

EVALUATION AND PHYTOCHEMICAL SCREENING OF SEED OIL OF *NIGELLA SATIVA* LINN.

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Abstract

Nigella sativa (Ranunculaceae) is a flowering plant, native to Southwest Asia. Seeds contain 36%–38% fixed oils, proteins, alkaloids, saponin and 0.4%–2.5% essential oil. The fixed oil is composed mainly of unsaturated fatty acids, including the unusual C20:2 arachidic and eicosadienoic acids. The seeds are used as a carminative and stimulant to ease bowel and indigestion problems and are given to treat intestinal worms and nerve defects to reduce flatulence, and induce sweating. The present paper deals with preliminary phytochemical screening of fixed oil obtained by the seeds. Also attempt was made to evaluate the oil so as to establish the standardization parameters.

Key-words: *Nigella sativa*, Fixed oil, Phytochemical screening, Evaluation

Introduction

Nigella sativa (Ranunculaceae) is a flowering plant, native to Southwest Asia commonly known as karayal (H) and black cumin (E). It is small prostrate herb about 45 cm high 2-3 slender leaves pinnatisect, 2-4 cm long cut into linear segment, segments oblong. Flowers pale, blue on solitary long peduncles, seeds trigonous and black in colour. The plant has a rather stiff, erect, branching stem, bears deeply-cut greyish-green leaves and terminal greyishblue flowers, followed by odd, toothed seed vessels, filled with small somewhat compressed seeds, usually three-cornered, with two sides flat and one convex, black or brown externally white and oleaginous, strong agreeable aromatic odour, like that of nutmegs, and a spicy, pungent taste. The flowers are delicate, and usually coloured pale blue and white, with 5–10 petal. The fruit is a large and inflated capsule composed of 3–7 united follicles, each containing numerous seeds. It has a pungent bitter taste and a faint smell of strawberries¹⁻².

N. sativa seeds contain 36%–38% fixed oils, proteins, alkaloids, saponin and 0.4%–2.5% essential oil. The fixed oil is composed mainly of unsaturated fatty acids, including the unusual C20:2 arachidic and eicosadienoic acids. The essential oil was analysed GC-MS. Many components were characterized, but the major ones were thymoquinone (27.8%–57.0%), p-cymene (7.1%–15.5%), carvacrol (5.8%–11.6%), t-anethole (0.25%–2.3%), 4-terpineol (2.0%–6.6%) and longifoline (1.0%–8.0%). Seeds contain numerous esters of structurally unusual unsaturated fatty acids with terpene alcohols (7%); furthermore, traces of alkaloids are found which belong to two different types: isochinoline alkaloids are represented by nigellimin and nigellimin-N-oxide, and pyrazol alkaloids include nigellidin and nigellicin. In the essential oil (avr. 0.5%, max. 1.5%), thymoquinone was identified as the main component (up to 50%) besides p-cymene (40%), pinene (up to 15%), dithymoquinone and thymohydroquinone. Other terpene derivatives were found only in trace amounts: Carvacrol, carvone, limonene, 4-terpineol, citronellol. The essential oil contains significant (10%) amounts of fatty acid ethyl esters. On

storage, thymoquinone yields dithymoquinonene and higher oligocondensation products. The seeds also contain a fatty oil rich in unsaturated fatty acids, mainly linoleic acid (50-60%), oleic acid (20%), eicodadienoic acid (3%) and dihomolinoleic acid (10%). Saturated fatty acids (palmitic, stearic acid) amount to about 30% or less³⁻⁴.

Karayal seeds are used as a carminative, aromatic, stimulant, diuretic, anthelmintic, galactagogue and diaphoretic. They are used as a condiment in curries. A tincture prepared from the seeds is useful in indigestion, loss of appetite, diarrhoea, dropsy, amenorrhoea and dysmenorrhoea and in the treatment of worms and skin eruptions. Externally the oil is used as an antiseptic. To arrest vomiting, seeds are roasted and given internally⁵. The present work was conceived with the objective to find out the presence of phytochemicals in the fixed oil of seed and to evaluate the oil on some parameters to establish the standardization parameters.

Material and Methods

Collection of plant material

The seeds of selected plants were collected from local market of Indore in the months of Jan 2011 and authenticated by the Department of Pharmacognosy, COP, IPS, Indore, M.P. and a voucher specimen NS/07/123 was deposited in our department.

Extraction of oil

The dried seed were weighed and was subjected to rotatory mills for the extraction of oil⁶.

Preliminary phytochemical screening

The oil was subjected to the chemical tests to determine the presence of different phyto-constituents as per the standard procedure⁷.

Evaluation of oil

The seed oil obtained from *Nigella sativa* Linn. was estimated for the quantitative parameters as per the standard procedure⁸⁻⁹.

Results and Conclusion

The plant *Nigella sativa* Linn. is an indigenous herb which was chosen for this study. The plant belongs to the family Ranunculaceae. The scanty availability of information on this plant facilitates the study on it. The attempt was made to evaluate the seed oil and phytochemical present in the oil. The oil of the plant of *Nigella sativa* Linn. were subjected to phytochemical screening which reveal the presence of various pharmacological active components. The oil shows the presence of fixed oil, fats, proteins, amino acid mucilage and gums (Table 1). The fixed oil obtained from seeds of the plant *Nigella sativa* Linn. was subjected to evaluation (Table 2) which reveals the quantity of various parameters. The color of oil is pale yellow brown, odor is aromatic having agreeable taste.

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Table 1: Preliminary phytochemical screening of seed oil of *Nigella sativa* Linn.

S/No.	Constituents	Test	Inference
1.	Fixed oil and fats	Spot test	+
		Soap formation test	+
2.	Tannins	FeCl ₃	-
		Vanillin hydrochloride	-
		Alkaline reagent	-
3.	Protein and amino acid	Million's test	+
		Ninhydrin test	+
		Biuret test	+
4.	Flavonoids	With NaOH	-
		Shinoda test	-
		With H ₂ SO ₄	-
5.	Steroids and triterpenoids	Libermann's Burchard test	-
		Salkowski's test	-
6.	Mucilage and gum	With 90% alcohol	+
7.	Waxes	With alc. KOH	-

Abbr.: + Present, - Absent**Table 2: Evaluation of seed oil of *Nigella sativa* Linn.**

S/No.	Parameters	Values obtained
1.	Organoleptic character	
	Colour	Yellowish brown
	Odour	Aromatic
	Taste	Agreeable
2.	Refractive index	1.4836
3.	Optical rotation	+1.56°
4.	Specific gravity	0.8756
5.	Saponification value	201.26
6.	Unsaponification matter	0.03
7.	Iodine value	115.50
8.	Acetyl value	25.20
9.	Acid value	40.27
10.	Ester value	160.99
11.	R. M. value	3.5

References

1. Bakhru H. K. (1998). Herbs that heals, Natural remedies for good health, 1st edition, Orient paperbacks, 17-18.
2. Sharma N. K., Ahirwar D., Jhade D. and Gupta S. (2009). Medicinal and Phamacological Potential of *Nigella sativa*: A review, Ethnobotanical leaflets, 13: 946-955.
3. The wealth of India, A dictionary of Indian Raw materials and Industrial products, Vol-I, Published and printed by National Institute of science communication (NISCOM) Council of Scientific and Industrial Research (CSIR), New Delhi, 270-273.
4. Chopra R. N., Nayar, S. L. and Chopra I. C. (2005). Glossary of Indian medicinal plants, Published and printed by National Institute of science communication (NISCOM) Council of Scientific and Industrial Research (CSIR), New Delhi.
5. Nadkarni K.M., Indian Materia Medica, Vol-I, Bombay Popular Prakashan, second edition, 1927, reprint 1995,854-856.
6. Harbone J.B., Methods of Plant Analysis Chapter II In: Phytochemical methods: A guide to modern techniques of plant analysis Toppan Company Ltd, Japan.,1973, (1), pp 4 – 5
7. Kokate C.K. (1997).Practical Pharmacognosy, Vallabh Prakashan, Delhi.,1997, 4th Edition, 107 - 111.
8. Divakar M C., Plant drug evaluation-a laboratory guide, published by, CD remedies, 2nd ed., 2002, 84-92.
9. The Ayurvedic Pharmacopoeia of India, Part-I, Vol-I, Published by The controller publication, Govt. of India, Ministry of Health & Family Welfare, 2001, 137-146.