

Ethnomedicinal Therapeutic Benefits of Tukhm-i-Kunjad (*Sesamum indicum* Linn) in Urogenital and Other Systematic Diseases

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Abstract:

Tukhm-i-Kunjad (*Sesamum indicum* Linn) Sesame seeds are a traditional oilseed crop from the Pedaliaceae family and the *Sesamum* genus. It is most commonly grown and cultivated in countries such as India, China, and South America. The seeds have wide medicinal and pharmaceutical applications. Sesame seeds have been used successfully in Unani medicine to treat urogenital disorders and other systemic diseases. Tukhm-i-Kunjad has aphrodisiac properties. It is also used in respiratory diseases such as cough, asthma and soreness of the throat. The paste of Tukhm-i-Kunjad is used as an anti-inflammatory property. This review made an effort to examine sesame seeds in traditional literature as well as explore them in scientific studies. To gather knowledge on sesame seeds, a manual literature search of Unani manuscripts was conducted.

In addition, all accessible material on the phytochemical, physicochemical, and pharmacological studies have been collected using an extensive review of internet sources such as PubMed, Google Scholar, and Science Direct. Based on sesame studies regarding its physical and chemical properties, Sesame and its bioactive molecules are beneficial for various ailments. Sesame has been used as a treatment for oligomenorrhea, foetal abortion, and enhancing sexual tendency and sperm count in traditional ethnomedicinal properties. It also resolves inflammation and possesses aphrodisiac, demulcent, diuretic, emmenagogue, emollient, lactagogue, laxative, astringent, tonic, cooling agent, nourishing, and styptic properties. Sesamin, sesamol, sesamol, and sesaminol are the main active lignans found in *Sesamum indicum* and are beneficial for a range of health conditions. Several in-vivo and in-vitro studies revealed that *Sesamum indicum* components have antioxidant, anti-microbial, analgesic, cardioprotective, anti-hypertensive, and anti-inflammatory properties.

Keywords:

Tukhm-i-Kunjad, Sesamin, Sesamol, *Sesamum indicum* Linn, Unani system of medicine, Urogenital disorders, Sesame, bed-wetting.

Introduction:

Nowadays Unani Medicine is popular for exponential growth because of People's faith in the safety and efficacy of Unani Medicine. It will highlight a variety of Unani prescriptions as well as numerous scientific studies undertaken on Sesame. It has been described in two parts for a more methodical and parallel presentation. Scientific works and descriptions of sesame in Unani and other ancient literature. *Sesamum indicum* Linn is a herbaceous flowering plant from which sesame seeds are obtained, it is a traditional oilseed crop belonging to the Pedaliaceae family and the *Sesamum* genus. *Sesamum indicum* is widely produced and grown in Africa, India, China, and South America. Several *in vivo* and *in vitro* studies have revealed that components of *Sesamum indicum* have anti-cancer, antioxidant, anti-microbial, and anti-inflammatory effects on various immune cells (Majdalawieh and Mansour, 2019). Sesame seeds have been successfully utilised in the Unani medicine for treating cases of Urogenital disorder and other problems. Hence, the review made an effort to compile the literature on *Sesamum indicum* in traditional medicine and scientific studies.

Methodology: For the Unani description, conventional pharmacological actions, uses and compound formulations many traditional manuscripts/texts were searched. Additionally, phytoconstituents, ethnobotanical descriptions, and pharmacological activities were explored via search engines browsing Google Scholar/PubMed/Medline. A bibliographic exploration was conducted to compile the available information on *Sesamum indicum*. Ibn Sina's *Al Qanoon Fil Tib*, *Al Jami ul Mufradat Lil Advia Wal Aghzia* of Ibn al Baitar, Kabiruddin's *Makhanzul Mufradat*, *Bustanul Mufradat*, *Taj al Mufradat*, and *Khazainul Advia Urdu* translation of these classical books were referred. To describe the appropriate Unani terminologies, Standard Unani Medical Terminology issued by Central Council for Research in Unani Medicine (CCRUM) and World Health Organization (WHO) was used. Indian Medicinal Plants and different indexed journals were referred for English and Botanical names. The World flora online (www.worldfloraonline.org) was browsed to check the currently accepted valid name of *Sesamum indicum*.

To retrieve online literature, Pub Med, Science Direct, Scopus and journals were used. Only English-language articles were included. The full-length papers were cited. The keywords used for the search included "Sesamum Indicum", "Sesame", "Sesame and pharmacological activities", and "sesame seed oil."

Introduction of plant in traditional and Unani literature: The sesame plant height is about 2-3 feet, bark of this plant is flat and hollow from the inside. Pods are long, pointed and divided into two parts which contain small white or black seeds, used for medicinal purposes (Tariq, 2010). It is a famous plant of two varieties, white and black. It is cultivated in different regions in different environments. Height is around 2 feet. Edges of Leaves have cuts in between and produce mucilage, and leaves are tasteless. Roots are thin. The flowers are white and pink. According to Vaidis, black seeds are better than other varieties (Ghani, n.d.). The vernacular names are cited in Table 1.

Botanical Name: *Sesamum Indicum* Linn

Synonym: *S. Orientale* Linn

Scientific Classifications:

Kingdom: Plantae
Division: Tracheophyta
Order: Lamiales
Class: Magnoliopsida
Family: Pedaliaceae
Genus: *Sesamum*
Species: *Indicum*

Table 1. Vernaculars Name (Al-Din, 2007),(C.P, 2007),(Linn, 2021), (CCRUM, ministry of health and family welfare, 1997)

Name used in other system or country or region	Vernacular Name
Unani medicine	<i>Kunjad, Til</i>
Persian	<i>Kunjad, Kunjed, Samsak</i>
English	<i>Gingelly Seed, Black Sesame, Sesamum, Benne oil</i>
Arabic	<i>Simsim, Samsam, khall, Duhn, Djyld-jylan</i>
Greek	<i>Seasamoon</i>
French	<i>Sesame, Benne, Jugeoline, Jugioline</i>

Morphological characteristics of the Seed: Tukhm-i-Kunjad (Sesame seeds) are very small in size about 3-4 mm in length, 2 mm in width and 1 mm in thickness and weighing approximately 2-3.5 g/1000 seeds. Seeds are compressed ovoid in shape (figure 1). In addition, they differ in terms of seed coat surface, size, and colour. Other than white, the colour of the seeds ranges in hues such as brown, gold, grey, violet, and black. The seed coat can occasionally have a smooth or rough feel. The seeds are delicately punctate and have four faint longitudinal ridges at the borders of the flat sides. The hilum is at the pointed end, from which the raphe extends as a line along the centre of one flat face to the broader end (Khatoon et al., 2019).

Microscopic characteristics of sesame seeds: One cell thick epidermis, with thick-walled cells, of the seed coat, comprises radially elongated palisade cells. Large calcium oxalate crystals in the form of cups are present in these cells. The radial walls are thicker and wavy. The rest of the testa contains 2-3 layers of crushed cells. The typical polygonal parenchymatous cells that make up the endosperm and cotyledons include oil globules and aleurone grains. The remaining cotyledon cells are isodiametric in form, except two that have palisade-like cells (Anonymous, 1997).



Figure 1. (a) Tukhm-i-kunjad (*Sesamum indicum* Linn); (b) Kunjad powder

Temperament (Mizaj):

Sesame Mizaj is Ḥārr 20 wa Rātāb 10 (Mohammad, 2007) and Ḥārr 10 wa Rātāb 10 (Anonymous, 1997; Ghani., n.d.)

Action:

It has several pharmacological properties such as Muḥallil-i-Waram (resolvent), Musammin-i-Badan (nourishing), Muqawwi--i-Bah (aphrodisiac), Mugharri (Tariq, 2010) Mullaiyan-i-shikam (laxative), Habis-i-Khun-i- Bawasir (hemostyptic) (Ghani N., n.d.; Hakim, 2002; Mohammad, 2007; Tariq, 2010)

Dose:

The dose of Sesame is 8-10g (Mohammad, 2007; Tariq, 2010)

Adverse effects:

According to Unani physicians, it causes delayed digestion, and headache and produces a bad odour in the mouth (Hakim, 2002).

Correctives:

By roasting the seeds or with pure honey and white sugar (Hakim, 2002)

Substitute:

Flax seeds (*Linum usitatissimum*) (Hakim, 2002)

Unani Formulation and Pharmaceutical Products:

Ma'jun Muqawwi 'Alvi Khan (Tariq, 2010) Ma'jun Salab (Tariq, 2010) Labub-i- Kabir (Tariq, 2010) Ma'jun Falasfa (Anonymous, 1997)

Phytochemistry:

Sesamol, sesamin, sesamolin, sesaminol (Figure 2) and their derivatives found to have anti-inflammatory effect in both in vivo and in vitro models. Sesame oil is well recognized for its high concentrations of lignans (sesamin, asarinin, sesamolin, and sesamol), gamma-tocopherol, and unsaturated fatty acids (palmitic, stearic, oleic, and linoleic acids). Prostaglandin and leukotriene levels are reduced by fatty acids. A significant amount of unsaturated fatty acids, mainly linoleic acid [37–47%], oleic acid [35–43%], palmitic acid [9–11%], and stearic acid [5–10%], together with a trace amount of linolenic acid, are present in sesame seed oil. The seeds are rich in antioxidants and bioactive substances like phytates, phytosterols, PUFA, short-chain peptides and phenolics. Sesame cake is rich in minerals, carbohydrates, and protein. Sesame seeds are particularly important for human nutrition due to their high levels of sulphur amino acids and phytosterols (Henriques Monteiro et al., 2014; Miraj and Kiani, 2016). Sesame seeds are high in protein and also rich in thiamine and niacin. The oil has wide medicinal and pharmaceutical applications.

Therapeutic uses in Unani Medicine:**• Genitourinary Uses:**

The decoction of Tukhm-i-Kunjad with chickpeas having emmenagogue property (Hakim, 2002). Powdered form of Tukhm-i-Kunjad mixed with jaggery is effective in incontinence of urine and bed wetting. In Waram al-Rahim, Safuf of Tukhm-i-Kunjad and Tukhm-i-Katan are boiled in water and applied below the umbilicus (Tariq, 2010). Drug such as Roghan-i-Gul with Kunjad in the form of Hamul is useful in all types of Waram-al-Rahim (Mohammad, 2006; Sumbul, 2022). The medicinal herb, *Sesamum indicum* can cause menstrual bleeding with ignorable side effects. Yadav documented the usage of sesame in gynaecological issues among Haryana's rural population. Abortion is accomplished by combining half-ground sesame seeds (Jangli Til) with ghee and honey. Half-ground seeds are blended with gud (jaggery) and ghee and consumed with milk throughout the menstrual cycle to alleviate amenorrhea. A decoction of bay leaves, dates, small cardamom (*Ellataria cardamomum* (L.)), sesame seeds, and desi ghee in milk is administered to initiate labour pain. Sesame seeds' cooling and diuretic characteristics make them good for urinary concretions, strangury, and burning during urination. The seeds of sesame are caustic with a harsh bittersweet flavour (Mukta and Neeta, 2017). Sesame has been used as a treatment for oligomenorrhea, foetal abortion, and enhancing sexual tendency and sperm count in traditional medicine (Mohebitabar et al., 2017). Sesame seeds are acrid with a sharp bittersweet taste and a cooling and diuretic action, making them effective for urinary concretions, strangulation, and burning sensations during micturition (Mukta and Neeta, 2017). These seeds contain calcium, which helps to keep bones strong. Zinc promotes bone health by strengthening and increasing bone density. The seeds are especially beneficial for older males and postmenopausal women who are high-risk candidates for osteoporosis (Wang et al., 2018).

- **Gastrointestinal Uses:**

It has *Muqawwī-i-Mi'da* properties. Oral intake of Kunjad with walnut helps to stop bleeding from piles (Ghani., n.d.). Indigestion and constipation are relieved by the seeds. They contain beneficial oils that aid in the lubrication of the intestines. The seeds also contain dietary fibre, which is essential for good digestion. Sesame oil is effective in a variety of gastrointestinal disorders, including diarrhoea, dysentery and constipation (Mukta and Neeta, 2017).

- **Respiratory Uses:**

It helps in reducing cough, asthma and dryness of the throat. (Tariq, 2010) Lozenges are useful for cough, lung infection and respiratory diseases. It also helps with the dryness of the throat and has anti-inflammatory action (Hakim, 2002). Gargle with warm water leaves infusion to relieve inflamed mucous membranes of the mouth (Mukta and Neeta, 2017).

- **Hair and Skin Use:**

Kunjad enhances face colour and helps in reducing abscesses and infectious disorders (Khan, 2018). It is effective in dry itching of the skin (Ghani., n.d.). Scalp wash with the decoction of leaves helps in the growth of hairs (Hakim, 2002; Tariq, 2010).

- **Miscellaneous:**

It is *Musammin-i-Badan*. Paste of *Tukhm-i-Kunjad* helps in reducing pain and removing black scars. *Roghan-i-Kunjad* is effective in reducing inflammations (Hakim, 2002; Tariq, 2010). The seeds' iron and B vitamins aid to combat these age-related ailments. Sesame is very effective in increasing hepatic fatty acid oxidation enzymes and lowering cholesterol levels, due to its lignans content and because of their phytosterol content, sesame seeds help to strengthen the body's immune system (Linn, 2021). Sesame resolves inflammation. (Anonymous, 1997) It is aphrodisiac, demulcent, diuretic, emmenagogue, emollient, lactagogue, laxative, astringent, tonic, cooling agent, nourishing, and styptic properties (Linn, 2021).

Scientific Studies:

Sesame has various pharmacological properties which include antioxidant, anti-inflammatory, antimicrobial, anticancerous, antiproliferative, antihypertensive and immune-modulator activity. It also possesses neuroprotective and antilipidemic activity. *Sesamum indicum* constituents may be employed as effective therapeutic agents for controlling immunological reactions linked to a variety of infectious and non-infectious diseases, including cancer (Linn, 2021; Majdalawieh et al., 2020).

Clinical Trials:

In a clinical study, A double-dummy, randomized standard controlled study was performed to see the therapeutic effect of *Sesamum indicum* L powder with *Rosa damascena* Mill (Rose) Oil in uncomplicated pelvic inflammatory disease (uPID). The experimental result showed that the clinical cure for lower abdominal pain on day 15 for sesame vs control was 82.85% vs 81.48% and on day 30 for sesame vs control was 89.04% vs 87.96% respectively. Pelvic tenderness (McPS) on day 15 for sesame vs

vs control was 82.85% vs 81.48% and on day 30 for sesame vs control was 89.04% vs 87.96% respectively. Pelvic tenderness (McPS) on day 15 for sesame vs control was 83.85% vs 81.60% and on day 30 for sesame vs control was 87.32% vs 82.85% respectively. The total SF-12 score improvement on day 30 was sesame vs control was 82.79% vs 80.04% respectively. (Sumbul, 2022) In a study sesame uses mentioned in gynaecology in the form of roasted and ground-up seeds that nursing mothers consume twice daily. In treatment for urinary troubles, a study was conducted and proved that a few grams of sesame seeds that have been roasted in ghee for five minutes is useful to cure bed wetting in children. A mixture of an equal amount of sesame seeds and jaggery can be helpful in children to treat the night bed wetting and burning sensation if used once daily for a week. Twice daily doses of seed oil are administered for urinary problems (Mukta and Neeta, 2017).

Pharmacological Studies:

- **Analgesic:**

The analgesic effect of *Sesamum indicum* ethanolic extract was investigated using an acetic-induced writhing model in mice. The extract considerably reduced writhing at doses of 500 mg/kg, which is comparable to the typical medicine Ibuprofen's dose of 50 mg/kg (Linn, 2021).

- **Anti-Bacterial:**

Anti-bacterial activity against *Streptococcus mutans* and *Lactobacillus acidophilus* in dental caries was found to be moderately sensitive to the sesame oil. Sesame oil has anti-bacterial effect against *S. mutans*, *Lactobacilli*, and total bacteria, according to the data. Instead of aqueous extracts, multiple *Sesamum indicum* components showed promising antibacterial and antioxidant activities. The capacity of sesamum seed extracts in hot, cold, and ethanol to kill several bacteria, including *E. coli*, *C. albicans*, *S. aureus*, *P. mirabilis*, and *P. aeruginosa* was investigated. The outcome showed that all bacteria, except *Pseudomonas aeruginosa*, were inhibited by the ethanolic extract. According to studies, human intestinal microflora can transform the sesamin lignan into enterolactone and enterodiol, two mammalian lignans that may have protective effects against hormone-related diseases like breast cancer. Another study discovered that sesamol lignan inhibited cancer cell proliferation and promoted apoptosis (Linn, 2021).

- **Antioxidant:**

Black sesame seeds also protect against chronic liver injury and have antioxidant, anti-inflammatory, anti-tumour, anti-cancer, and anti-ageing characteristics. They have also been proven to protect against neurodegeneration. Black sesame was also found to reduce oxidative stress, have protective effects on the kidneys, and prevent osteoporosis in studies. (Hsu et al., 2011) Black sesame seeds had significantly higher quantities of indole-3-carboxylic acid, hesperidin, 2-methoxy cinnamic acid, vitamin B2, coniferyl aldehyde, phloretin, and hyoscyamine than white sesame seeds. According to previous studies black sesame seed metabolites have been shown to be physiologically active. Hesperidin, for example, has been shown to protect the nervous system and regulate cell proliferation and differentiation in human osteosarcoma.

Meanwhile, vitamin B2 is a metabolite with anti-oxidant and anti-infective characteristics, as well as the ability to protect eyesight and regulate sugar, fat, and protein metabolism. The identification of these distinct metabolites aids in the functional and nutritional assessment of black sesame seeds (Miraj and Kiani, 2016; Wang et al., 2018).

- **Anti-Fungal:**

Cladosporium Flavum was resistant to the antifungal activity of Chloro sesesmone, hydroxysesamone, and 2, 3-epoxysesamone which were separated from the roots of *Sesamum indicum*. On every examined fungal species, the majority of the extracts displayed an inhibitory effect (Linn, 2021).

- **Anti-Inflammatory:**

The sesame coat's ethanol extract (EESC) also has anti-inflammatory properties. Sesamin, sesamol, phenolic compounds, and tetranortriterpenoids have been found in EESC. Sesame lignans reduces the occurrence of inflammatory disorders and they also restrict the transmission of inflammatory cytokines and inflammatory mediators. In addition to sesame lignans, other sesame extracts also show modulation of inflammatory-related pathways (Wu et al., 2019). Sesame has an anti-inflammatory effect by inhibiting COX2 activity or PGE2 synthesis in both in-vitro and in-vivo models. Other studies have revealed that some of these constituents suppress pro-inflammatory cytokines like IL-1 β , TNF- α , IL-6, and NF-kB in a rat model or a cell culture model (Afroz et al., 2019). Sesame lignans display inhibition of inflammation-related pathways because they prevent the spread of inflammatory mediators and inflammatory cytokines (Deme et al., 2018; Wu et al., 2019) Studies reported that sesame bioactive molecule acts on opioid agents (specific central antinociceptive) which exert their analgesic effects through supra spinal and spinal receptors (Henriques Monteiro et al., 2014). Hence, we hypothesize that because of the aforementioned mechanism, sesame seeds were able to inhibit the inflammatory biochemical mediator and thereby reduce inflammation and pain.

- **Cardioprotective:**

Black sesame has been found to block myocardial remodelling and protect cardiovascular function, as well as prevent the onset and progression of atherosclerosis and lower total cholesterol, low-density lipoprotein (LDL) levels, and blood lipids. Sesamin supplementation reduced cardiovascular risk factors in women with rheumatoid arthritis, according to recent clinical research (Afroz et al., 2019).

- **Gastroprotective:**

The impact of sesame seed extract on alendronate-induced stomach ulcers in adult Wistar rats was studied in animal research. It was revealed that therapeutic doses of 0.5 and 1 mg/kg sesame extract generated results comparable to pantoprazole 30 mg/kg. Sesame's gastroprotective action against alendronate-induced stomach ulcers in Wistar rats was equal at dosages of 0.5 and 1 mg/kg, leading researchers to conclude that they were effective (Linn, 2021).

• **Miscellaneous:**

Karthikeyan and Gajendran (2005) demonstrated how powdered gingelly (*Sesamum indicum* L.) mixed with palm jaggery can assist cattle expel their placentas because the ergometric alkaloid in the mixture helps the uterus contract (Mukta and Neeta, 2017). Table 2 summarizes the active constituents and their pharmacological activities.

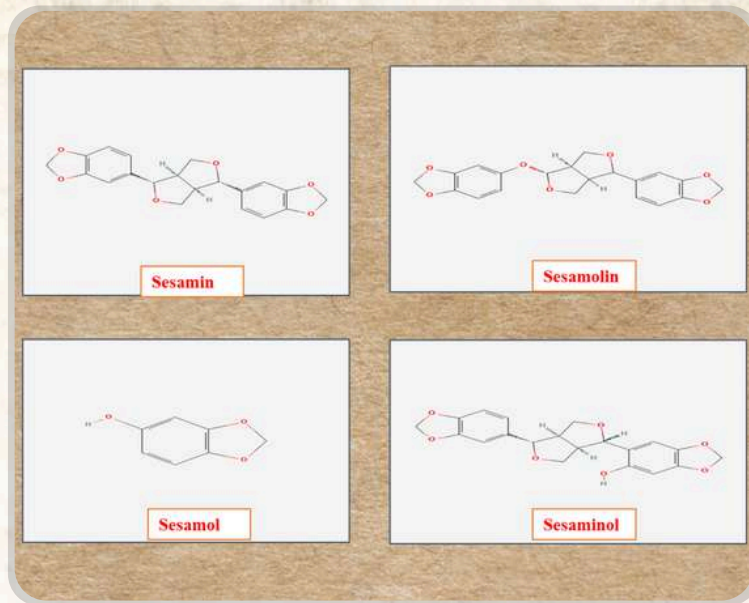


Fig 2. Chemical Structures of *Sesamum indicum* L. lignans. (Source: Pubchem)

Table 2: Active constituents of Sesame and its pharmacological activities

Pharmacological Activity of Sesame	Active Constituents	References
Antioxidant activity	<i>indole-3-carboxylic acid, vitamin B2, coniferyl aldehyde, hesperidin, phloretin, 2 methoxycinnamic acid and hyoscyamine</i>	(Miraj and Kiani, 2016; Shahidi et al., 2006; Wang et al., 2018; Zhou et al., 2016)
Anti-hyperlipidemic activity	<i>Sesamin, asarinin and sesamol</i>	(Henriques Monteiro et al., 2014; Linn, 2021)
Anti-hypertensive activity	<i>Sesamin, asarinin and sesamol</i>	(Henriques Monteiro et al., 2014; Linn, 2021)
Anti-inflammation and wound healing	<i>Sesamin, sesamol, sesamol, sesaminol and hesperidin</i>	Henriques Monteiro et al., 2014; Majdalawieh et al., 2020; Wu et al., 2019; Zhou et al., 2016
Antibacterial / Antimicrobial activity	<i>Sesamin, sesamol, sesamol, sesaminol and hesperidin</i>	(Linn, 2021)

Antiviral	<i>sesamin, sesamol, vitamin A, B, C, fixed oils, phenolic compounds</i>	(Mukta and Neeta, 2017)
Cytotoxicity/Toxicity	<i>Sesamin, asarinin and sesamol</i>	(Majdalawieh et al., 2020; Wu et al., 2019)
Hepatoprotective activity	<i>Sesamin, asarinin and sesamol</i>	(Linn, 2021)

Toxicity study of *Sesamum indicum*: The *Sesamum indicum* extract was employed at a dose range of 1–100 µg/mL for all experiments as it was demonstrated that this range exhibited no toxicity. (Majdalawieh et al., 2020) Ten mice were given oral doses of 0.5, 1, 1.5, 2, and 3 g/kg sesame seed oil, whereas the control group was given saline. According to the data, the oil was not hazardous to animals at the doses used when the groups were monitored for 48 hours. Toxicity symptoms such as cyanosis, diarrhoea, ptosis, piloerection, ataxia, hypnosis, tremors, convulsions, writhing, and crimson urine were not observed. Additionally, there was no change in the motor activity parameters of breathing, corneal reflex, righting and withdrawing, and body tone (Henriques Monteiro et al., 2014).

Conclusion: The review made an effort to examine *Sesamum indicum* in traditional literature and scientific studies. Sesame seeds have been successfully utilised in Unani medicine to treat cases of Urogenital disorders and other problems, according to the information that was retrieved above. In vitro and in vivo studies substantiate its several other properties. According to Unani and conventional literature, sesame possesses a diverse range of pharmacological characteristics, and its effectiveness in treating numerous ailments is noteworthy. As a result, it is needed to comprehend the explanation of Sesame's mode of action in Unani medicine. So, our recommendation is to concentrate future research on sesame lignans and its essential oil. Additionally, it is advised to do clinical experiment on large population to determine effectiveness and safety of sesame lignans and its essential oil.

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