

CHEMICAL EVALUATION OF OIL FROM *DATURA STRAMONIUM*

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## Summary

Oil extracted from the seeds of *Datura stramonium* with the help of soxhlet apparatus, using petroleum ether (40–60°C) as solvent, was purified by treating it with activated charcoal and kieselghur. Yield, physicochemical characteristics and chemical composition of the oil were determined and the results obtained were compared with those of oil from *Datura alba* and other *Datura* species. It was concluded that this oil was of the same nature as those of the other *Datura* species and could be similarly used in medicine.

## Introduction

*Datura* oil is usually obtained from the seeds of *Datura stramonium* belonging to the family Solanaceae (6). *Datura stramonium* which is indigenous to Asia has now spread throughout Europe. L. Wallis states that *Datura stramonium* is indigenous to shores of Caspian sea and is believed to have spread throughout Europe, Asia, America and South Africa occurring as weed growing in waste places at the edges of the roads and rubbish heaps in the warmer districts. It is now cultivated for drugs in South England, Germany, France and Hungary (11). Chopra on the other hand claims it to be indigenous to India where it grows abundantly throughout the temperate Himalaya from Kashmir to Sikkim (2).

In Pakistan *Datura stramonium* is very common in Baluchistan, Punjab, Murree hills, Azad Kashmir and Abbottabad at an elevation ranging from 7000 ft. to 9000 ft. (12).

**Review of Literature.** 18.10% of fixed oil from the seeds of *Datura alba* were reported by Pazir Gul and F. W. Khan (8). 15–30% of fixed oil from the seed of *Datura stramonium* was reported by Trease (10) whereas 17–25% of oil from the seeds of *Datura fastuosa* was reported by S. Krishna and S.V. Puntambeker (7). It has also been reported by S. Krishna that this oil is used in medicine.

The usual range of characteristics of oil from *Datura stramonium* as reported by Jamieson are: specific gravity at 15°C, 0.917–0.923; saponification value, 186–202; iodine value, 113–126, and unsaponifiable matter, 1.0–2.6% (6). Pazir Gul and F.W. Khan reported characteristics of oil from *Datura alba* which are; specific gravity at 15°C, 0.893; refractive index at 27°C, 1.471; saponification value, 187.94; acid value, 6.21 iodine value, 112.5; hehner value, 78.06; and unsaponifiable matter 2.70%. They also reported that the mixed fatty acid contained saturated fatty acid, 33.2%; unsaturated fatty acid 50.40%; oleic acid, 59.80%; linoleic acid 26.42% and palmitic acid 6.20% (8).

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T.P. Hilditch and M.B. Ichaporia examined an oil sample of *Datura stramonium* which gave the following characteristics; saponification value, 287; iodine value, 115.8; acid value, 6.7; and unsaponifiable matter, 1.9%. They also reported that the mixed fatty acid contained oleic acid, 33.10%; linoleic acid, 53.6%; myristic acid, 1.30%; palmitic acid, 10.8%; and stearic acid 1.2% (4). The present study was taken up with an objective to find the yield and chemical composition of the oil from the seeds of *Datura stramonium* plant and to compare its characteristics with oil from the seeds of *Datura alba* and other *Datura* species, in order to explore the possibility of its commercial utilisation in pharmaceutical industry.

**Material and Method.** *Datura stramonium* seeds, collected from Baluchistan Forest Division, were dried and cleaned. They were powdered using willey mill and sieved through 20 mm. mesh. The oil was extracted with the help of soxhlet apparatus using petroleum ether (40–60°C) as solvent and was purified following the method outlined by Jamieson (6). The individual fatty acids in the oil were determined by fractional precipitation techniques followed by Rosenthaler (9). The physico-chemical constants of the oil from the seeds of *Datura stramonium* were estimated following the methods given by A.O.A.C., Griffin; Jamieson and Jacobs (1,3,5,6).

**Results and Discussion.** The yield of fixed oil from the seeds of *Datura stramonium* was found to be 21.72%. It is encouraging enough as compared to the oil yield of *Datura fastuosa* (11.0%) reported by S. Krishna (7), and to the oil yield of *Datura alba* (18.10%) reported by Pazir Gul and F.W. Khan. (8) Moreover the oil yield (21.72%) as determined in the laboratory in case of *Datura stramonium* falls in the agreeable range as reported by Trease (15–30%) and Jamieson (17.25%), (10,6). The yield of oleic acid (58.90%) as determined in the Laboratory from the oil of *Datura stramonium* is comparable to those reported by S. Krishna (62.20%) and Pazir Gul (59.80%). The yield of Oleic acid is higher than that reported by T.P. Hilditch. Similarly the linoleic acid obtained from the oil of *Datura stramonium* compares well with that reported by S. Krishna whereas it is low as compared to those reported by T.P. Hilditch and Pazir Gul in case of *Datura stramonium* and *Datura alba* respectively. This difference may be probably due to the changing locality, variety and time of collection of the seeds, for these factors effect the oil yield and its composition to some extent. The oil after purification with activated charcoal and kieselghur was yellow in colour like that of oil of other reported species and has almost the same odour and physical properties. Physico-chemical constants as determined of the oil of *Datura stramonium* are compared below with those of oil reported in literature (Table-1).

TABLE 1

Physico-chemical constraints	<i>Datura stramonium</i> (Lab. work)	<i>Datura alba</i> (reported) (Pazir Gul and F. W. Khan)	<i>Datura stramonium</i> (reported) (G.S. Jamieson)	<i>Datura stramonium</i> (reported) (T.P. Hilditch)
Specific gravity at 15°C	0.919	0.893	0.917–0.923	N.A.
Refractive Index at 27°C	1.470	1.471	N.A.	N.A.
Saponification value	188.65	187.94	186–202	287.0
Acid value	5.50	6.21	N.A.	6.70
Iodine value	114.17	112.5	113–126	115.80

N.A. = Not available

It is obvious from the above table that the physico-chemical characteristics of the oil obtained in the laboratory compare favourably well with these reported in literature.

The observed chemical composition of the oil of *Datura stramonium* is compared below with those of oil reported in literature by other workers. (Table-2).

TABLE - 2

Name of constituents	<i>Datura stramonium</i> (Lab. work) %	reported (%)			
		<i>Datura stramonium</i> (S. Krishna)	<i>Datura stramonium</i> (T.P. Hilditch)	<i>Datura alba</i> (P. Gul and F.W. Khan)	<i>Datura stramonium</i> (Trease)
Oil	21.72	N.A.	N.A.	18.19	15.30
Saturated fatty acid	27.90	N.A.	N.A.	33.20	N.A.
Unsaturated fatty acid	65.50	N.A.	N.A.	50.40	N.A.
Unsapoinifiable matter	1.20	1.107–2.13	1.90	2.70	N.A.
Oleic acid	58.90	62.20	33.10	59.80	N.A.
Linoleic acid	16.00	15.0	55.10	26.42	N.A.
Palmatic acid	9.50	10.00	10.80	6.20	N.A.

N.A. = Not available

It is obvious from the results summarized in the above table that the composition of *Datura stramonium* determined in the laboratory compares well with those of *Datura alba* reported by P. Gul and F.W. Khan and with those reported by S. Krishna whereas it differs with the results reported by T.P. Hilditch.

#### Conclusion:

It was concluded from the study that :

- (i) The solvent extraction using soxhlet apparatus yielded good recovery of oil.
- (ii) The physico-chemical characteristics and chemical composition of the oil of *Datura stramonium* compare well with those of oil from *Datura alba* and other *Datura* species.
- (iii) The oil of *Datura stramonium* seems to be superior in quality and hence can be used in medicine like other *Datura* species.

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