

HEALTH BENEFITS OF *SESAMUM INDICUM*: A SHORT REVIEW

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ABSTRACT

Sesamum indicum is the primary source of sesame oil. Sesame has one of the highest oil contents of any seed. Sesame (*S. indicum* L.) is originated in India. Sesame seeds have been widely employed in culinary as well as traditional medicines for their nutritive, preventive, and curative properties. Sesame 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. Sesame seeds have been widely employed in culinary as well as traditional medicines for their nutritive, preventive, and curative properties. Sesame 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. The antimicrobial effectiveness of Sesame oil and its products against bacterial and common skin infection are seen. Sesame oil contains vitamin E in abundance along with vitamin B complex and vitamin A which helps nourish and rejuvenate skin. Sesame oil is also very beneficial in the cure and prevention of acne due to its oil pulling properties. Studies show the presence of carboxylic acids and phenolic groups in essential oils especially some of the most potent antioxidants such as sesamol, sesamolol, and sesamin. The decoction of both leaves and roots has been found to be effective against chicken pox and measles (anti-viral) and used as hair shampoo for *Taenia capitis*. Hence, the following review is done to understand the pharmacological action of sesame oil.

Keywords: *Sesamum indicum*, Antioxidants, Anti-inflammatory, Anti-microbial, Anti-pyretic.

INTRODUCTION

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 [1]. Sesame (*Sesamum indicum* L.) is originated in India. It is a member of *Pedaliaceae* family and 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 [2]. Sesame seeds have been widely employed in culinary as well as traditional medicines for their nutritive, preventive, and curative properties. Sesame 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. Sesame oil extracted from *S. indicum* seeds has been employed in the food and pharmaceutical industries due to the high lipids and protein content and its distinctive flavor [3,4]. Several beneficial effects of the sesame oil were already recorded in ancient Indian medical literature, Ayurveda. Studies explain that sesame contains many constituents, the presence of carboxylic acids and phenolic groups in essential oils especially some of the most potent antioxidants such as Sesamol, Sesamolol, and sesamin, glycerol esters of different fatty acids, and lignans and myristic acid [5,6]. The medicinal, industrial and pharmaceutical characteristics of the seeds are described in a recent review [7]. They are considered to possess anti- cancer, lactagogue, and diuretic, hepatoprotective and laxative properties too. In this review, the various therapeutic potential and health benefits of *S. indicum* is reviewed.

Pharmacological activity

Anti-pyretic and anti-inflammatory activity

Sesame oil produced significant antipyretic effect comparable to paracetamol. In a study, the sesame oil administered as dietary

supplement produced analgesic, antipyretic and anti-inflammatory activities in animal models [8]. The anti-inflammatory activity was assessed on the basis of paw edema inhibition induced by the injection of carrageenan (an edematogenic agent) into the subplantar region of the right hind paw of the rat. Their results showed that the sesame oil and sesamin inhibited the formation of pleural exudate and the leucocyte migration confirming the anti-inflammatory activity [9,10].

Anti-oxidant effect of *S. indicum*

Sesame increases the recycling of vitamin E, improves liver functions and provides protection against alcohol-induced oxidative stress. Sesamin decreases cholesterol levels while increasing high-density lipoprotein levels [11]. Sesame oil enhances hepatic detoxification of chemicals, reduces the incidence of chemically-induced mammary tumors, and protects against oxidative stress [5], which is involved in the pathogenesis of endotoxin intoxication [6-9]. Oxidative stress may be caused by reactive oxygen intermediates (ROI). ROI, including singlet oxygen, nitric oxide (NO), hydrogen peroxide, and free radicals [10], all of which are important mediators of cellular injury and play a putative role in oxidative stress in endotoxin intoxication [11]. The effects of ethanolic extract of sesame coat on oxidation of low-density lipoprotein (LDL) and production of nitric oxide in macrophages were investigated. The results showed that extract in the range of 0.01-0.8 mg/ml markedly inhibited copper-induced LDL oxidation and H₂O₂ induced cell damage that implies that ethanolic extract could exhibit a protective action on biomolecules and generation of inflammatory mediators *in vitro* [12]. Clinically, it was found that sesame oil consumption helped in hypertensive patients remarkably reduced oxidative stress and simultaneously increases glutathione peroxidase (GPx), SOD and catalase activities [13].

Anti-microbial activity

Sesame is naturally antibacterial for common skin pathogens such as *Staphylococcus* and *Streptococcus*, as well as common skin fungi such as athlete's foot fungus. As a throat gargle, it kills *Streptococcus* and other common cold bacteria. It helps sufferers of psoriasis and dry skin ailments. It is a useful natural ultraviolet protector. In a study, the results revealed that minimum inhibitory concentration (MIC) of sesame oil against *Salmonella typhi* is 10 µl/ml. However, for other organism the

MIC values were in the range of 350-500 µl/ml. The sesame oil shows best antimicrobial activity and also equal with standard Kanamycin and also it shows highest zone of inhibition against *S. typhi*. It reported that sesame oil is found to have the antibacterial activity against *Streptococcus mutans*, *Lactobacilli acidophilus* and total bacteria [14].

Anti-hypertensive activities

In a study, it is revealed that the sesamin and its active metabolites can induce antihypertensive effects in experimental animal models [15]. A study in hypertensive patients indicated that sesame oil consumption remarkably reduced oxidative stress and simultaneously increased GPx, superoxidase dismutase, and catalase activities. These results support the hypothesis that sesame oil consumption may help to enhance antioxidant defense system in human beings. The investigators suggested that sesamin is a useful prophylactic treatment in hypertension and cardiovascular hypertrophy [16]. In another study, among the hypertensive patients using nifedipine (calcium channel blocker) was compared along with other edible oils. Among the groups, sesame appeared to be promising against the blood pressure rise [17].

Sesame in lipid metabolism

Considering the chemical composition, the dietary intake of sesame oil is expected to improve the condition preventing any postprandial lipemia or lipid oxidation. Although many reports are available concerning the effect of sesamin on lipid metabolism, but only a few studies using the intact sesame oil as a diet are available [18]. It seems it possess lipid peroxidation and also the lipid profile. It is apparent that sesame rich in lignans more profoundly affects hepatic fatty acid oxidation and serum triacylglycerol levels. Therefore, consumption of sesame rich in lignans results in physiological activity to alter lipid metabolism in a potentially beneficial manner [6]. Sesamol has been shown to reduce lipopolysaccharide-induced oxidative stress and upregulate phosphatidylinositol 3-kinase/Akt/endothelial nitric oxide synthase pathways [19].

Wound healing properties

Free radicals are generated at the site of injury, which are known to impair the healing process by causing damage to cellular membranes, nucleotides, proteins and lipids. In this context, several antioxidants, such as curcumin, vitamin E, have been reported to give protection against oxidative damage to tissues. The use of antioxidants has been shown to promote wound healing. Sesame oil extract has potential antioxidant activity which helps to prevent oxidative damage and promote the healing process [20,21]. *S. indicum* seeds and oil both promote wound healing in experimentally induced rats. Gel containing seeds or oil applied topically or administration of seeds or oil orally significantly promoted the breaking strength, wound contraction and period of epithelialization in incision, excision and burn wound models [22].

Sesame in atherosclerosis

Sesame oil could inhibit atherosclerosis lesion formation effectively, perhaps because of the synergistic actions of fatty acid and nonsaponifiable components [23]. A modified form of sesamol (INV-403) to enhance its properties and assessed its effects on atherosclerosis. INV-403 is a novel modified lignan derivative that potently inhibits atherosclerosis progression via its effects on IKK2 and nuclear factor- κ B signaling [19].

Anti-cancer properties

Sesame oil has been found to inhibit the growth of malignant melanoma *in vitro* and the proliferation of human colon cancer cells [25]. Sesame seed consumption increases plasma γ -tocopherol and enhances vitamin E activity, which is reported to prevent cancer and heart diseases. Cephalin from sesame seed has hemostatic activity. Historically, fiber is used as an antidiabetic, antitumor, antiulcer, cancer preventive, cardioprotective and laxative. Myristic acid has cancer preventive capability and is found in sesame seed ranging from 328 to 1,728 ppm [24].



Fig. 1: *Sesamum indicum*

Other medicinal uses

In recent experiments in Holland by Ayurvedic physicians, the oil has been used in the treatment of several chronic diseases including hepatitis, diabetes and migraine. These effects are supported by main pathophysiological theories of migraine such as neural and sensitization theories. Sesame flower extract possessed tumor arresting property [23]. Sesame oil is used as a solvent for intramuscular and has nutritive, demulcent, and emollient properties and has been used as a laxatives. The leaves are rich in a gummy matter and when mixed with water from rich bland mucilage that is used in the treatment of infant cholera, diarrhea, dysentery, cataract, boils, carbuncle, menstrual irregularities, poly-urea, stomach-trouble, serious burns skin diseases, alopecia and used as a tonic [26].

CONCLUSION

Sesame plant is not only in use for culinary purposes, but also in various applications such as industrial, engineering, and pharmaceutical sesame. Sesame is an important source of phytonutrients such as omega-6 fatty acids, flavonoid phenolic anti-oxidants, 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, antioxidant, anti-microbial, anti-hypertensive, anti-cancer and other properties. Henceforth, sesame plant gives a future scope in the medical field to improve the quality of life in a better way.

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