

**DIETETIC AND THERAPEUTIC EFFECT OF SESAME IN AYURVEDA: A CRITICAL REVIEW**Shubhashree M.N ^{1*}, Usha C ²¹Research Officer (Ayu), National Ayurveda Dietetics Research Institute (NADRI), Government Central Pharmacy Annexe, Near Ashoka Pillar, Jayanagar, Bangalore, Karnataka, India²Junior Research Fellow (Ayu), National Ayurveda Dietetics Research Institute (NADRI), Government Central Pharmacy Annexe, Near Ashoka Pillar, Jayanagar, Bangalore, Karnataka, India

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DOI: 10.7897/2277-4572.05210

Received on: 22/02/16 Revised on: 16/03/16 Accepted on: 04/04/16

ABSTRACT

Ayurveda, the “Science of life” has given much importance to the preservation of health and the prevention of the diseases. It emphasizes diet as one of the essential part of healthy life. The ancient, empirical, elegant art of dietetics has become a science which tells us what nutrients we need and from which food they can be obtained. Sesame is used extensively from times immemorial. It is interesting to explore the wide array of its activities. This paper attempts to carefully review the ancient and contemporary uses of sesame as food and medicine with reference to Ayurveda. Data was collected from different Ayurvedic texts regarding the Dietetic and Therapeutic effects of sesame and it was correlated with the research findings from various research works. This paper intends to explore the rationality behind Ayurvedic views regarding sesame and its applications based on the research findings.

Keywords - Sesame, Til, Gingelly, Gingelly oil.**INTRODUCTION**

Aharatattva or dietetics forms an important part of life. Ayurvedic classics describe in great detail about nutritive value and medicinal value of various herbs. Sesame has been used traditionally as a health supplement in India and other countries for a long time. The scientific name for sesame seed is *Sesamum indicum*. It belongs to the family Pedaliaceae¹. It enjoys an esteemed position in the field of Ayurveda. Sesame oil is the first and foremost drug used for vatashamana.² Most of the oils used in Ayurvedic medicines has sesame oil as a base.

Ayurvedic/Medicinal importance of Sesame - Ayurvedic lexicons attribute various properties to sesame such as Balya (Strength promoting), Keshya (promotes hairgrowth), Tvachya (Emmolient), Vranaropana (Wound healing), Dantya (Strengthens the teeth), Alpamutrakruth (reduces the output of urine) Grahi (Constipating), Vataghna, Agnideeptikara (Improves appetite), Matiprada (Promotes intelligence).³

Sesame is most commonly used in the treatment of Vrana (wound) Bhagna (fracture), Dantaroga (dental diseases), Anartava (amenorrhea), Vatashonitha (gout), Udara (ascites) Palita (premature graying of hair), for Keshasamvardana (Promotes hair growth). It repeatedly finds mention in the context of Vranaropana (wound healing).

REVIEW OF LITERATURE

Chemical constituents - Sesame seeds are rich in thiamine and niacine. Nonsaponifiable fraction of the seed oil yields sterols, lignans (sesamin and sesamol). Sesamin and sesamol are not found in any other vegetable oil. Sesame protein is rich in sulphuraminoacids, particularly methionine (2.6-3.5g /16g/N) and tryptophan. It has abundant oleic and linoleic acids. Sesamin, the most abundant lignan in sesame seed oil is a potent antioxidant. The oil is less destructive to β carotene than most vegetable oils.

Table 1: Nutritive values of oils⁹

Serial No	Food stuff	Carotene	Thiamine	Riboflavin	Niacin	Folic acid	Vitamin C
1.	Gingelly	60	1.01	0.34	4.4	134	-
2.	Groundnut	37	0.9	0.13	19.9	20	-
3.	Mustard	162	0.65	0.26	4.0	-	-

Table 2: Nutritive values of oils⁹

Serial No.	Food stuff	Protein	Fat	Minerals	CHO	Energy Kcal	Ca (mg)	P (mg)	Fe (mg)
1.	Gingelly	18.3	43.3	5.2	25.0	563	1450	570	9.3
2.	Groundnut	25.3	40.1	2.4	26.1	567	90	350	2.5
3.	Mustard	20	39.7	4.2	23.8	541	490	700	7.9

Table 3: Nutritive value of oils⁹

Serial No	Seeds	Cu	Mn	Zn	Cr
1.	Gingelly	2.29	1.32	12.2	0.087
2.	Groundnut	0.90	1.1	3.9	0.048
3.	Mustard	0.83	2.56	4.8	0.063

DISCUSSION

Dietetic effect of Sesame

In the background of lifestyle related non communicable disorders assuming alarming proportions in India and across the globe, the exploration of the potential role of dietetics as a preventive factor is the need of the hour. A detailed description of the gamut of ancient cuisines are described in Samhitas like Charaka Samhita, Sushruta samhita, Bhavaprakasha and others. Acharya Sushruta, Father of ancient surgery states that the paste of sesame and *Mudga* (green gram) and also the soup of *Mudga* (green gram) is a wholesome diet.⁴ A combination of Tila (Sesame), Masha (Black gram), Ashwagandha (*Withania somnifera*) mixed with goat's ghee and honey promotes strength, when consumed in the morning.⁵ Regular use of black sesame with cold water promotes development of body and strengthens the teeth. Black sesame mixed with either Amalaki (*Emblica officinalis*) or Bhibhitaki (*Terminalia bellerica*) or Haritaki (*Terminalia chebula*) is recommended as a rasayana.⁶ According to the Ayurvedic classical texts, gargling with the milk boiled with sesame and Yastimadhu (*Glycyrrhiza glabra*) acts as Dantya (strengthens teeth).⁷ It is also recommended diet in case of Pandu (anaemia), as Shulagna (anodyne) in case of Vatahoniha (gout) and other diseases. Sesame along with butter is an excellent remedy in Raktarshas (bleeding piles).⁸ It has been attributed with properties like Garbhashaya shuddhikara (cleansing the uterus), hence finds mention as emmenagogue in Anarthava (Amennorhea) and Kastarthava (Dysmenorrhea).

Therapeutic effect of Sesame

Pandu (Anaemia)

Copper plays an important role in iron absorption and it is involved in cross linking of connective tissues, neurotransmission and lipid metabolism. It is an essential element for the formation of red cells and required for various oxidation reduction reaction.⁹ Anila and Vijayalakshmi have reported that the flavonoids from sesame were effective in raising the hemoglobin levels in rats.¹⁰ Thus, usage of sesame in Pandu (anaemia) is well justified as it is rich in Copper and Iron.

Vatahara

Principles of Ayurvedic Science states that Vata is the responsible factor for all the movements in the body. It is known fact that Calcium is an essential element required for normal contraction of muscle to make the limbs move, contraction of heart for its normal function, nervous activity and blood clotting.⁹ Sesame seeds contain three times more calcium than a comparable measure of milk which justifies the role as Vatahara by contributing to the normal locomotor functions.

Aggravated vatadosha is responsible for all types of pain in the body as stated by ancient Acharyas and this aggravated vatadosha can be mitigated by snehatatwa (oily factor). Sesame oil is used as pain reliever and it is universally used as base for many oil preparations in Ayurveda. In fact, it is considered as superior as compared to other oil bases.

The extract of sesame seeds has shown a significant analgesic activity & antioxidant activity in vitro assays. Nahara and Rokouzzaman have reported the analgesic activity of the

ethanolic extract of sesame.¹¹ In addition, Jeng KCG and Hou RCW have stated that the Sesamin(SA) and sesamol(SO) are major lignans(a non-fat constituent) in sesame seed oil, inhibit 5-desaturase activity and cause accumulation of dihomog- γ -linolenic acid (DGLA), a precursor of 1-series prostaglandins, and the decreasing production of pro inflammatory 2-series prostaglandins and 4-series leukotrienes.¹² Thus, sesame oil is said to have therapeutic potential in relieving the pain due to the presence of sesamin lignans. Studies have shown that sesamol could be used as an effective agent in the management of Huntington's disease (HD) ¹³ degenerative neurological disorders (Dhatu kshayajanyavatavikaras). It is a progressive neurodegenerative genetic disorder, which affects muscle coordination and some cognitive functions, typically noticeable in middle age. In vitro studies have substantiated the neuroprotectant activity of sesame by regulating levels of reactive oxygen species and attenuating the ischemic cell death. Sesamin, which is a potent antioxidant, may also be a potential compound in stroke therapy.¹¹

Rasayana (Rejuvenating)

Sesame has exhibited anti aging effect due to the synergistic effect of lignans with tocopherols resulting from the inhibition of metabolic decomposition of tocopherols by sesame lignans. It increases the recycling of vitamin E, improves liver functions and provides protection against alcohol induced oxidative stress. Sesamin decreases cholesterol levels while increasing HDL levels. Anti-inflammatory activity of the sesamin has also been reported.¹⁴

Antioxidants are important in protection against hypertension, diabetes, cardiovascular diseases and cancer. Epidemiological studies have suggested that a 2-3 mmHg decrease in Blood Pressure reduces the rate of cardiovascular diseases, therefore Blood Pressure reduction achieved by sesamin may be meaningful to prevent cardiovascular diseases.¹⁵ The sesame seed oil constituent, sesamol, induces growth arrest and apoptosis of cancer and cardiovascular cells.¹⁶ Sesame oil has been found to inhibit the growth of malignant melanoma in vitro and the proliferation of human colon cancer cells.¹⁷ Sesame seed, alone and in combination with flaxseed, produces mammalian lignans. The mammalian lignans enterolactone and enterodiol, are produced by the microflora of colon of humans and animals from precursors in foods, have been suggested to have potential anticancer effects.¹⁸ Sesame seed consumption increases plasma γ -tocopherol and enhances vitamin E activity, which is reported to prevent cancer and heart diseases.¹⁹

Bhagna (Bone related diseases, fracture)

Study by Hyun et al 2004 has revealed a clear correlation between low dietary intake of zinc, low blood levels of the trace minerals and osteoporosis at the hip and spine. Sesame seeds are rich in zinc thus, they contribute towards the bone mineral density which justifies its role in strengthening bones and also used in Bhagna chikitsa.²⁰

Stoulyahara (Anti – Obesity)

Hirata et al. (1996) have reported that Sesamin is one of the major components of lignan of sesame seeds, which is a potential hypocholesterolemic agent in humans²¹. This sesamin binds to and activates a receptor in the body called Peroxisome

Proliferator Activator Receptor Alpha (PPARalpha) which is involved in the regulation of lipid metabolism. Activation of PPAR alpha increases gene expression of the fatty acid oxidation enzymes. In other words, sesamin increases the fat burning process and decreases the storage of fat in the body.²² The beneficial effects of sesame seed on hypercholesterolaemic rats appears to be due to its fiber, sterol, polyphenol and flavonoid content, enhancing the fecal cholesterol excretion and bile acid production and as well as increasing the antioxidant enzyme activities. In case of obese people, owing to its vyavayi (Spreading quickly), Sukshma (entering minute channels) Tikshna (entering deep) Sara, Ushna (hot potency) it helps in depletion of Medodhatu (fat) and thereby helps in depletion. Hence the activity of sesame as Stauyahara (anti- obesity) appears logical¹⁴.

Anartava (In Amenorrhea)

Lignans present in the pericarp of sesame has been shown phyto-oestrogenic activity²³ and these findings authenticate the actions mentioned in Ayurveda as Jarahara (Anti-aging), Rasayana (rejuvenating) and also its usage in amenorrhea. Black sesame is found to be more effective in Anartava and Kastartava. It is recommended for internal use in case of inevitable abortion and Leenagarbha (difficult labour). It has been attributed with properties like Ushna and Teekshna helps in expelling Arthava (menstrual flow), thereby helps in Garbhashayashodhana (cleansing the uterus), hence finds mention in anarthava.²⁴

VranaRopana (Wound healing)

Sesame seeds and oil applied topically or administered orally possess wound healing activity.²⁵ In- vivo studies reveals that, daily supplementation of sesame oil helps in reduction of oxygen free radicals and lipid peroxidation. Both the sesame seeds as well as sesame oil promotes wound healing as evident by promoting the wound contraction, epithelialisation as seen in the mice. Therapeutically, it is indicated in various kinds of healing & non healing ulcers, sinus & fistula in ano. Sesame oil helps to control eruptions. It heals and protects areas of mild scrapes, cuts and abrasions. Sesame helps to tighten the facial skin, particularly around the nose and controls the usual enlargement of pores as skin ages. Paste of sesame and Madhuka (*Glycyrrhiza glabra*) along with ghee possesses wound healing properties when it is applied externally. Paste of sesame mixed with ghee and honey is recommended to be applied on the wound to hasten ripening.²⁶ Sesame with honey is also used in cases of non healing ulcers²⁷. Thus, sesame plays an important role in wound healing activity and maintains healthy skin.

Dantya (Oral hygiene)

Ayurveda advocates a special treatment for the gums and teeth known as Kavala and Gandusha which can be compared to gargling. The clinical study conducted among the plaque induced gingivitis has shown a reduction in the total colony count of aerobic microorganisms²⁸. In one of the studies at Maharshi International College in Fairfield, Iowa, it has been found out that rinsing the mouth with sesame oil has reduced gingivitis by 85% reduction in the bacteria which causes gingivitis. This corroborates with the indication of Taila gandusha (oil gargling) as Dantya (strengthens the teeth).

Matiprada (Promoting Intellect and memory)

Sesaminol glycosides present in sesame seeds have shown protective effect against cognitive deficits induced by beta amyloid peptide in mice which shows its significance in promoting the intellect and memory.

Keshya (For hair growth)

Sesame seed proteins are richer in methionine, an amino acid responsible for growth and development of hair. It nourishes and feeds the scalp to control dry scalp and to kill dandruff causing bacteria. It has been successfully used in the children's hair to kill lice infestations. It protects the skin from the effects of chlorine in swimming pool water. Thus, sesame plays an important role in prevention of scalp infections and promotion of healthy hair. Paste made up of Sesame, Amalaka (*Indian Gooseberry*), Kamalakeshara (*Nelumbo nucifera*), Madhuka (*Glycyrrhiza glabra*) & honey, when applied on the head promotes the growth of hair and also results in dyeing the grey hair.²⁹

Tvachya (For healthy skin)

Sesame oil is rich in fat soluble vitamins, easily absorbed and very nourishing for the skin³⁰. It has proven effect as antifungal activity against *Cladosporium flavum* owing to Chlorosesanone, hydroxysesamone, and 2, 3 epoxysesamone present in it³¹. Sesame seeds have antibacterial effect against *Staphylococcus* and *Streptococcus* as well as common skin fungi, such as athlete's foot fungus has also been well documented. It keeps the skin supple and soft. It is advised after exposure to wind or sun to calm the burns. Sesame oil used for baby skin also, particularly in the area covered by a diaper, sesame seed oil protects the tender skin against rash caused by the acidity of body wastes. Ayurveda system of medicine recommends regular topical application of sesame oil to the skin, as a health-promoting procedure. We found that sesame and safflower oils, both of which contain large amounts of linoleate in triglyceride form, selectively inhibited malignant melanoma growth over normal melanocytes whereas coconut, olive and mineral oils, does not contain linoleate as triglyceride. This study reestablishes the age old wisdom of Ayurveda which highlights the positive effects of Abhyanga (oil massage).

CONCLUSION

To bring global attention towards Ayurvedic system of medicine in concern to nutritional programme, to implement and to develop more nutritional programme in our system, a great interest has to be focused on the role of dietary factors in the promotion of health and the prevention of the diseases. Sesame is an important oil seed crop that possesses a wide spectrum of pharmacological activities. It is interesting to explore the wide array of its activities. The medicinal uses of this commercially important, nutritionally rich oil seed need to be explored for better utilization. A humble effort has been made to understand the tenets of Ayurveda based on the research data.

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How to cite this article:

Shubhashree M.N, Usha C. Dietetic and therapeutic effect of sesame in Ayurveda: A critical review. *J Pharm Sci Innov*. 2016;5(2): 47-50 <http://dx.doi.org/10.7897/2277-4572.05210>

Source of support: Nil, Conflict of interest: None Declared

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