML after 48 hours, ENL is the most effective treatment.

➢ANTI INFLAMMATORY PROPERTY

C-reactive protein levels were decreased when 12 weeks of lignans capsules (360 mg/d) were given to diabetic individuals with mild hypercholesterolemia. [54] Intestinal bacteria transform flaxseed lignans into enterolignans, enterolactove, and enterrodiol. Little is known about the bioavailability of entero-lignans. When compared to ground laxseed, the mean relative bioavailability of enterolignans from whole was 28% (p<or =0.01), however when compared to crushed laxseed, it was 43% (p<or =0.01). Flaxseed grinding and crushing significantly increase the enterolignans'. [55] Serum levels of eicosapentaenoic acid, docosapentaenoic acid, and alpha linolenic acid significantly increased, and when flaxseed supplementation was administered, the concentration of enterolactone in the serum doubled. [56]

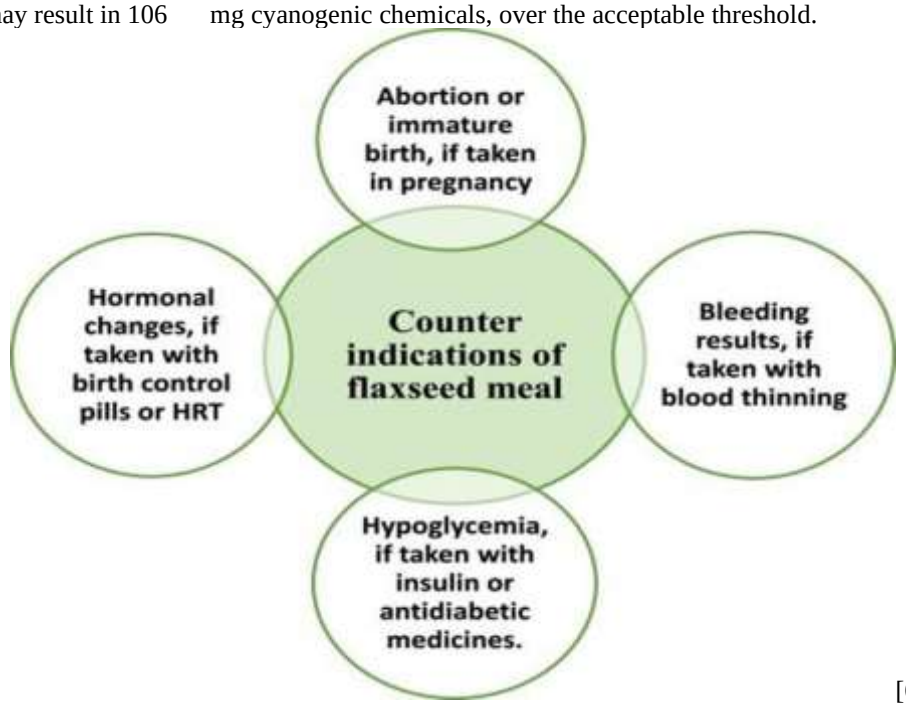
UNDESIRABLE IMPACTS OF LINSEEDS COMPONENTS

It is impossible to ignore the harmful substances and phytoestrogens with detrimental health consequences found in flaxseed. The following are the inhibitors found in flaxseed: cyanogen glycosides, trypsin, myo-inositolphosphate, cadmium. Protease inhibitors are found in small amounts in flaxseed (13.3 mg/g crude protein). [57] These amounts decrease to trace levels following germination. Trypsin inhibitors, which are included in food, have been known for decades to stunt animal growth because they inhibit proteases, which reduces protein breakdown and subsequent absorption. [58]

- The animal's digestibility of flaxseed proteins increases during thermal treatment, protease inhibitors are thermolabile.
- As phytic acid has the potential to bind with proteins and divalent minerals, seeds with high amounts of it in the inositol penta (IP-5) and hexaphosphate (IP-6) have a generally lower bioavailability. [59, 60]
- Flaxseed has around 0.526 µg of cadmium per kilogram of seed [61], which is a product of sand that has been artificially fertilized. [62]
- Heavy metal like cadmium that can be hazardous to humans because it can develop in the kidneys and cause renal dysfunction, pulmonary emphysema, amino aciduria, glycosuria, phosphaturia, and even impair mineral reabsorption, which can lead to osteomalacia. [63]
- Cadmium buildup also damages the renal tubes, which leads to proteinuria. Cadmium and mercury are recognized as two of the most hazardous metals consumption of cadmium should not exceed 1µg/kg of body weight each day. [64]
- Cyanogen glycosides causes headaches and tachycardia.
- Given the previously mentioned cadmium level of flaxseed, eating flaxseed regularly does not present a risk of intoxication for consumers because it would take an enormous amount of the seed to supply the content that is deemed poisonous to the body.264–354 mg cyanogen are present in 100 g of flaxseed; these comprise 10-11.8 mg linamarin, 136–162 mg of linustatin, and 105–183 mg neo-linustatin per 100 g flaxseed.[65] These substances are harmful to human health, and it is thought that an adult may die if they consume 100 mg of them. [66]
- People who consume large amounts of cyanate in their diets are more likely to experience the long-term effects of cyanogenic chemical consumption, which show up in the nervous system.[67]Additional symptoms associated with cyanogenic glycoside poisoning include palpitations and fast heartbeat. Nevertheless, these substances exhibit instability when exposed to mechanical and thermal procedures, such as boiling, autoclaving, and microwave cooking. [65,66,67]

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- • World Health Organization stated that, the average tolerance for cyanogenic chemical intake without harmful consequences is 0.11 mg/kg weight in the guise of cyanogen chloride; hence, a person weighing 60 kg may consume up to 0.66 mg. [68]
- Based on the documented concentration of cyanogenic compounds in linseed in the literature [69], consuming 30 grams of flaxseed daily may result in 106 mg cyanogenic chemicals, over the acceptable threshold.



[69]

CONCLUSION

Flax seeds are well-known for their abundance of antioxidants, lignans, and omega-3 fatty acids. They could also include anti-inflammatory, hypoglycemic, and anti-cancer effects. Their topical treatment has also drawn attention for hair care, especially in gel formulations. Flax seeds' fatty acids and vitamin E protect the scalp from damage caused by free radicals and encourage the creation of healthy hair. Furthermore, flax 18 seed extracts' inherent antibacterial and antifungal qualities increase how successful they are as a hair treatment. As a result, flax seeds are a natural solution for nourishing the scalp and conditioning hair, as well as a functional meal.

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