



Flax Seeds: A Nutrient-Rich Functional Food for Optimal Health

Meghal Sharma, Neeraj Gupta, Daman Preet Kour and Seerat Gupta

Division of Post Harvest Management, Sher-e-Kashmir University of Agricultural Sciences and technology of Jammu, Chatha J&K-180009

*Corresponding author: meghalsha99@gmail.com

Received: 10/07/2023

Published: 18/07/2023

Modern-day living poses a significant challenge to good health due to the prevalence of various degenerative lifestyle diseases. As society becomes more aware of the detrimental effects of unregulated food processing and excessive medication, there has been a notable shift towards recognizing the importance of plant-based products. The growing realization of the relationship between diet and overall wellness has sparked an interest in foods that possess medicinal properties. These foods, commonly referred to as "functional foods" or "nutraceuticals", offer health benefits that go beyond their basic nutritional value. In essence, functional foods have the potential to enhance well-being beyond what would typically be expected from their traditional nutrient composition (Katare *et al.*, 2012). Flaxseed, the seed derived from the flax plant, is an annual herb belonging to the Linaceae family. It flourishes in well-drained soils that are deep and moisture-retaining, characterized by a combination of sand, silt, and clay. Originally native to the Eastern Mediterranean, the flax plant has spread across Western Asia, the Middle East, and even into India (Daun *et al.*, 2003). India ranks fourth in total flaxseed output, with 0.15 million tonnes produced (FAO 2012). In India flaxseed is mainly cultivated in Madhya Pradesh, Maharashtra, Chattisgarh and Bihar (Shakir and Madhusudan, 2007). Flax (*Linum usitatissimum*) is a blue flowering annual plant with little flat seeds ranging in colour from golden yellow to reddish brown. Flaxseed has a crunchy texture and a nutty flavour (Rubilar *et al.*, 2010).

Nutritional Composition of Flax Seeds

Flax is high in oil, protein, and fibre. A nutritional analysis of brown Canadian flax revealed that it included 28 % total dietary fibre, 7.7 % moisture, 41 % fat, 20 % protein and 3.4 % ash, which is the mineral-rich residue left after samples were burned. Flaxseed content might vary depending on genetics, growing environment and seed processing (Ganorkar and Jain, 2013). Flaxseed has a distinctive fatty acid composition. It has a high polyunsaturated fatty acid content and a low saturated fatty acid content. Linoleic acid, an omega-6 fatty acid, accounts for approximately 16 % of total fatty acids, whereas α -linolenic acid accounts for over 57 %, the highest of any seed oils (Ramcharitar *et al.*, 2005). Flaxseed is the richest source of plant lignans (Gutte *et al.*, 2015). Lignans are antioxidants and phytoestrogens found in fiber-rich plants, cereals (wheat, barley, and oats), legumes (bean, lentil, and soybean), vegetables (broccoli, garlic, asparagus, and carrots), fruits, berries, tea, and alcoholic beverages. Flaxseed contains 75-800 times the amount of lignans as cereal grains, legumes, fruits, and vegetables (Hosseinian and Beta, 2009). Flaxseeds are high in both soluble and insoluble dietary fibre. Flaxseed is unique among oilseeds due to the presence of mucilage in the seed's outer layers (Singh *et al.*, 2012). Calcium, magnesium, and phosphorus are just a few of the vitamins and minerals found in flaxseeds. Given that a 30g serving of the seed provides 7-30% of the Recommended Dietary Allowances (RDAs) for various minerals (Singh *et al.*, 2011).

Table 1: Nutrients Value per 100 g

S.NO	Nutrients	UNIT VALUE PER 100g
1.	Moisture (g)	6.5
2.	Protein (g)	20.3
3.	Fat (g)	37.1
4.	Mineral (g)	2.4
5.	Crude Fibre (g)	4.8
6.	Total Dietary Fibre (g)	24.5

7.	Carbohydrates (g)	28.9
8.	Energy (kcal)	530.0
9.	Potassium (mg)	750.0
10.	Calcium (mg)	170.0
11.	Phosphorous (mg)	370.0
12.	Iron (mg)	2.7
13.	Vitamin A (μg)	30.0
14.	Vitamin E (mg)	0.6
15.	Thiamine (B1) (mg)	0.23
16.	Riboflavin (B2) (mg)	0.07
17.	Niacin (mg)	1.0
18.	Pyridoxine (mg)	0.61
19.	Panthenic acid	0.57
20.	Biotin (μg)	0.6
21.	Folic acid (μg)	112

Source: Morris 2007; Gopalan *et al.* 2004

Health Benefits of Flax seeds

Consuming flaxseed has been linked to a number of potential health advantages. Evidence suggested that consuming flaxseed (oil or enriched product) could aid in the prevention of a number of chronic illnesses, including chronic cardiovascular, obesity-related, and cancerous diseases. Alpha linolenic acid, an essential omega-3 fatty acid, is abundant in flaxseed. Omega-3 fatty acids found in large quantities in ground flaxseed have been demonstrated to lower blood pressure, cholesterol levels, and triglyceride levels (Gutte *et al.*, 2015). Flaxseed's dietary fibres were discovered to be directly related to health, especially when it comes to controlling body weight by stifling hunger and reducing nutrient absorption. Typically, soluble fibre and water combine to create a gel. By delaying the stomach's emptying, this gel may lower blood sugar levels. Cholesterol is also lowered as it is surrounded by the gel, which inhibits its absorption and leads to more cholesterol being excreted (Kristensen *et al.*, 2012). It has been demonstrated that lignans present in flax seeds reduce the relative risk factors for heart disease and may influence oestrogen metabolism and reduce the incidence of breast and colon cancer. Both lupus and polycystic kidney disease models have showed favourable effects from the use of flax seed or SDG. Additionally, flax seed has been linked to hepatoprotective effects (Westcott *et al.*, 2003). Flaxseed contains the isomer-tocopherol of vitamin E, a fat-soluble vitamin. Vitamin E is an antioxidant ingredient that shields cell components from free radical damage, which could promote the growth of cancer, if left unchecked. Additionally, vitamin E may inhibit the production of cancer-causing nitrosamines that are produced in the stomach as a result of the consumption of nitrite-containing meals and prevent cancer by boosting immune response (Winter, 2013).

Conclusion

In conclusion, flaxseed possesses numerous nutritional and functional properties that make it a valuable addition to the human diet for promoting health and well-being. This is primarily due to its rich composition of various compounds, including polyunsaturated fatty acids, essential amino acids, vitamin E, lignans, and dietary fibers. These components work together to fulfill essential dietary requirements and contribute to maintaining good health.

Flaxseed's remarkable properties are closely associated with its ability to exhibit anti-inflammatory, antioxidant and anti-carcinogenic activities. Furthermore, consuming flaxseed has been found to contribute to the reduction of cholesterol levels, lowering the risk of cardiovascular disease, and aiding in the prevention of diabetes. By incorporating flaxseed into one's diet, individuals can reap the benefits of these health-promoting effect which can have a positive impact on overall well-being and longevity.

References

Daun J. K., Barthelet V. J., Chornick T. L. and Duguid S. 2003. Structure, composition, and variety development of flaxseed. Flaxseed in human nutrition, 1-40.

- Ganorkar, P. M. and Jain, R. K., 2013. Flaxseed--a nutritional punch. *International Food Research Journal*, **20**: 2.
- Gopalan C., Sastri R. and Balasubramanian S. C. 2004. Nutritive value of Indian foods. National Institute of Nutrition, ICMR, Hyderabad, **52**
- Gutte, K. B., Sahoo, A. K. and Ranveer, R. C. 2015. Bioactive components of flaxseed and its health benefits. *International Journal of Pharmaceutical Sciences Review and Research*, **31**(1): 42-51.
- Katare, C., Saxena, S., Agrawal, S., Prasad, G. B. K. S. and Bisen, P. S., 2012. Flax seed: a potential medicinal food. *Journal of Nutrition Food Science*, **2**(1): 120-7
- Kristensen, M., Jensen, M. G., Aarestrup, J., Petersen, K. E., Sondergaard, L., Mikkelsen, M. S. and Astrup, A. 2012. Flaxseed dietary fibers lower cholesterol and increase fecal fat excretion, but magnitude of effect depend on food type. *Nutrition & metabolism*, **9**(1): 1-8.
- Morris, D. H., 2007. *Flax: A health and nutrition primer*. Flax Council of Canada.
- Ramcharitar A, Badrie N, Mattfeldt-Beman M, Matsuo H and Ridlet C. 2005. Consumers acceptance of muffins with flaxseed (*Linum usitatissimum*). *Journal of Food Science and Technology*. **70**(1): 504-507.
- Rubilar, M., Gutierrez, C., Verdugo, M., Shene, C. and Sineiro, J., 2010. Flaxseed as a source of functional ingredients. *Journal of soil science and plant nutrition*, **10**(3): 373-377.
- Shakir K. A. F. and Madhusudan B. 2007. Hypo cholesterolemic and hepatoprotective effects of flaxseed chutney: evidence from animal studies, *International Journal of Clinical Biochemistry*, **22**: 117-121.
- Singh, K. K., Jhamb, S. A. and Kumar, R. 2012. Effect of pretreatments on performance of screw pressing for flaxseed. *Journal of Food Process Engineering*, **35**(4): 543-556.
- Singh, K. K., Mridula, D., Rehal, J. and Barnwal, P., 2011. Flaxseed: a potential source of food, feed and fiber. *Critical reviews in food science and nutrition*, **51**(3): 210-222.
- Westcott, N. D. and Muir, A. D. 2003. Flax seed lignan in disease prevention and health promotion. *Phytochemistry Reviews*, **2**: 401-417.
- Winter R. Vitamin E: Your Protection Against Exercise Fatigue, Weakened Immunity, Heart Disease, Cancer, Aging, Diabetic Damage, Environmental Toxins. Crown Publishing Group. 2013