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Comparative Study of Volatile oil of Two Different Species *Curcuma caesia* and *Curcuma longa* Rhizome

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ABSTRACT

The present study was undertaken to analyze the quality and purity of volatile oil obtained from different species *Curcuma caesia and Curcuma longa* of *Zingiberaceae* family. The colour, odour, solubility, refractive index and optical rotation of essential oil of both varieties were nearly same. Thin layer chromatography of essential oil of *Curcuma caesia* showed 8 different compounds at different R_f values while *Curcuma longa* showed 7 different compounds at different R_f values. The GC/MS studies showed up to 30 compounds were found in Essential oils of both varieties of plants but percentage of compounds were varies. In conclusion it appears that, in essential oil of both varieties there were no marked variations found. Hence both varieties of *turmeric* rhizome can be used for medicinal purpose for future prospects.

Keywords: Volatile oil, *Curcuma caesia*, *Curcuma longa* , rhizome.

1. INTRODUCTION

Herbal medicines are defined as a “crude drugs of vegetables origin utilized for the treatment of disease states, often of a chronic nature, or to attain or maintain a condition of improved health”. Volatile oil is odorous volatile principles of plant and animal source, it evaporates when exposed to air at ordinary temperature and hence known as volatile or essential oils. It is secreted in plant from some special secretary tissues[1-8]. Essential oils contain highly volatile substances that are isolated by hydrodistilation method from rhizome of curcuma caesia having chemical constituent 18 cineole, z,β-terpineol, cis β-terpineol, Pinene, phellandrene, camphor etc. and curcuma longa having chemical constituent careen, terpinene, camphene, terpinolene, β-sesquiphyllandrine, caryophyllene etc. These are chemically derived from terpenes (mono-terpenoids and sesqui-terpenoids) and their oxygenated derivatives [9-15].

2. MATERIALS AND METHODS

2.1 Selection, Identification/Authentication, Collection and Processing of plant material

The plant rhizome of turmeric (Curcuma caesia and Curcuma longa) belonging to family Zingeberaceae were collected from my villege-Unchakhera (Dist-Sehore) in February-march further authenticated from the Department of Pharmacy, B. U. Bhopal.

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2.2 Evolution of Parmacognostical and Phytochemical Parameters of plant material [16-19]

- Following physical parameters were determined
- Determination of moisture content
- Determination of ash value
- Determination of Total ash
- Determination of Acid Insoluble ash
- Determination of water soluble ash
- Extractive values
- Determination of water soluble extractive value
- Determination of alcohol soluble extractive value

2.3 Extraction of Essential oil from rhizome of two varieties of turmeric (*Curcuma caesia* and *Curcuma longa*)

Fresh rhizome were washed for removal of dirt than chopped into small pieces and material is subjected to hydrodistilation using Clevenger type glass apparatus for 4-8 hr. the oil were separated and stored at 0oC in air tight container after drying them over anhydrous sodium sulfate the oil of both species (Curcuma caesia and Curcuma longa) were extracted for finding out physical parameter.

2.4 Screening of essential oil

a) Preliminary examination like Color, Odor Physical examination which include

- Optical rotation
- Refractive index

b) Thin layer chromatography of Essential oil of two different species of Curcuma caesia and Curcuma longa

c) GC-MS Analysis of extracted essential oil

Table 1. Evaluation of phytochemical constant of rhizome of *Curcuma caesia and Curcuma longa.*

Parameter	***Curcuma caesia*** **Value %(w/w)**	***Curcuma longa*** **Value %(w/w)**
Ash content	8.6	5.60
Acid insoluble ash	4.31	4.10
Moisture content	8.0	6.70
Water soluble extractive	12.6	12.40
Alcohol soluble extractive	7.9	6.60
Volatile oil in fresh rhizome	2.8-4.0 (w/v)	3.5-4.50 (w/v)

Table 2: Physical parameter of essential oil of *Curcuma caesia and Curcuma longa*

test	***Curcuma caesia***	***Curcuma longa***
Color	Yellowish brown	Light yellow
Odor	Characteristic	Characteristic
Refractive index	1.417	1.416
Optical rotation	+22 to +25	+18 to +22
Solubility	Soluble in ethanol, Chloroform, Benzene,Toluene, and Hexane	Soluble in ethanol, Chloroform, benzene,Toluene, and Hexane

Table 3: Thin layer chromatography of *Curcuma caesia* oil with solvent system Benzene: chloroform.

Drug	**Solvent system**	**Rf value**			
		Rf_1	**Rf_2**	**Rf_3**	**Rf_4**
Curcuma caesia	Benzene:chloroform (4:1)	0.69	0.82	0.87	0.88
	Benzene:chloroform (9:1)	0.64	0.76	0.78	0.80

Table 4: Thin layer chromatography of *Curcuma longa* oil with solvent system Benzene: chloroform**.**

Drug	**Solvent system**	**Rf value**			
		Rf_1	**Rf_2**	**Rf_3**	**Rf_4**
Curcuma longa	Benzene:chloroform (1:1)	0.44	0.76	0.78	0,79
	Benzene:chloroform (4:1)	0.35	0.40	0.54	0.56
	Benzene:chloroform (9:1)	0.54	0.56	0.60	0.63

Table 5: TLC on AgNO3 plate -TLC with solvent system diethyl chloride: chloroform: ethyl acetate: n-propanol (45:45:5:5).

Drug	**Solvent system**	**Rf value**
Curcuma caesia	Dimethylechloride:chloroform:ethyle acetate:n-propanol	0.88
Curcuma longa	Dimethylechloride:chloroform:ethyle acetate:n-propanol	0.92

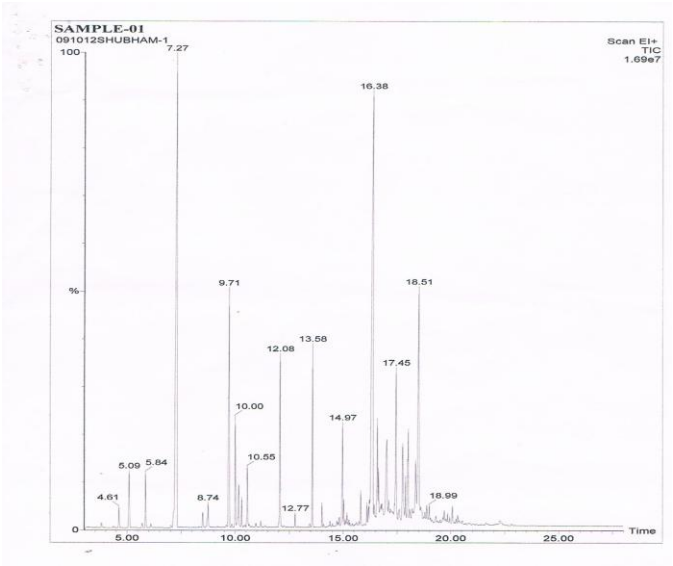

Figure 1. Chromatogram of Essential oil of *Curcuma caesia* rhizome by GC-MS (sample-1)

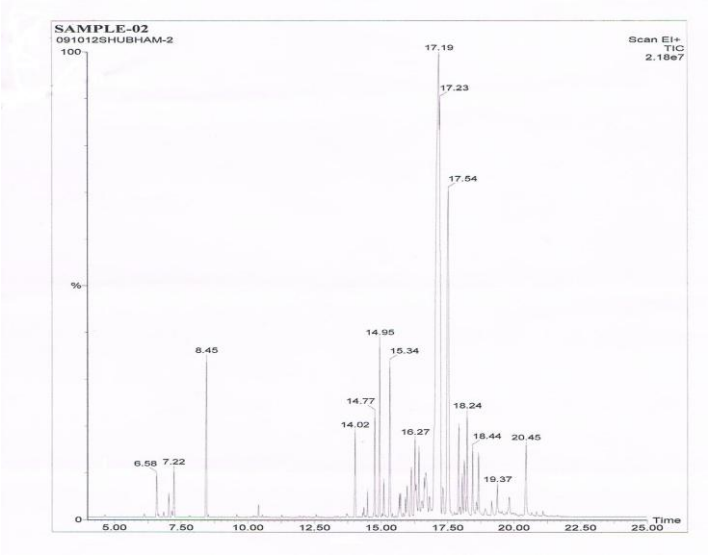

Figure 2. Chromatogram of Essential oil of *Curcuma longa* rhizome by GC-MS (sample-2)

3. RESULTS AND DISCUSSION

In table no. 1 the ash content of Curcuma caesia was compared to Curcuma longa it was 8.6% (w/w) in Curcuma caesia and 5.60 % (w/w) in Curcuma longa. and the Essential oil contain 2.8-4.0 % (w/v) and 3.5-4.50 % (w/v) respectively in fresh rhizome. While the other parameters are nearly same[20].

In table no. 2 the color of oil obtained by hydrodistilation method Curcuma caesia oil has Yellowish brown color but Curcuma longa Light yellow while the odor, Refractive index, Optical rotation, Refractive index, and solubility almost same[21].

In table no. 5 the oil constituent Separation by TLC method requires same solvent system for good result as per the literature and experiment nearly same compound was isolated having the different Rf value given above in the table.

3.1 Gas Chromatography and Mass Spectroscopy of volatile oil of Curcuma caesia and Curcuma longa[22]

After isolation of volatile oil from fresh rhizome of Curcuma caesia and Curcuma longa, it was further evaluated by GC-MS analysis. Compound isolated from the volatile oil of the Curcuma caesia rhizome by GC-MS analysis in figure no. 1

The oil of Curcuma caesia (Sample no. 1) showed 23 peak in figure no:-1 peak fragments shows similarity to structure of 1,8 cineole, z-β-terpneol, cis β-terpineol, having molecular formula (C10H18O) with molecular weight 154.

Pinene (C10H18O), phellandrene (C10H18O), terpeniol (C10H18O), in other fragmentation of sample no.-1 shows

structure as camphor (C10H16O) with mol.wt.152. The other peak have been showing the peak of molecular formula (C10H16) with mol.wt. 136 it may be camphene. Other compound could possible in oil of Curcuma caesia like carene, eucalyotol, polyphenolic compound like flavanoid phinolic compound etc.

3.2 Compound isolated from the volatile oil of the Curcuma longa rhizome by GC-MS analysis (figure 2) [23]

The oil of Curcuma longa (Sample no. 2) showed 30 peak in figure no:-2 having majority of various volatile oil and as the further fragments of major peak have been showing the probability of carene, terpinene, camphene, terpinolene,these all of the above have molecular formula ($C_{10}H_{16}$), terpiniol having molecular formula ($C_{15}H_{24}$) with molecular weight 136. B-sesqui-phellandrene ($C_{10}H_{18}O$), with molecular weight 204 caryophyllene ($C_{15}H_{24}$), as per the review literature and in other fragmentation of oil of Curcuma longa (sample no.2) have been showing the near affinity to termerone, campher, curcumene.

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