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AN ANALYSIS OF HEALTH BENEFITS OF FLAX SEED

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ABSTRACT

Flaxseed is gaining popularity as a multifunctional food component owing to high levels of -linolenic acid (ALA, omega-3 fatty acid), lignans, & fibre. Flaxseed oil, fibres, & flax lignans might aid in lessening heart disease risk, arosclerosis, diabetes, cancer, arthritis, osteoporosis, autoimmune diseases, & neurodegenerative problems. Flax protein aids in management & cure of heart disease, along with immune system support. Flax or flaxseed oil has used as a multifunctional food component in baked goods, juices, milk, pastries, dry pasta products, macaroni, & chicken products. Current review focuses on evidence of flaxseed's potential health benefits from recent human & animal research, along with commercial application in a variety of food items.

KEYWORDS:*Fiber, Flax, Flaxseed, Obesity, Oil.*

1. INTRODUCTION

Flaxseed is an essential oilseed crop used in industry, along with for feed, food & fiber. Nearly each component of flaxseed is economically viable, wher raw or processed. Stem produces high-quality fiber that is both strong & long-lasting. Seed contains lignans, omega-3 fatty acids, digestible proteins, &. Flaxseed is important resource of higher quality protein & soluble fiber, along with possible source of phenolic compounds, & is one of greatest sources of -linolenic acid oil & lignans. Flaxseed is acquiring popularity in form of functional food owing to its increased level of -linolenic acid (ALA), fiber, & lignans. Lignans seem anticancer substances. Flaxseed omega-3s & lignan phytoestrogens are being studied for ir potential benefits in a variety of health problems, & y might have chemoprotective effects in both animals & humans (1).

1.1 Cullnary Uses Of Flax Seed:

Gluten-free flaxseed meal has a nice nutty flavor. Protein level of flax meal, along with gelling/binding qualities of food's soluble fibre, makes it perfect for use in gluten-free baked goods or gluten-free thickening agent. Allowing one spoonful of meal of flaxseed to gel with 3 tablespoon of water can used in form of egg replacer in baked products. In morning, flake complements both hot & cold breakfast cereals & is a good source of fibre (2).

1.2 Nutrient in Flaxseed:

1.2.1 Omega-3 Fatty Acid:

There is optimum omega-6 to omega-3 ratio in diet of humans. Flaxseed, walnut, & canola oils all help to maintain this balance. While just a small percentage of ALA transforms in long-chain polyunsaturated omega-3 found in marine oil, it neverless provides health advantages. Researcher are examining wher omega-3 fatty acid present in flaxseed can aid prevent contaminations & cure illnesses such as psoriasis ulcer, migraine, attention deficit, eating disorders, premature labour, emphysema, , & ors (3).

1.2.2 Proteins:

Flax protein has an amino acid sequence that is comparable to soybean protein, considered one among most nourishing plant protein. Flax seed proteins, like or plants, have techno-functional characteristics that influence their behavior in food system by interacting with or components. For solubility & wateroil retention capacity, se characteristics are mostly reliant on ir hydration processes. Flax protein contains an amino acid sequence similar to soybean protein, which itself is regarded as among most nutrient-dense plant proteins. Flaxseed grain & paste contain roughly 21% & 34% protein,, however this varies depending on genetic & environmental variables. Cool-climate seeds have a high oil content & a low protein content(4).

1.2.3 Dietary Fiber:

Flaxseed meal contains a lot of fiber, with a lot of it soluble (20%) in gums & mucilages form. Soluble fiber, furthermore to accounting for flaxmeal's laxative action, is known to have strong cholesterol-reduction properties, decreasing a key risk factor for cardiacdisease. re is currently an authorized fitness claim for using ground flaxseed for reducing cholesterol in Canada, where extensive study has conducted. Insoluble dietary fiber lowers insulin resistance, relieves constipation, & promotes overall bowel health. Amplified stool volume, standardised intestinal transit time, fit gut flora, & synsis of shorter-chain fatty acid like butyrate are benefits of a high-fiber diet for colon. Low-fiber diets have linked to fatness inflammatory bowel disease, fatness, heart disease, , fatness, & colon cancer, among or chronic illnesses. Flaxmeal's high fiber content makes it excellent complement to well-balanced diet aiming at lowering risk of various chronic illnesses (5).

1.2.3 Carbohydrates:

Carbohydrates are a kind of carbohydrate that might be found in a variety. Flax has just 1 gram (g) of carbs (sugars & starches) per 100 g. As a result, flax contributes tiny in total carbohydrate consumption & is only advised for individuals suffering from certain diseases. Polysaccharide in flaxseed is made up of 2 main fractions. Non-communicable diseases (NCDs) were responsible for 36 million (63 percent) of worldwide deaths in 2008, with diabetes accounting for 1.3 million (3 percent) of those fatalities, with figure expected to quadruple by 2030. A more intriguing statistic is that, according to a recent WHO study, one out of every ten people has diabetes).(6).

1.3 Health Benefits:

Flaxseed is widely recognised for possessing chemical constituents with unique biological activity & functional qualities, such as omega-3 polyunsaturated fatty acids (PUFA), carbohydrates, soluble dietary fibres, lignans, , & proteins. It does, however, contain trace amounts of potentially hazardous substances such as Cadmium, protease inhibitors, & cyanogenic compounds..

1.3.1 Flaxseed & Cancer:

Many remarkable investigations have undertaken by Lilian Thompson's research group on anti-cancer potential of ground flax seeds. In a study, flax seed, lignan fraction, or oil were added to diet of mice that were formerly exposed to chemical carcinogen that caused cancer. tumour burden was lessen by all three treatments, with lignan fraction comprising secoisolariciresinol diglycoside (SDG) & flax seed lowering metastasis.. In other research, mice were given flax lignan SDG for one week after being exposed to carcinogen dimethylbenzanthra-cene. In this research, no. of tumors per rat decreased through 46% when matched to control group. Flax or its lignan (SDG) were studied to determine wher y might stop melanoma from spreading. Mice were given flax or lignan fraction 2 week before & after melanoma cells were injected. When compared to control, flax rapy reduced number of tumors by 32, 54, & 63 percent. SDG, which was given in quantities equal to 2.5, 5, or 10% flax seed, also decreased no. of tumors per mouse, from 62 in control group to 38, 36, & 29 tumors per mouse in SDG groups, respectively (7).

1.3.2 Flaxseed & Heart Disease:

Flaxseed has lately acquired popularity in field of cardiacdisease, owing to its higher content of alpha-linolenic acid (ALA) & phytoestrogen lignans, along with being excellent basis of soluble ber. Flaxseed has found in human trials to lower total & lesser-density lipoprotein cholesterol levels, reduce postpr&ial glucose absorption, reduce inflammation indicators, & increase blood levels of omega-3 fatty acids ALA & eicosapentaenoic acid. However, re is no conclusive evidence that flaxseed has antiplatelet, antioxidant, or hypotensive properties. Total cholesterol, LDL cholesterol, apolipoprotein B (5.4 1.4 percent; P = 0.001), & apolipoprotein A-I (5.8 1.9 percent; P = 0.005) were all decreased by partially defatted flaxseed, but serum lipoprotein ratios were not affected. Ex vivo &rogen & progestin action, serum HDL cholesterol, serum protein carbonyl concentration, & serum HDL cholesterol were all unaffected. Surprisingly, serum proteinthiol groups were suggestively lower (10.8 3.6 percent; P = 0.007), indicating that oxidation was enhanced. In rabbits, dietary flaxseed has demonstrated to have strong antiarogenic effects. When LDL receptor deficient mice (LD-LrKO) were fed a 10% flaxseed-supplemented diet for 24 hours, circulating cholesterol levels were found to be lower, suggesting that flax seeds had an anti-arogenic impact.

1.3.3 Menopause & Flaxseed:

Lignans compete with estrogen for receptor sites, resulting in a two-fold impact. Because lignan has a modest hormonal effect, prolonged flaxseed use might have an antiestrogenic effect throughout periods of life when estrogen synsis is high since it contends with estrogen for similar receptors. Flaxseed might defend women at risk of cancer by reducing hormonal signaling involved in early stages of tumor formation via this method. Consuming lignans might help decrease severity of osteoporosis & reduce risk of endometrial cancer in postmenopausal women. Flax treatments on menopausal symptom & bone health in premenopausal & postmenopausal women were studied by Dew et al. in a systematic review published in 2013. Bulk of research looked at indicated that flax intake changes circulating sex hormones & raises urine 2-hydroxyestrone/16-hydroxyestrone ratio, which is linked to a reduced risk of breast cancer. Fewer studies, however, looked at bone mineral density or indicators of bone turnover;

additional research is required to confirm effect of flax lignan on postmenopausal bone mineral density.

1.3.4 In Treatment Of Diabetes Mellitus:

Increased blood sugar (Diabetes mellitus), which is acknowledged as fasting plasma glucose level of 126 mg/dl or above, is significant risk factor for cardiac illnesses. Diabetes mellitus is characterized by hyperglycemia & is linked to abnormalities in carbohydrate, protein, & lipid metabolism, which might lead to secondary problems. Non-communicable diseases (NCDs) were responsible for 36 million (63 percent) of worldwide deaths in 2008, with diabetes accounting for 1.3 million (3 percent) of those fatalities, with figure expected to quadruple by 2030. A more intriguing statistic is that, according to a recent WHO study, one out of every ten people has diabetes). Diabetes has risen in prevalence from 153 million in 1980 to 347 million in 2008. India has world's biggest diabetic population along with one of world's highest diabetes prevalence rates. Diabetes was predicted to be responsible for approximately 2% of all fatalities in India in 2008. Diabetes, if left untreated, might lead to heart disease, renal failure, & blindness. A link has discovered between high blood glucose levels & risk of cardiacdisease. Furrmore, diabetes is linked to additional risk factors such as fatness, hypertension, poor HDL cholesterol, & high triglyceride levels.

1.3.5 Preventing From Kidney Diseases:

Chronic kidney disease (CKD) is a major well-being concern in elderly, & it might progress to end-stage renal failure, necessitating dialysis or transplantation to survive. It has hyposized that -3 fatty acids might protect kidneys from injury in adults due to ir anti-inflammatory characteristics. In animal models, PUFA supplementation was shown to reduce renal inflammation & fibrosis. Increased dietary consumption of long-chain -3 PUFA was shown to be inversely related to prevalence of CKD, according to a study. Long-term omega-3 fatty acid intake was linked to a substantial decrease in systolic & diastolic blood pressure, according to anor study. Because hypertension is a risk factor for CKD, effect of long-chain n-3 PUFA on blood pressure might be one way in which it protects kidneys. Anor study, on or h&, discovered a link between -linolenic acid & mild CKD. One explanation for findings might be a lower conversion of -linolenic acid to EPA & DHA, which have proven to protect heart.

1.3.6 Prevention & Dealing With Obesity:

Fatness-related disease conditions have traditionally treated &/or prevented with a variety of plant materials, including flax. When flaxseed fibers are hydrated, y produce highly viscous solutions similar to those seen in or gums. Hunger inhibition seems to be more effective with viscous fibers. Flaxseed mucilage soluble nonstarch dietary fibers are multibranched hydrophilic substances that form viscous solutions that delay gastric emptying & nutrient absorption in small intestine.

Flaxseed might defend women at risk of cancer by reducing hormonal signaling involved in early stages of tumor formation via this method. Consuming lignans might help decrease severity of osteoporosis &reduce risk of endometrial cancer in postmenopausal women. Flax treatments on menopausal symptom & bone health in premenopausal & postmenopausal women were studied by Dew et al. in a systematic review published in 2013. Bulkof research looked at indicated that flax intake changes circulating sex hormones &raises urine 2-hydroxyestrone/16-hydroxyestrone

ratio, which is linked to a reduced risk of breast cancer. Changes in leptin expression were inversely correlated with arosclerosis risk & strongly & positively correlated with adipose ALA levels.

1.3.7 Natural Treatment Of Bowel Syndrome:

Constipation is still a significant health issue in Western cultures, owing to a refined diet. A adequate quantity of dietary fiber is widely recognized as a key component in prevention& treatment of constipation. Flaxseed fiber metabolism is similar to that of any or dietary fiber. During 1970s& 1980s, dietary fiber was first line rapy for irritable bowel syndrome since it was a natural approach to control disease. A study looked at effects of eating 50 grams of flaxseed each day for four weeks on a variety of nutrition indicators in ten young healthy individuals. GI motility, constipation, glucose tolerance, hypocholesterolemic impact, & fermentation are all effects of flax fiber that have well documented in many reviews & publications.

1.4 Uses Of Flaxseed By-Product By Means Of Protein Source:

Flaxseed is oilseed that is grown primarily for its oil yield & fatty acid profile, with protein-rich meals produced as a byproduct. To yet, flaxseed has not widely used as a protein supplement for human utilization.. Consumer concerns (e.g., prion disease), religious inhibitions, & dietary & moral choices connected with eating animal by-products are driving industry to discover plant-based alternatives to animal-derived components in food protein ingredient market. Primary product of flaxseed is oil, & leftover paste is used to make animal feed. Flaxseed grain & flaxseed paste, on or h&, contain approximately 21% & 34% protein, respectively. Converting flaxseed paste into protein concentrate is one method to include it into traditional meals. In this manner, a product with a high protein content & certain desired functional properties might be produced. Flaxseed proteins have studied for ir emulsifying capabilities, however findings have inconsistent (8).

2. LITERATURE REVIEW

Vivek Sharma et al. discussed Flax & flaxseed oil in which y discussed how an adequate quantity of dietary fiber is widely recognized as a key component in prevention& treatment of constipation. Flaxseed fiber metabolism is similar to that of any or dietary fiber. During 1970s& 1980s, dietary fiber was first line rapy for irritable bowel syndrome since it was a natural approach to control disease. Flaxseed oil, fibers, & lignans might help to prevent cardiacdisease, arosclerosis, autoimmune diseases, & neurological problems. Flax protein aids in heart disease prevention & rapy, along with immune system support. Flax or flaxseed oil has used in baked goods, juices, milk & dairy products, muffins, dry pasta products, macaroni, & meat products as an useful food component. current review focuses on evidence of flaxseed's potential health benefits from recent human & animal research, along with commercial usage in a variety of food items (3).

Rajalakshmy Prasanth discussed Flax Seed & Its Health Benefits in which he discussed how with average levels of 55 percent in oil, flaxseed oil is worthy resource of omega-3 fatty and linolenic acid. re are a variety of flaxseed products available, each with its own set of health benefits. Whole flaxseed is generally regarded as a nutritious food with anticancer properties. In female rat mammary gl&s, dietary flaxseed flour decreases epilial cell proliferation & nuclear abnormalities. This suggests that flaxseed might slow progression of breast cancer. Furrmore,

flaxseed lignan has shown to decrease breast tumor development in later phases of carcinogenesis. Lignans & polysaccharide mucilage are abundant in flaxseed coat components. It also demonstrates positive benefits on digestive health (9).

Pierce G et al. discussed bioactive components & cardiac benefits of flaxseed in which y discussed how cardiacdisease continues to be major cause of death & morbidity throughout globe. An adequate quantity of dietary fiber is widely recognized as a key component in prevention& treatment of constipation. Flaxseed fiber metabolism is similar to that of any or dietary fiber. During 1970s& 1980s, dietary fiber was first line rapy for irritable bowel syndrome since it was a natural approach to control disease. Dietary flaxseed has shown to have antihypertensive, anti arogenic, cholesterol-lowering, anti-inflammatory, & arrhythmia-inhibiting actions in cardiacsystem. Its high fiber content, along with its high levels of -3 fatty acid -linolenic acid & antioxidant lignan secoisolariciresinol diglucoside, have linked to its favorable cardiaceffects. Flaxseed also contains additional possible bioactive substances such as proteins, cyclolino peptides, & cyanogenic glycosides, which might have biological effects but are less well known. se chemicals might also be responsible for flaxseed's cardiacbenefits. This article will cover cardiaceffects of flaxseed supplementation along with its bioactive components, including ir characteristics, biological effects, & potential mechanisms of action. It will also address future research paths that might lead to discovery of new health advantages of eating flaxseed (10).

3. DISCUSSION

Flaxseed is one of world's oldest crops, having grownsince dawn of time. Linum usitatissimum is Latin word for flax seed, which means "extremely helpful." Flax was originally brought to United States by colonists, who used it to make textile fabric.. Flax was primarily utilized in manufacture of textiles (linen) & papers until 1990s, while flax seed oil & its by-products are used in animal feed formulation. Words flax seed & linseed have a little variation in meaning.. Flax seed has sparked renewed attention in area of food & disease research during past two decades, owing to possible health advantages associated with certain of its biologically active components.. Its popularity is increasing because to its health advantages, which include reduced cardiacdisease risk, reduced risk of cancer, especially of breast& prostate gl&s, anti-inflammatory action, laxative impact, & relief of menopausal symptoms & osteoporosis. Gluten-free flaxseed meal has a nice nutty flavor. Protein level of flax meal, along with gelling/binding qualities of food's soluble fibre, makes it perfect for use in gluten-free baked goods or gluten-free thickening agent. Allowing one spoonful of meal of flaxseed to gel with 3 tablespoon of water can used in form of egg replacer in baked products. In morning, flake complements both hot & cold breakfast cereals & is a good source of fibre (2).

4. CONCLUSION

Flax seed proteins, like or plants, have techno-functional characteristics that influence their behavior in food system by interacting with or components. For solubility & wateroil retention capacity, se characteristics are mostly reliant on ir hydration processes. Flax protein contains an amino acid sequence similar to soybean protein, which itself is regarded as among most nutrient-dense plant proteins. When one of most sought & highly requested health advantages from functional foods is a healthy heart, & food industry's aim is to create new ways to solve nutritional problems, flaxseed will play a critical role. Flaxseed might help to increase

availability of healthy food options by enhancing nutritional profile of meals by lowering salt, sugar, & saturated fat levels while also boosting amount of omega-3 fatty acids & or bioactive components. Global market for healthy heart meals is expected to exp& significantly in future years as a result of such factors. As a consequence, flax & flaxseed oil might become more popular in future as components in functional meals & nutraceuticals. re is no question that switching to a high-fiber, omega-3-rich diet would be helpful. As a result, flaxseed, wher whole or ground, might be prescribed as a dietary supplement. New methods to processing, stabilization, & use of flaxseed oil will be paved by modern techniques such as high-powered ultrasound, micro fluidization, spray granulation, & Nano encapsulation. Anor way to use flaxseeds is to supplement animal diets with flax/flaxseed oil for production of omega-3 enriched eggs, milk, meat, & or animal origin products.

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