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## Standardization and phytochemical investigation of *Sesamum indicum* L. seed extract

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### Abstract

Standardization the process of developing and implementing technical standards and to maximize compatibility, safety, repeatability and quality of the drugs is one of the important measures in view of the various practical problems encountered from time to time especially in the field of herbal drugs and Ayurveda. Scientific data pertaining to the standardization of the herbal drugs could be of immense value to substantiate efficacy, safety or toxicity of an herb. Hence present study was intended to standardize *Sesamum indicum* L seed extracts, since *Sesamum indicum* L. (sesame or *til*) is an important food, oil, medicinal and religious crop in India. Standardization of seeds of *Sesamum indicum* L. were carried out using organoleptic characterization and chemical characterization as moisture content & ash value to assess the quality and purity of drug. The oil was extracted from seed of *Sesamum indicum* L. by solvent extraction method using Soxhlet apparatus with suitable solvents as Petroleum ether (40- 60°C), ethanol, benzene and n-hexane. The percentage oil yield on weight of the dried seeds was 46% in the ethanol extract and was found to most suitable as the yield is more and is less toxic and economic. The present study assessed phytochemical characteristics of the oil extracted from seeds of *Sesamum indicum* L. Qualitative phytochemical analysis of extracts revealed presence of alkaloids, flavonoids, glycosides, phenols, anthraquinones, tannins, carbohydrates and proteins extracts. The oil quality parameters were accessed in terms of acid value, free fatty acid value, saponification value, iodine number and peroxide value. Results indicated the authenticity of the herbal drugs used in the study. Study was successful in establishing quality standards for the seeds of *Sesamum indicum* L. These preliminary studies may offer great help in initial procurement and assessment of quality of the crude drugs when these are being used as raw materials for preparations of herbal formulations.

**Keywords:** Standardization, *Sesamum indicum* L., sesame, extraction, phytochemicals

### Introduction

Sesame (*Sesamum indicum* L.) from family Pedaliaceae is a flowering plant in the genus *Sesamum*. It is an annual crop grown between 1.6 and 3.3 ft high. It has opposite leaves 4 to 14 cm long. The flowers may vary in color with some being blue, white or purple<sup>[1]</sup>. The seeds are small in size ranging between 3 to 4 mm long by 2 mm wide and 1 mm thick. The seeds are oval in shape and slightly flattened<sup>[2]</sup>. It is one of the most important oil seed crops around the world and it is cultivated for its edible seeds since ancient times for use as a traditional health food and also medicinal benefits<sup>[3,4]</sup>.

Sesame oil, otherwise also referred to as gingelly oil, is one of the major sources of edible oil in India and is culturally associated from the Vedic period. The Sanskrit word for oil, taila is derived from the Sanskrit word for sesame tila<sup>[5]</sup>. Sesame oil has very pleasant flavor and can be consumed without further purification. It ranks second with regard to nutritional value after olive oil<sup>[6]</sup>.

Now a days, Sesame or *Til* oil has been mostly used for cosmetics, medicinal industries in manufacturing proprietary branded oils and medicines and less used as a cooking and culinary oil in India. Sesame (*Til*) seed and oil has been in use as a food its rich nutty flavour<sup>[7]</sup> and healing oil for hundreds of years<sup>[8]</sup>. It is a good source of protein 22% and fatty oil 54%<sup>[9]</sup>. It is a good protector of ultra violet light, sun, wind, and radiation and therefore, it is used in various cosmetics, and also in baby & children skin care. Sesame oil is a source of vitamin E which is an anti-oxidant. The uses of sesame oil as natural antioxidant have been reported<sup>[10]</sup>. In Japan apart from being used in salad it is used in treating cough, for treating cancer in Germany, for treating cold in Venezuela, for treating constipation, impotency, malaria, diarrhea and sore in China<sup>[11]</sup>. Sesame oil has been used as a solvent for intramuscular injections for several years<sup>[12]</sup>. Sesame oil contains magnesium, copper, calcium, iron, zinc and vitamin B<sub>6</sub>. Copper provides relief for rheumatoid arthritis. It is established that Magnesium supports vascular and respiratory health systems while Calcium helps prevent colon cancer, osteoporosis and migraine; zinc is known to promote health<sup>[13]</sup>.

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Extraction process can either be liquid-liquid or solid-liquid extraction. But for the purpose of this investigation, the solid-liquid extraction-leaching is employed. Oils extracted from whole seeds were more stable than those extracted from dehulled seeds<sup>[14]</sup>.

The aim of the present study is to extract and characterise the physico-chemical properties of the *Sesamum indicum* Seed Oil and its medicinal applications.

## Materials and Method

### Materials

For present study *Sesamum indicum* L. shall be collected and authenticated following which they shall be successively extracted by using different solvents. The extracts shall be tested for the different physico-chemical test. The solvents and reagents used were purchased from Rankem, India and Qualigens Fine Ltd., India. All other chemicals were of analytical grade.

### Standardization of Plant Material

Standardization of plant material is essential in order to assess the quality and purity of drugs. Standardization of seeds of *Sesamum indicum* L. were carried out using organoleptic characterization and chemical characterization as moisture content & ash value<sup>[15]</sup>. The organoleptic characters - the color, odor, taste, shape, size and texture of the plant material were estimated by visual and sensory evaluation.

### Preparation of powder

The unripe fruits of *Sesamum indicum* L. were dried under shade and then seed were collected and followed by crushing and separation into the particle size with an average of 24 and 28 mesh and stored in an airtight container for further use.

### Oil Extraction

The dried powder of seed was extracted with various solvents. Petroleum ether (40- 60°C), ethanol, benzene and n-hexane had been used as solvent for Soxhlet extraction process, performed in triplicate.

A dried powder seed was subjected to Soxhlet. Extraction was carried out for 4 hrs by maintaining solvent to solid ratio (25:1). The temperature was maintained at 40-50 degree centigrade. The solvents were removed by distillation under reduced pressure and the resulting semisolid mass was vacuum dried using rotary flash evaporator to obtain the extract<sup>[16, 17]</sup>. Extracts were then labelled and stored in airtight containers at room temperature for further studies.

### Qualitative Phytochemical analysis

Various phytochemicals such as alkaloids, flavonoids, glycosides, tannins, phenols, anthraquinone saponins, steroid, terpenoids, carbohydrates and proteins were detected in the extracts according to the procedures followed by Debela<sup>[18]</sup>.

### Physiochemical analysis

The percentage oil yield was calculated from the ratio of mass of oil to the mass of the raw material used for the extraction. The extracted oil was then analyzed by determination of its acid values and by free fatty acid methods. The iodine value, saponification value, peroxide value, colour, texture, solubility and pH value were determined by IUPAC (1979) and AOAC (1995)<sup>[15, 19]</sup>.

## Result and Discussion

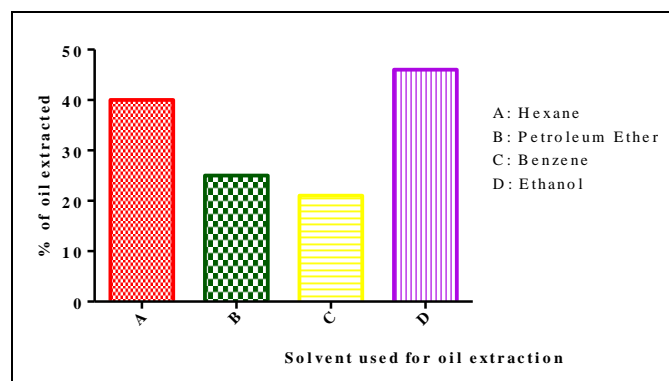
### Standardization of Sesame seeds

Results showed that the seeds were observed white color,

pear-shaped, overate, and small flatted having aromatic flavour. It contains 4.90% moisture and 5.40% ash. The composition of the sesame seed is dependent on genetic, environmental factors, variety, cultivation, climate, ripening stage, the harvesting time of the seeds and the analytical method used. The low moisture contents observed in the seed may enable this plant to possess a long storage capability.

### Extraction of oil from Sesame seeds

Soxhlet extractor was used for sesame oil extraction for 4 hours by maintaining solvent to solid ratio (25:1). Petroleum ether (40- 60°C), ethanol, benzene and n-hexane had been used as solvent for Soxhlet extraction process, performed in triplicate. Extracted products were then evaporated under vacuum at 40°C using a rotary vacuum evaporator under reduced pressure. The percentage oil yield was calculated from the ratio of mass of oil to the mass of the raw material used for the extraction. Percentage yield among petroleum ether (25%), ethanol (46%), benzene (21%) and n-hexane (40%), the ethanolic extract was found to most suitable as the yield is more and is less toxic and economic (Figure 1).



**Fig 1:** Effect of solvent on sesame oil extraction from the seeds of *Sesamum indicum* L.

### Qualitative Phytochemical analysis

The results of preliminary qualitative phytochemical analysis of extracts of *Sesamum indicum* L. revealed the presence of different bioactive constituents, including alkaloids, flavonoids, glycosides, tannins, phenols, anthraquinones, and carbohydrates in Table 1.

**Table 1:** Phytochemical determination present in seed extract of *Sesamum indicum* L.

Phytochemicals	Extract of <i>Sesamum indicum</i> L.
Alkaloids	+
Flavonoids	+
Glycosides	+
Tannins	+
Phenols	+
Anthraquinone	+
Saponins	-
Steroids	-
Terpenoids	-
Carbohydrates	+
Proteins	+

### Physiochemical analysis

The physiochemical properties of *Sesamum indicum* L. seed oil were shown in Table 2. The test results were compared with the standard values as per the literature data revealed that the test result complies with the standard values.

**Table 2:** Physical and chemical characteristics of *Sesamum indicum* L. seed oil

Properties	Observation	
	Reference	Observed
Color	Light yellowish	Light yellowish-pale yellowish
Odour	Nutty flavour	Nutty flavour
Texture	Viscous	Viscous
Physical state at room temperature (°C)	Liquid	Liquid
Solubility	Immiscible with aqueous solution, water	Immiscible with water
Acid value (mg NaOH/g)	0.5-1.0	0.98
Free Fatty acid value (mg NaOH/g)	0.5-1	0.41
Iodine value g/100 g	70-80	73.76
Peroxide value (meq/kg)	4-5	3.43
Saponification value mg/g	24-28	26.70
Specific gravity	0.5-1.5	0.87
pH value	4-6	5.67

Extracted sesame oil was light yellowish-pale yellowish in color with nutty flavour with viscous texture, found as liquid at room temperature (°C) (Sesame oil). Iodine value showed 73.76 g/100 g which placed the oil in the class of non drying oil which confirmed that it could be utilized in topical formulation. The low saponification value of 26.70 mg/g suggested that the oil could be used for soap production. The free fatty acid is 0.41 mg NaOH/g which is very close to the reference value which shows that this oil is stable. Peroxide value of 3.43 meq/kg showed that the degree of oxidation in the oil was low, which could be attributed to the nutty flavour of the oil. Oils with high peroxide values are known to have awful smell. Acid value 0.98 mg NaOH/g of oil gives indication of its freshness and edibility. The low values of acid and free fatty of *Sesamum indicum* seed oil also suggested that the oil would have long shelf life. The specific gravity and pH value of the oil as obtained fell in the reference range.

### Conclusion

Study was successful in establishing quality standards for the *Sesamum indicum* L. seed. Results indicated that *Sesamum indicum* L. seed was a good source of oil because it has high oil content. The phytochemical constituents present in the oil were generally moderate or in high concentration. These preliminary studies may offer great help in initial procurement and assessment of quality of the crude drugs when these are being used as raw materials for preparations of herbal formulations as having both nutritional and pharmacological benefits.

### Conflict of interest

The authors declare no conflict of interest.

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