



A Review on the Therapeutic Potential and Bio-Actives of Sesame Seeds

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ABSTRACT

Sesame (*Sesamum indicum* L., family Pedaliaceae) is esteemed as the "queen of oilseeds" due to its superior oil quality enriched with sterols and antioxidants like tocopherols, sesamin, and sesamol, offering significant nutraceutical benefits. Believed to have originated in Africa, sesame cultivation spread across West Asia, China, India, and Japan. Its seeds, available in black, brown, and white varieties, are characterized by high protein and fat content, low carbohydrates, and notable levels of fiber. Rich in bioactive components such as PUFAs, lignans, and phytosterols, sesame demonstrates antioxidant, anticancer, and cholesterol-lowering properties. Its therapeutic potential includes benefits for diabetes management, cardiovascular health, and inflammatory conditions. The diverse applications of sesame in culinary and medicinal practices underscore its status as a versatile nutritional resource and functional food ingredient.

Keywords: Antioxidants, High protein, Low carbohydrate, Diabetes management, Functional Foods.

Introduction:

As one of the first crops to be cultivated, sesame (*Sesamum indicum* L., family Pedaliaceae) is widely recognized. Because of the superior oil quality, sterols, and antioxidants such tocopherols, sesamin, and sesamol, which serve as nutraceuticals and have physiological and nutritional advantages, it is referred to as the "queen of oilseeds" (Li *et al.*, 2024). Although the exact origin of sesame domestication is unknown, despite many claims to the contrary, it is generally accepted that the crop began in Africa and spread to West Asia, China, India, and Japan (Mostashari *et al.*, 2024). A person may benefit from a variety of health benefits from sesame seeds and its constituents, including pharmacological and nutraceutical effects. It has been demonstrated that sesame seeds contain anticancer, antioxidant, and cholesterol-lowering qualities (Abbas *et al.*, 2022). The cultivars, cultural techniques, and growing environment all have a significant impact on the output of sesame (Preety *et al.*, 2024). Compared to wheat, sesame cereal has a higher fat level, lower carbohydrate content, and comparable protein content (Olombrada *et al.*, 2024).

Morphology:

The sesame capsule has a rectangular form, measures 2-3 cm long and 6-12 mm wide, and has microscopic hairs on the epidermis and longitudinal ribs on the surface (Wei *et al.*, 2022). The tiny, flattened seeds have dimensions of 2 to 4 mm in length and 1 to 2 mm in width. Their colour can vary from white to black, fading into grey tones (Olombrada *et al.*, 2024). There are three different colours of sesame seeds: black, brown, and white (Mostashari *et al.*, 2024).

Table 1 – Nutritional Value

Nutrients	Value (per 100g or 100mg)
Protein	17.6 g
Carbohydrate	9.85 g
Fat	49.7 g
Fiber	14.9 g
Calcium	962 mg
Magnesium	324 mg
Phosphorus	605 mg

Bioactive Components:

Sesame may contain high levels of antioxidants and bioactive substances such as PUFAs, lignans, tocopherols, and phytosterols (Mostashari *et al.*, 2024). Sesame lignans have antioxidant and health-promoting effects (Abbas *et al.*, 2022).

Sesame seeds contain two different kinds of lignans: oil-soluble lignans, which contain sesamin, sesaminol, sesamol, pinoretinol, and sesamolol; and glycosylated water-soluble lignans, which contain two isomers of sesaminol diglucoside and sesaminol monoglucoside, pinoretinol triglucoside, and sesaminol monoglucoside (Li *et al.*, 2024). Sesame seeds contain 200-500 mg of sesamin and 200-300 mg of sesamol per 100 g, respectively (Hadipour *et al.*, 2023).

Sesame seeds include α -tocopherol, γ -tocopherol, δ -tocopherol, and tocotrienols, as well as lignans, which may have health benefit (Li *et al.*, 2024). Sesame milk also has good dispersion stability and doesn't cause the flatulence that some other options can (Abou Ayana *et al.*, 2024). Black and white sesame have respective polyphenol contents of 1.38 mg/g and 2.88 mg/g, while their respective flavonoid contents are 0.05 mg/g and 0.12 mg/g (Olombrada *et al.*, 2024).

Therapeutic Function:

Sesame's low carbohydrate, high fiber, and protein content have been linked to health benefits, including diabetes prevention, according to multiple writers. Sesame seeds contain magnesium, which helps balance blood glucose and insulin levels (Olombrada *et al.*, 2024). In the stomach, bacteria metabolise this essential antioxidant metabolite to create physiologically active chemicals like enterolactone and enterodiol molecules, which are derived from mammalian lignan. Furthermore, studies are conducted on the impact of these chemicals on particular diseases, including cardiovascular disease, bone disease, breast cancer, and colon cancer, all of which show encouraging trends in risk reduction (Li *et al.*, 2024). Lecithin, an antioxidant and hepatoprotective substance, is found in sesame seeds. Lecithin has also been shown to effectively treat dermatitis and reduce hepatic steatosis in individuals receiving parenteral feeding for an extended period of time (Abbas *et al.*, 2022). Numerous antioxidants, polyphenols, and phytoestrogens found in sesame seeds have been shown to be effective against inflammatory biomarkers, insulin resistance, and hormone level normalization—all of which are clinical biomarkers of polycystic ovary syndrome (PCOS) (Zafar *et al.*, 2024).

Conclusion:

One of the most significant nutritious foods is sesame, which contains both bioactive and nutritional ingredients (Hadipour *et al.*, 2023). The white variety had more sesamin than sesamol, whereas the black variant had a higher proportion of sesamol (Abbas *et al.*, 2022). Rich in nutrients, sesame seeds are known as the "crown of eight grains" and a "all-purpose nutrient bank" (Wei *et al.*, 2022). Sesame seeds are processed in businesses to provide a variety of goods, including sesame oil, roasted seeds, sesame paste (tahini), and sesame paste halva, commonly referred to as tahini halva (Abbas *et al.*, 2022). Sesame's high lignan content provides antioxidative, anticholesterolemic, and antihypertensive benefits, making it useful for both prevention and treatment of different ailments (Li *et al.*, 2024). Black and brown sesame seeds have stronger antioxidant potential, but white sesame seeds include more dietary fibre, which can benefit gastrointestinal health after consumption (Luo *et al.*, 2022). According to the present study, the amount of sesame consumed increases HDL levels proportionately (from 26.04 mg/L in a normal diet to 32.39 mg/L with the addition of 8% sesame seed oil), while total cholesterol, LDL, VLDL, and triglycerides decrease (from 66.20 to 48.88 mg/L, from 66.20 to 48.80 mg/L, from 137.33 to 115.46 mg/L and from 99.99 to 97.27 mg/L, respectively). The decrease in blood lipid- content is linked by authors to an increase in the concentration of lignans provided by sesame (Olombrada *et al.*, 2024).

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