

Review on Sesame oil

Kadam Komal Santosh, Mr. Wamane Vikas, Dr. Mahesh Sherkar

Pratibhatai pawar college of pharmacy, Maharashtra

Abstract: Sesame oil (SO), a supplement known to have anti-inflammatory and antioxidant properties, may be effective in reducing the risk of atherosclerosis and heart disease. Because of the side effects of statins, which are now approved for the treatment of atherosclerosis and heart disease, the idea of using food and nutritional products was invented. The health benefits of eating food have become increasingly known, as many different cultures derive health benefits from ingredients in their meals that have side effects. The purpose of this literature review is to provide an overview of the benefits and risks of SO in the development of atherosclerosis and guidance for clinical use in humans. The role of SO has been demonstrated by existing *in vivo* and *in vitro* studies showing that SO can lower low-density lipoprotein (LDL) levels while maintaining high-density lipoprotein (HDL) levels.

Current limitations in recent research include subjects for whom SO doses have not been assigned, and the specific mechanisms underlying the different properties of SO are unknown. Future studies should explore similar benefits and side effects of SO when combined with current physician-recommended and other complementary therapies.

INTRODUCTION

The seeds contain many antioxidant lignan compounds, including fat-soluble lignans and water-soluble lignan glycosides. Most of these are oil-soluble lignans and are therefore decomposed when extracted into crude oil. Currently, 16 types of lignans have been

isolated from sesame seeds, the rest are glycosylated and therefore not included in the diet. Sesamin and sesamin are the main aglycone lignans. Sesamol, sesaminol, sesamolol, pinoresinol, matairesinol, lariciresinol and episesamine are auxiliary aglycones. Lignan glycosides also include sesamol, sesamol and pinoresinol mono-, di- and triglycosides. Sesaminol triglucoside, Sesaminol diglucoside, and sesaminol monoglucoside are the most abundant lignan glycosides in sesame [1]. It has been reported that sesamin and sesamin have many medicinal properties such as anti-inflammatory, anti-inflammatory, anti-inflammatory, anti-neuroprotective agents against hypoxia or brain damage, and reduce the incidence of breast and prostate cancer [1]. The presence of lignans such as sesamin and sesamin is closely related to the high oxidative stability in sesame oil [2].

Tocopherol is a plant-derived lipophilic phenolic compound that is the main source of vitamin E, jiang, and according to Al. The most common ingredient in sesame seeds is tocopherol. Sesame seeds also contain alpha and beta tocopherols. According to Yamashita et al., the vitamin E activity recorded in sesame seeds is due not only to the reduction of tocopherol content in the seeds, but also to the synergistic effect of sesame lignans and tocopherols [3].

The seeds are also a rich source of phytosterols. Compared with cholesterol, phytosterols have a better ability to inhibit the activity of HMG-CoA reductase Az. Phytosterols have anti-cancer, anti-atherosclerotic, anti-inflammatory and antioxidant effects [4]. β -sitosterol is the main phytosterol in sesame oil, followed by campesterol and stigmasterol between 231.7 and 305.



Fig 1. Sesame seeds of different colours: black sesame & white sesame

NUTRITIONAL COMPONENTS

Sesame seeds are rich in fat, protein, minerals, vitamins, and dietary fiber. Sesame oil, which is obtained through traditional oil production methods, is rich in unsaturated fatty acids, fat-soluble vitamins, amino acids, etc. Studies have found that sesame seeds

contain 21.9% protein and 61.7% fat, and are rich in minerals such as Fe and Ca [28]. Sesame seeds are rich in nutrients and have the reputation of being an “all-purpose nutrient bank” and the “crown of eight grains” [29]. The content of the main nutrients in sesame seeds is shown in below table.

Main nutritional constituents of sesame:

Component	Value	Min	Max
Protein (g/100 g)	17.6	17	18
Protein, crude, N × 6.25 (g/100 g)	20.8	3.2	21.3
Carbohydrate (g/100 g)	9.85		
Fat (g/100 g)	49.7		
Sugars (g/100 g)	3	0.29	0.31
Starch (g/100 g)	4		
Fibers (g/100 g)	14.9	11.8	18
Ash (g/100 g)	4.48	4.45	4.5
Fatty acid saturated (g/100 g)	7.09	6.7	7.6
Fatty acid mono (g/100 g)	18.8		18.9
Fatty acid poly (g/100 g)	21.8		21.9

Fatty acid 14:0 (g/100 g)	85	0.048	0.13
Fatty acid 16:0 (g/100 g)	4.22		4.59
Fatty acid 18:0 (g/100 g)	2.78	2.09	2.96
Fatty acid 18:1 n-9 cis (g/100 g)	18.7	18.6	
Fatty acid 18:2 9c,12c (n-6) (g/100 g)	21.2	20.9	21.5
Fatty acid 18:3 9c, 12c, 15c (n-3) (g/100 g)	26	0.14	0.38
Calcium (mg/100 g)	962	714	1150
Copper (mg/100 g)	1.58	1.5	4.08
Iron (mg/100 g)	14.6		
Magnesium (mg/100 g)	324	318	351
Manganese (mg/100 g)	1.24	1.17	2.46
Phosphorus (mg/100 g)	605	453	694
Potassium (mg/100 g)	468		
Selenium (µg/100 g)	26.5	2.2	51.9
Sodium (mg/100 g)	2.31	0.88	11
Zinc (mg/100 g)	5.74	5.3	7.75
β-Carotene (µg/100 g)	5		
Vitamin E (mg/100 g)	25		
Vitamin B1 or thiamin (mg/100 g)	79		
Vitamin B2 or riboflavin (mg/100 g)	25		
Vitamin B3 or niacin (mg/100 g)	4.52		
Vitamin B5 or pantothenic acid (mg/100 g)	5		
Vitamin B6 (mg/100 g)	79		
Vitamin B9 or folate (µg/100 g)	97		



Fig 2. Sesame oil

Applications

Improves blood pressure

D. Sankar said in his study that he reduced blood pressure in hypertensive patients using only diuretics

and beta-blockers instead of sesame oil as edible oil. Sesame oil also has a positive effect on triglycerides, electrolytes, lipid peroxidation and antioxidants. Antihypertensive studies have shown that consuming

2.52 grams of black seed per day for 4 weeks can lower blood pressure by an average of 8%. 2 mmHg[6]. This antihypertensive effect is due to the reduction of oxidative stress. Considering the absence of side effects and inexpensive preparation, regular consumption of black cumin helps prevent cardiovascular diseases in prehypertensive patients and even in hypertensive patients [7].

Action on fatty acid metabolism

According to studies in mice, sesamin has also been shown to reduce lipogenesis by reducing lipogenic liver enzymes. Sesame has been shown to reduce the expression of lipogenic gene sterol regulatory element-binding protein-1 (SREBP-1), acetyl-CoA carboxylase, and fatty acid synthase, which means less fat esterification in the liver and therefore reduced fat synthesis. [8].

Improves cardiac health

In a 3-month study, male low-density lipoprotein receptor (LDLR) mice were fed either an atherogenic diet or a reconstituted atherogenic diet with a balanced diet. After 3 months, we measured blood lipids and atherosclerotic lesions. A diet containing sesame oil reduces the formation of atherosclerotic plaques and levels of triglycerides, plasma cholesterol and LDL-cholesterol in LDL-receptor mice. These results show that sesame oil can prevent the formation of atherosclerotic disease [9]. Sesame lignans can also inhibit the esterification of fatty acids and promote ketosis [10]. Sesame oil reduces hepatic 3-hydroxy-3-methyl-glutaryl-CoA reductase (HMG-CoA reductase) enzyme activity and intestinal absorption. HMG-CoA reductase is the rate-limiting enzyme in cholesterol synthesis and therefore lowers blood sugar and cholesterol in rats [11]. A study by Hirata et al. Cholesterol, LDL-c and apolipoprotein B levels were evaluated in 12 hypercholesterolemic men by taking 32 mg sesamin capsules for 4 weeks, followed by 65 mg sesamin for 4 weeks.

A 9% reduction in total cholesterol, a 16.5% reduction in LDL-C and a 10.5% reduction in apolipoprotein B were observed [12].

Anti-inflammatory effect

Sesame oil and its lignan "sesamol" have been shown to be effective anti-inflammatory agents. They are very protective against endotoxin-related

inflammatory damage, as they inhibit the release of inflammatory mediators. Sesamol also reduces the activation of the inflammatory factor NF- κ B by preventing the binding of endotoxin to its receptors. Therefore, sesame oil or sesamol will help reduce the inflammatory response in inflammation [13]. Studies have shown that the use of aromatic oil can reduce oxidative stress by inhibiting xanthine oxidase and nitric oxide production in rats [14]. Sesame oil has been used in Taiwanese traditional medicine to reduce pain in joints and wounds. Sesame oil massage has been shown to be effective in reducing the severity of pain in patients with severe trauma [15] Oral sesame oil has anti-inflammatory properties in mice against severe pain caused by MSU crystals. Another clinical study showed that the use of aromatherapy reduced the frequency of NSAID use in patients with upper or lower extremity pain [16]. The seeds contain lignans and gamma tocopherol, which work together to produce vitamin E in mice. It increases the production of vitamin E, which improves liver function and protects against oxidative stress. Sesamin lowers cholesterol and raises HDL levels [17].

Anti-obesity effect

A 2006 study published in the Yale Journal of Biology and Medicine found that participants who consumed 2.6 tablespoons of sesame oil per day lost an average of 2.6 pounds in 45 days. When the subjects stopped consuming sesame oil for 45 days, they started losing weight again. This study suggests that the polyunsaturated fatty acids in sesame oil may play a role in weight loss by increasing plasma levels of leptin, a substance that regulates energy balance and inhibits food intake [6].

Role in cancer prevention

Application of sesame oil has shown antineoplastic properties and has been shown to inhibit the growth of human cancer cells [18]. An in vitro study conducted by the University of Toronto Department of Health in 2005 examined the effects of giving healthy women 25 grams of ground flaxseed and sesame seeds over 4 weeks. Urine results showed that lignans increased when female animals were fed whole flaxseed and sesame; This indicates that both are efficiently transformed by plants in the colon and may help prevent colon cancer growth and spread [19].

Prevent diabetes

Magnesium and other nutrients in sesame seeds, especially sesame oil, have been shown to prevent diabetes. Sankar et al. (2010) found that sesame oil enhanced the efficacy of the oral hypoglycemic drug glibenclamide in patients with type 2 diabetes [20]. Yaounde, Noumi, and Bouopda reviewed the photographic evidence of sesame seeds for the prevention and treatment of prostate cancer in 2014. 2-3. 1 drop of oil is given twice daily for prostatitis for months [21]. Studies have shown that sesamol can be used as an important drug in the treatment of Huntington's disease (HD) [22].

Boosts bone health

Sesame seeds are rich in zinc, so they help support bone health, which confirms its role in strengthening bones and was used in the Bhagna chikitsa research by Hyun et al. 2004 reported an association between a zinc-deficient diet, low blood pressure, and osteoporosis of the hip and spine [23].

Oral health

Seed oil and seed oil are some of the top benefits for removing plaque and improving oral health. They participate in a game called oil pulling, which involves oil in the mouth so that you can improve oral health and beautify your teeth. One study showed that extracting sesame oil with sesame oil reduced dental and oral plaque and streptococcal mutants in saliva and improved overall health [24].

Dermatological use

Ultraviolet rays create more active oxygen in the skin. This can cause skin damage such as sunburn, wrinkles, and skin cancer. Sesame is rich in antioxidants that protect against reactive oxygen species. Chen et al. In his research, p53 gene mutations caused by ultraviolet radiation can be prevented by topical application of alpha-tocopherol. Dietary intake of α -tocopherol reduces UVB light-induced photocarcinogenesis [25]. Some studies have shown that gargling with sesame oil can reduce gingivitis by 85%. Sesame oil can also treat sinusitis. It kills strep and other colds when used as a mouthwash. It can help people with psoriasis and dry skin. It is an effective UV protection [26]

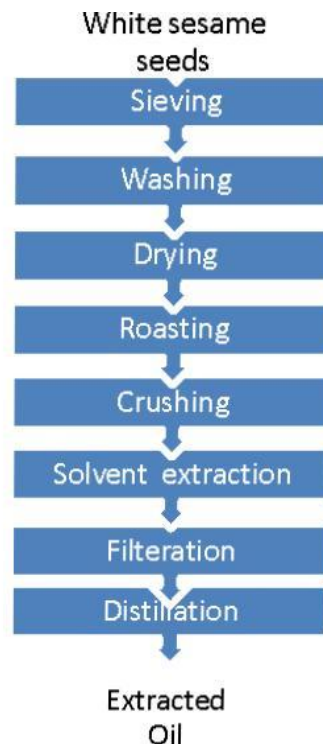


Fig 3: Extraction process description of sesame seeds

Extraction process of sesame oil:

Sesame oil can be obtained from sesame seeds by many methods, but the most common method is mechanical pressing. Below are the general steps of sesame oil extraction:

- 1) Cleaning: Sesame seeds are first cleaned to remove any dirt, debris or impurities. This can be done using various methods such as sifting or tossing.
- 2) Roasting: To improve the flavor and aroma of the oil, the seeds are washed and then roasted. Roasting can help increase the oil content by breaking down the walls of the seeds. The seeds can be roasted dry or wet.
- 3) Press: The roasted seeds are then pressed to extract the oil. This can be done using a press machine that uses force on the seeds to squeeze out the oil. Alternatively, a hydraulic press can be used, which uses more pressure to extract more oil.
- 4) Refining (optional): Refined oil can be refined to remove remaining impurities or improve color, taste and aroma. Treatment may include various treatments such as degumming, bleaching and deodorizing. Sesame oil can be stored in airtight containers in a cool and dry place to preserve its quality and freshness after extraction.

It is worth noting that different manufacturers and manufacturers use slightly different methods and variations of the above steps to extract sesame oil.

EXPERIMENTAL STUDY

The following are some of the metrics often used to evaluate the quality of sesame oil:

yield: The yield of the extracted oil is important for measuring the quality of the extraction process. Yield can be calculated by comparing the weight of the obtained oil with the weight of the first seed.

Color: The color of sesame oil varies according to the extraction method and the degree of refining used. Sesame oil usually tends to be yellow or golden in color.

Aroma: Sesame oil has a characteristic nutty flavor and the intensity of the aroma can be used as an indicator of the quality of the oil.

Free fatty acid (FFA) content: FFA content is important for measuring oil quality. High FFA levels can indicate bad fat or rancid oil.

Peroxide Value (PV): PV measures the degree of oxidation of the oil and can be used as an indicator of the freshness and stability of the oil. High PV levels indicate bad or rancid oil.

Smoke point: The smoke point is the temperature at which the oil begins to smoke and explode, which affects the flavor and nutritional value of the oil.

High smoke is preferred for cooking and frying.

Nutritional profile: Sesame oil is rich in polyunsaturated and monounsaturated fatty acids, vitamin E and other antioxidants. The nutritional value of oils can be measured to determine their health benefits and usability.

These parameters can be measured using a variety of analytical methods such as gas chromatography, spectrophotometric and titration.

CONCLUSION

One of the largest crops, sesame is a plant with many nutritional benefits. In addition to making oil, sesame seeds are often made into juice, juice, juice and other food products. Now, with the deepening research of sesame seeds, many bioactive substances have been discovered and used that support the development of the sesame industry. There is an interest in the search for high-quality and profitable crops. Current research

isolates and identifies lignans, polyphenols, phytosterols, phenols, anthraquinones, cerebrosides, fatty acids, vitamins, proteins, essential amino acids, sugar. Many studies have shown that sesame seeds and sesame oil are rich in phytochemicals and are more beneficial than other sesame plant sources. Drugs with many medicinal properties such as sesamin and sesamol, which are beneficial for human health, can be used in the treatment of diseases such as anti-inflammatory, antioxidation, anti-cancer, anti-melanin, anti-ear and anti-inflammatory. -cancer. -Lowers cholesterol, prevents aging, protects the heart, liver and kidneys. Little research has been done on sesame seeds and genetic modification and root development. Deep research on sesame seeds is still needed to improve the benefits and benefits of sesame seeds and improve the benefits of sesame seeds.

REFERENCE

- [1] Karnika Prakash SN Naik. "Bioactive Constituents as a Potential Agent in Sesame for Functional and Nutritional Application". *Journal of Bioresource Engineering and Technology* (2014) 1: 48-66.
- [2] Abou-Gharbia HA., et al. "Effect of processing on oxidative stability and lipid classes of sesame oil". *Food Research International* 33 (2000): 331-340.
- [3] Ikeda S., et al. "Dietary alpha- tocopherol decreases alpha tocotrienol but no gamma – tocotrienol concentration in rats". *Journal of Nutrition* 133 (2003): 428.
- [4] MJ Lagarda., et al. "Analysis of phytosterols in foods". *Journal Of Pharmaceutical and Biomedical Analysis* 41 (2006): 1486-1496.
- [5] Niti Pathak AR. "Value addition in sesame: A perspective on Bioactive components for enhancing utility and profitability". *Pharmacognosy Review* 8 (2014): 147-155.
- [6] Sankar D., et al. "Effect of Sesame Oil on Diuretics or β -blockers in the Modulation of Blood Pressure, Anthropometry, Lipid Profile, and Redox Status". *Yale Journal of Biology and Medicine* 79 (2007): 19-26.
- [7] Jatuporn Wichitsranoi NW. "Antihypertensive and antioxidant Effects of dietary black sesame Meal in pre-hypertensive humans". *Nutrition Journal* (2011).

- [8] Ide T., et al. "Sesamin, a sesame lignan, decreases fatty acid Synthesis in rat liver accompanying the down-regulation of Sterol regulatory element binding protein-1". *Biochimica et Biophysica Acta* 1534 (2001): 1-13.
- [9] Bhaskaran S., et al. "Inhibition of atherosclerosis in low- density lipoprotein receptor-negative mice by sesame oil". *Journal Of Medicinal Food* 9 (2006): 487-490.
- [10] Fukuda N., et al. "Reciprocal effects of dietary sesamin on ketogenesis and triacylglycerol secretion by the rat liver". *Journal Of Nutritional Science and Vitaminology* 44 (1998): 715-722.
- [11] Hirose N., et al. "Inhibition of cholesterol absorption and synthesis in rats by sesamin". *Journal of Lipid Research* 32 (1991): 629-638
- [12] Hirata F., et al. "Hypocholesterolemic effect of sesame lignan
- [13] Dur-Zong Hsu and Si-Jin Chen. "Therapeutic effects of sesame Oil on monosodium urate crystal-induced acute inflammatory Response in rats". Springerplus (2013).
- [14] Chiang JP., et al. "Effects of topical sesame oil on oxidative Stress in rats". *Alternative Therapies in Health and Medicine* 11 (2005): 40-45.
- [15] Nasiri M and Farsi Z . "Effect of light pressure stroking massage with sesame (*Sesamum indicum* L.) oil on alleviating Acute traumatic limbs pain: A triple-blind controlled trial in Emergency department". *Complementary Therapies in Medicine* 32 (2017): 41-48.
- [16] Bigdeli Shamloo MB., et al. "The Effects of Topical Sesame (*Sesamum indicum*) Oil on Pain Severity and Amount of Received Non-Steroid Anti-Inflammatory Drugs in Patients With Upper or Lower Extremities Trauma". *Anesthesia and Pain Medicine* (2015).
- [17] Yamashita K., et al. "Sesame seed lignans and gamma-tocopherol act synergistically to produce vitamin E activity in rats". *Journal of Nutrition* 122 (1992): 2440-2446.
- [18] Smith DE SJ. "Selective growth inhibition of a human malignant melanoma cell line by sesame oil In vitro". *Prostaglandins, Leukotrienes and Essential Fatty Acids* 46 (1992):145-150.
- [19] Coulman KD., et al. "Whole sesame seed is as rich a source of Mammalian lignan precursors as whole flaxseed". *Nutrition And Cancer* 52 (2005): 156-165.
- [20] Sankar DAA. "Sesame oil exhibits synergistic effect with antidiabetic medication in patients with type 2 diabetes mellitus". *Clinical Nutrition* 30 (2011): 351-358.
- [21] Patel ND and Parsons JK. "Epidemiology and etiology of benign prostatic hyperplasia and bladder outlet obstruction". *Indian Journal of Urology* 30 (2014): 170-176.
- [22] Kumar P., et al. "Nitric oxide mechanism in the protective effect of antidepressants against 3-nitropropionic acid-induced Cognitive deficit, glutathione and mitochondrial alterations in Animal model of Huntington's disease". *Behavioural Pharmacology* 21 (2010): 217-230.
- [23] Hyun TH., et al. "Zinc intakes and plasma concentrations in Men with osteoporosis: The Rancho Bernardo Study". *The American Journal of Clinical Nutrition* 80 (2004): 715-721.
- [24] Asokan SRJ., et al. "Effect of oil pulling on *Streptococcus mutans* Count in plaque and saliva using Dentocult SM Strip mutans Test: a randomized, controlled, triple-blind study". *Journal of Indian Society Pedodontics And Preventive Dentistry* 26 (2008): 12-17.
- [25] Nagendra Prasad MN., et al. "A Review on Nutritional and Nutraceutical Properties of Sesame". *Journal of Nutrition and Food Sciences* (2012).
- [26] Ajay Pal., et al. "Nutritional, Medicinal and Industrial Uses of Sesame (*Sesamum indicum* L.) Seeds – An Overview". *Agriculturae Conspectus Scientificus* 75 (2010): 159-168.