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Therapeutic implications of flaxseed peptides and bioactive components against various diseases

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ABSTRACT

Flaxseed (*Linum usitatissimum* L.) is nutritionally loaded with alpha-linolenic acid, lignans, Secoisolariciresinol diglucoside, soluble fiber, proteins, and bioactive peptides that implicate numerous therapeutic and health-boosting effects. The current review article aimed to comprehensively summarize the essential components of flaxseed along with their therapeutic role against different physiological disorders. Flaxseed is used in different forms including oil, powder, extract and whole seed where polyunsaturated fatty acids such as alpha-linolenic acid are significantly abundant in flaxseed oil. Most of the fiber in flaxseed comes from the hull, which contains 9 % insoluble fiber and 20 % soluble fiber. Soluble fibers contain neutral glucose and acidic polysaccharides, while insoluble fibers consist of lignin, cellulose, and acid detergent fiber. Bioactive peptides present in flaxseeds have gained acceptance as health-promoting medicines due to their useful amino acid profile. Studies revealed that flaxseed is rich in 40 % protein and bioactive peptides which are made up of 20 amino acids and two (dipeptides) residues with a molecular mass of 0.4–2 kDa. Enzymatic hydrolysis is a successful process for producing and releasing bioactive peptides which are obtained from the wastes of flaxseed oil after extraction. Peptide fractions (1 kDa) obtained after ultrafiltration of alcalde-hydrolyzed flaxseed are used in various applications, including as a food source and nutraceutical. Flaxseed has become a well-acknowledged functional food due to its physiological properties, such as anti-diabetic, antibacterial, angiotensin-converting enzyme inhibition, and antioxidant capacity owing to the presence of peptides, SDG, lignin, ALA and fiber. In addition, these bioactive fractions of flaxseed in various forms tend to reduce and prevent arthritis, hyperlipidaemias, cardiovascular diseases, osteoporosis, neurological disorders, and cancers of many types. Hence, flaxseed is evident to be a versatile functional food that elicits several physiological disorders and ailments due to its mechanically active compounds. Further research is required about the bioavailability of active components and their broad spectrum application in humans for health promotion and disease prevention.

1. Introduction

The flaxseed plant has some biologically beneficial and bioactive compounds, including soluble dietary fiber, lignans, Ω-3 PUFA, and peptides or linusorbs (also known as cyclolinopeptides) that are gaining popularity due to their nutritional benefits to human health (Shim et al., 2022; Emeish et al., 2023). Many clinical and epidemiological studies support the data that functional foods of plant origin can minimize the risk of chronic diseases (Jimayu, 2021). The attention of researchers has been drawn toward the food and health sector due to the bioactive peptide discovery (Langyan et al., 2021). It has been demonstrated that peptides made from oilseed proteins such as lunasins reflect a broad spectrum of bioactivities, including antioxidation, cholesterol-lowering reduction, anti-inflammation, and mineral chelation (Merkher et al., 2023; Han et al., 2019). Vitamins, omega-3 polyunsaturated fatty acid (Ω-3 PUFA), dietary fibers, phytochemicals, lignans, and other bioactive

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