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## Functional Properties and Health Benefits in Flaxseed fiber and oil (*Linum usitatissimum* L.)

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### Abstract

Flax (*Linum usitatissimum*) is cultivated in Araucania Region for oil extraction. Studies have shown that crop yield is higher in this Region, because of its soil and climate characteristics. Flax is best suited for fertile, fine textured and loamy soils. They are however, rich potential sources of proteins for use as supplements in human diets. Flaxseed (*Linum usitatissimum* L.) is a rich source of nutritive and bioactive compounds. The research evaluated the disparity in phytochemical profiles along with total and cellular antioxidant activities between oil and fiber flaxseeds. There were significant differences in total phenolics, total flavonoids and antioxidant activities among the six cultivars of fiber and oil flaxseed, respectively. Four phytochemical compounds including caffeic acid, p-coumaric acid and ferulic acid, and secoisolariciresinol diglucoside (SDG) were identified and quantified in the cultivars of oil and fiber flaxseed by HPLC analysis. Notably, the average of total phenolic and flavonoid contents, along with total antioxidant activities between fiber and oil flaxseeds were not different significantly; even the cellular antioxidant activity of fiber flaxseed was superior to oil flaxseed. These results suggest that fiber flaxseeds would be valuable candidates as functional products and dietary supplements production owing to the higher bioactive values as well as oil flaxseeds.

**Keywords:** Health Benefits, Flaxseed fiber, *Linum usitatissimum*, human diets

### 1. Introduction

As specified by Indian Council of Medical Research that Food is one of the basic needs of human existence. Food grain like rice, wheat, millets, pulses and oilseed constitute the basic food of human beings. But food problem is a serious problem for the Indian economy. As a nation, India is a short of food both in absolute term as well as in comparative term. About 250 million people of India are either under nourished or malnourished or both. In spite of the increase in food grain production in India, the level of per capita net availability of food grain per day is found to the lower than minimum nutrition requirement of 594 g per day. Flax is considered a functional food or source of functional ingredients, because it contains alpha-linolenic acid, lignans and polysaccharides (other than starch), all of which have positive effects in disease prevention.

### Chemical Composition of Flaxseed

Flaxseed (*Linum usitatissimum*) grain (100g) contains moisture (6.5g), carbohydrate (28.8g), protein (20.3g), fat (37.1g), minerals (2.4g), calcium (170 mg), iron (370 mg), carotene (2.7ug), thiamine (0.23 mg). Flaxseed cakes serve as a proteinaceous supplements for livestock it provides moisture (11%), carbohydrate (32%), protein (32%), oil (10%), fibre (6%), and minerals (6%). (Srivastava *et al*, 1997) [7].

### Flaxseeds act as anti-nutrients

Flaxseeds contain anti-nutrients that may have adverse influence on the health and well-being of human population. Cyanogenic glycosides are the major anti-nutrients and are fractionated into linustatin (213–352 mg/100 g), neolinustatin (91–203 mg/100 g), linamarin (32 mg/100 g). Fiber type linseed has a higher percentage of glycosides than the seed type, and ripe seed contains less glycoside than the immature seed. Whole flaxseed contains 250–550 mg/100 g cyanogenic glycoside (Singh *et al*. 2011) [6].

In the intestine, cyanogenic glycosides release hydrogen cyanide, a potent respiratory inhibitor, by intestinal  $\beta$ -glycosidase that produces thiocyanates. Thiocyanates interfere with iodine uptake by thyroid gland and long term exposure aggravates iodine-deficiency disorders, goiter and cretinism. Phytic acid, another anti-nutrient present in flaxseed, ranges from 23 to 33 g/kg of the flaxseed meal (Oomah *et al.* 1996)<sup>[5]</sup>. Phytic acid interferes with the absorption of calcium, zinc, magnesium, copper and iron. It is a strong chelator, forming protein and mineral-phytic acid complexes and thus reducing their bioavailability (Erdman 1979; Akande *et al.* 2010)<sup>[3, 1]</sup>.

### Therapeutic and Medicinal Properties of Flaxseed

Therapeutic and medicinal properties of flaxseeds such as a good source of dietary fiber, insufficient evidence for diverticulitis, lowering the cholesterol level, lowering the blood sugar level, lower prostate specific antigen (PSA), lowering haemoglobin, improved kidney function, relieving mild menopausal symptoms, insufficient evidence for breast pain. Flaxseed is likely safe for most people. Adding flaxseed to diet might increase the number of bowel movements each day. It might also cause gastrointestinal (GI) side effects such as bloating, gas, abdominal pain, constipation, diarrhoea and nausea. Higher doses are likely to cause more GI side effect.

### Flaxseed as functional food

Flaxseed is considered as functional food owing to the presence of three main bioactive components such as alpha-linolenic acid, lignans and dietary fiber.

### Conclusion

It is now known that the evaluation of the quality of the flaxseed is an important food supplement to achieve some medicinal properties such as promote skin protection, promote lung health, good for eye, promote kidney function increasing the flow of urine etc. and these food could be applied in various food systems as an excellent functional food with highly antioxidant properties. Flaxseed is considered as contributing significantly in overcoming protein deficiency, vitamin A deficiency and calcium deficiency deficiencies disease in developing countries like India. Flaxseeds have contained vitamin A, omega3-fatty acid, fiber, protein and high calcium. Therefore, they play an important role for a population suffering from atherosclerosis etc.

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