



PHYTOCHEMICAL COMPOSITION, MEDICINAL BENEFITS AND FOOD APPLICATIONS OF SESAME SEEDS

Health Science

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ABSTRACT

Sesame (*Sesamum indicum* L.) is originated in India. It is a member of Pedaliaceae family. This plant is used in medicine for their digestive, carminative, antispasmodic, sedative, analgesic, tonic and diuretic as well as for functional gastrointestinal disorders. The aim of this study was to overview its phytochemical composition, medicinal benefits and food applications. This review article was carried out by searching studies in PubMed, Medline and Web of Science. The initial search strategy identified about 102 references. In this study, 25 studies was accepted for further screening and met all our inclusion criteria (in English, full text, Medicinal benefits of sesame and dated mainly from the year 1999 to 2024). The search terms were "Phytochemical composition, *Sesamum indicum*, food application and alternative medicine. The result of this study was indicated that this plant is commonly used for its medicinal properties. Hence, this review will highlight and discuss the potential nutritional and health promoting effects of sesame seeds.

KEYWORDS

Sesame, Phytochemical, Medicinal, Food, Application, Seeds.

INTRODUCTION

Sesame (*Sesamum indicum* L.) is originated in India. It is a member of Pedaliaceae family. It is known as "Queen of Oilseeds" due to its high degree of resistance to oxidation and rancidity. It is an annual shrub with white bell-shaped flowers with blue, red or yellow branches. Sesame fruit is a capsule, normally pubescent rectangular in cross section and typically grooved with a short triangular beak. Sesame seeds are small and vary in colors and variety. They are ovate, slightly flattened and somewhat thinner at the eye of the seed. Sesame seeds have been widely employed in culinary as well as traditional medicines for their nutritive, preventive, and curative properties (Mohdaly et al, 2014).

Traditionally, sesame seeds were used in Hindu culture as a "symbol of immortality" and its oil was used widely in prayers and burial ceremony. It was used in traditional Middle Eastern cooking. The nutritious seed cake is used as animal feed and sesame flour. Sesame oil is largely used in southern and Chinese cooking. Recently, it is used for its usefulness for the liver, kidney, spleen and stomach. Its high oil content not only lubricates the intestines, but nourishes all the internal viscera. It is also known to blacken the hair, especially the black sesame. Hence, it is applied to white hair, habitual constipation and insufficient lactation. Sesame oil is also helpful in treating intestinal worms such as ascaris, tapeworm, etc. (Bedigian, 2014).

Phytochemical Property Of Sesame Seeds

Sesame seeds contain up to 55% oil and 20% protein. Sesame proteins consisted of lysine, tryptophan and methionine. Sesame oil is rich in linoleic and oleic acids, the predominance of gamma-tocopherol over the other isomers of vitamin E and high content of fat-soluble lignans (sesamin and sesamol). Sesame oil is constituted 50% of compound of this herb, which is highly resistant to oxidation, and 25% protein, which has a unique balance of amino acids (Martinchik and Pitan et al, 2011). Sesame seed contain vital minerals, vitamins, phytosterols, polyunsaturated fatty acids, tocopherols and unique class of lignans such as sesamin and sesamol. Sesame seed is high in protein, vitamin B1, dietary fiber as well as an excellent source of phosphorous, iron, magnesium calcium, manganese, copper and zinc. In addition to these important nutrients, sesame seeds contain two unique substances, sesamin and sesamol. Both of these substances belong to a group of special beneficial fibers called lignans (sesamin, sesamol, sesaminol and sesamolol). Sesame seed also contains lignan aglycones in oil and lignan glucosides. Sesame seed is rich in oil, contains high amounts of (83-90%) unsaturated fatty acids, mainly linoleic acid (37-47%), oleic acid (35-43%), palmitic (9-11%) and stearic acid (5-10%) with trace amount of linolenic acid (Devarajan et al, 2016). The seeds are a rich source of antioxidants and bioactive compounds including phenolics, phytosterols, phytates, PUFA and short chain peptides. Sesame cake is a rich source of protein, carbohydrate and mineral nutrients. Sesame seeds have special significance for human nutrition on account of its high content of sulfur amino acids and phytosterols. It

is an important source of phytonutrients such as omega-6 fatty acids, flavonoid phenolic anti-oxidants, vitamins, and dietary fiber with potential anti-cancer, as well as health promoting properties (Pathak et al, 2014).

Medicinal Benefits Of Sesame Seeds

Sesame (*Sesamum indicum* L., Pedaliaceae) is one of the oldest and essential oilseed crop known to mankind. It is widely used in baking and confectionary products. They are the affluent source of fat, protein, carbohydrates, dietary fiber, zinc, magnesium, and many other minerals (Prakash et al., 2014). Sesame seeds are an excellent source of copper, a very good source of manganese, and a good source of magnesium, copper, vitamin E, thiamine, calcium, phosphorus, iron, zinc, molybdenum, phytosterols and selenium (Carvalho et al., 2012 ; Mohdaly et al, 2013).

- Sesame seed contains very high levels (up to 2.5%) of furofuran lignans with beneficial physiological activities, mainly sesamin, sesamol, and sesamol glucosides.
- Lignans plays an important role in inter modulation of fatty acid metabolism, inhibition of cholesterol absorption and biosynthesis, antioxidant and vitamin E-sparing effects, hypotensive and antiaging effects, and improvement of liver functions.
- Lignans may also increase antioxidant potential of diets and provide stability (Periasamy et al., 2010).
- Sesame seeds contain about 25-35% protein, as well as 55% fatty acids, mainly unsaturated fats. The sesame oil also contains oleic acid (35.9-47%), linoleic acid (35.6-47.6%), palmitic acid (8.7-13.8%), stearic acid (2.1-6.4%), and arachidonic acid (0.1-0.7%).
- The sesame seeds contain approximately a quarter of soluble fibers out of the total fiber present in sesame. The main part of soluble fiber is mucilaginous gum and its composition ranges from 8 to 11g per 100g.
- Sesame has more unsaturated fatty acids than many other vegetable oils, and its higher proportion of unsaturated to saturated fatty acids makes it a potentially important dietary source of essential fatty acids.
- Sesame is among the seeds rich in quality vitamins and minerals. They are very good sources of B-complex vitamins such as niacin, folic acid, thiamin (vitamin B1), pyridoxine (vitamin B6), and riboflavin.
- 100 g of sesame contains 97 µg of folic acid, about 25% of recommended daily intake. Folic acid is essential for DNA synthesis. When given to expectant mothers during the periconception period, it may prevent neural tube defects in the baby.
- Niacin is another B-complex vitamin found abundantly in sesame. About 4.5 mg or 28% of daily-required levels of niacin is provided by just 100 g of seeds. Niacin helps reduce LDL-cholesterol levels in the blood. In addition, it enhances GABA activity inside the brain, which in turn helps reduce anxiety and neurosis.
- Linoleic acid is required for cell membranes, for transportation of

cholesterol in the bloodstream, and for blood clotting (Bedigian, 2014).

- The rich zinc and magnesium content of sesame seeds can be helpful for those suffering from respiratory problems, while the zinc and calcium present in sesame seeds are powerful tools in combating osteoporosis. Sesame seeds contain sesamol, an essential antioxidant and anti-inflammatory compound known to be beneficial in battling heart disease and atherosclerosis. Sesame seeds contain significantly more polyunsaturated fats, including omega-3 fatty acids, which protect the heart from damage, regulate blood pressure, and might reduce the risk of type-2 diabetes (Silky and Bisla, 2024).

Food Applications Of Sesame Seeds

People believe and trust that plant-based medicines are natural and are effective with no or less side effects. However, it may or may not be true for each and every plant unless they are clearly studied and identified its uses. Sesame seeds have been widely employed in culinary as well as traditional medicines for their nutritive, preventive, and curative properties. Its primary marketable products are the whole seeds, seed oil, and meal. Sesame seeds have been grown in tropical regions throughout the world. The utilization of sesame into diet can help to have a better taste in our daily consumed dishes. The sesame seeds have a pleasant flavor and taste that resembles the nuts and its utilization is simple in different products. It can be spread over soups, salads, cereals or yoghurt. The baked products can be supplemented with whole sesame grains to achieve an attractive and appealing form that improves the texture of final product. The grinding of sesame before its addition to products can be more beneficial to obtain the prospective health benefits from its active components like dietary fiber, lignans and Omega-3 fatty acids. Several researchers have studied that ground sesame or whole seeds can be replaced with wheat flour used for the production of pancake, muffins, breads and cookies. Several food products containing sesame are available in the market. The energy bars, pasta, bagels, muffins and pancakes are some of the examples of products with added sesame either in whole or its ground form (Isha and Milind, 2012).

CONCLUSIONS

Sesame is an important source of phytonutrients such as omega-6 fatty acids, flavonoid phenolic, vitamins, and dietary fiber with potential medicinal effects. Sesame reveals the truth that it is a more helpful beneficial plant with anti-pyretic, anti-inflammatory, anti-microbial, anti-hypertensive, and anti-cancer and other properties. Sesame plant is not only in use for culinary purposes, but also in various applications such as industrial, engineering, and pharmaceutical sesame. Henceforth, sesame plant gives a future scope in the medical field to improve the quality of life in a better way.

REFERENCES

1. Bedigian, D. Characterization of Sesame (*Sesamum Indicum* L.), (2014). Germplasm: A Critique. *Genet Resour Crop Evol.* 57:641-7. DOI:10.1007/S10722-010-9552-X.
2. Carvalho, C. W. P., Takeiti, C. Y., Freitas, D. D. G. C., & Ascheri, J. L. R. (2012). Use of Sesame Oil Cake (*Sesamum indicum* L.) On Corn Expanded Extrudates. *Food Research International*, 45(1), 434–443.
3. Devarajan, S., Chatterjee, B., Urata, H., Zhang, B., Ali, A., Singh, R., et al. *Am J Med.* 2016.
4. Martinchik, A. N. and V. Pitan. (2011). 80 (3):41-3.
5. Mohdaly, A. A. A., Hassanien, M. F. R., Mahmoud, A., Sarhan, M. A., & Smetanska, I. (2013). Phenolics Extracted From Potato, Sugar Beet, And Sesame Processing By Products. *International Journal of Food Properties*, 16(5), 1148–1168.
6. Pathak, N., A. K. Rai, R. Kumari, K. V. Bhat. *Pharm Rev.* 2014; 8(16):147-55
7. Periasamy S, Liu C.T, Hsu D.Z, et al. (2010). Sesame Oil Accelerates Kidney Healing Following Gentamicin-induced Kidney Injury In Rats. *Am J Nephrol.* 32:383-92. DOI: 10.1159/000319853. PMID: 20814198.
8. Prakash, K., & Naik, S. N. (2014). Bioactive Constituents as A Potential Agent In Sesame For Functional And Nutritional Application. *Journal Of Bioresource Engineering And Technology*, 1, 48–66
9. Silky and G. Bisla. (2024). Nutritional Profile and Sensory Attributes of Sesame Seeds Flour Incorporated Biscuits. *Global Journal for Research Analysis.* Volume-13. ISSUE-04. DOI: 1036106/Gira