

**GC-MS DETERMINATION OF BIOACTIVE COMPOUNDS OF *CURCULIGO ORCHIOIDES* GAERTN**Daffodil E D<sup>1</sup>, Uthayakumari F K<sup>2</sup>, Mohan V R<sup>1</sup><sup>1</sup>Ethnopharmacology Unit, Research Department of Botany,  
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vrmohanvoc@gmail.com**ABSTRACT**

The investigation was carried out to determine the phytochemicals of ethanol extract of *Curculigo orchioides* Gaertn. Rhizome. GC-MS analysis of ethanol extract was performed using Perkin-Elmer GC Clarus 500 system and Gas chromatograph interfaced to a Mass spectrometer (GC-MS) equipped with Elite-1, fused silica capillary column (30mmx0.25mm 1D x 1µMdf composed of 100% Dimethyl poly siloxane). Interpretation on mass spectrum GC-MS was conducted using the database of National Institute Standard and Technology (NIST). Six compounds were identified. The prevailing compounds were Hexadecane,5-butyl, Benzoic acid, 4-ethoxy-,ethyl ester, Ethyl iso allochololate and Dodecane 2,6,11-trimethyl. The findings of the present study confirm the presence of important phytochemicals and this type of study will be helpful for further detailed study.

**Keywords:** *Curculigo orchioides*, GC-MS, antioxidant.

**INTRODUCTION**

The genus *Curculigo* belongs to the family Hypoxidaceae and consists of approximately 20 species exclusively of tropical origin (Kocyan, 2007). The members of the family are small to medium of herbs with grass like leaves and an invisible stem, modified into corm or a rhizome. *Curculigo orchioides* is popularly known as black musali in India. The plant is found from sea level to 2300m especially in moist laetrite soil. The rhizome as well as tuberous roots are extensively used in indigenous medicine in India.

*Curculigo orchioides* has been used as oxytocic activity (Sharma *et al.*, 1975); antioxidant (Venukumar and Latha, 2006); hepatoprotective (Rao and Mishra, 1997); immunomodulatory (Lakshmi *et al.*, 2003) and antimicrobial (Singh and Gupta, 2008). Taking into consideration of the medicinal importance of the plant, the ethanol extract of *Curculigo orchioides* was analyzed for the GC-MS. This work will help to identify the compounds of therapeutic value. GC-MS is one of the techniques to identify the bioactive constituents of long chain branched chain hydrocarbons, alcohols, acids, ester etc.

**MATERIALS AND METHODS**

The rhizome of *Curculigo orchioides* Gaertn. were collected from Abishekapatti,

Tirunelveli District, Tamil Nadu. The rhizomes were shade dried and pulverized to powder in a mechanical grinder. Required quantity of powder was weighed and transferred to stoppered flask, and treated with ethanol until the powder is fully immersed. The flask was shaken every hour for the first 6 hours and then it was kept aside and again shaken after 24 hours. This process was repeated for 3 days and then the extract was filtered. The extract was collected and evaporated to dryness by using a vacuum distillation unit. The final residue thus obtained was then subjected to GC-MS analysis.

**GC-MS ANALYSIS**

GC-MS analysis of these extracts were performed using a Perkin-Elmer GC Clarus 500 system and Gas chromatograph interfaced to a Mass spectrometer (GC-MS) equipped with a Elite-1, fused silica capillary column (30mmX0.25mm 1D X 1 µMdf, composed of 100% Dimethyl poly siloxane). For GC-MS detection, an electron ionization system with ionizing energy of 70 eV was used. Helium gas (99.999%) was used as the carrier gas at constant flow rate 1ml/min and an injection volume of 2µl was employed (split ratio of 10:1); Injector temperature 250°C; Ion-source temperature 280°C.

The oven temperature was programmed from 110°C (isothermal for 2 min.), with an increase of 10°C/min, to 200°C, then 5°C/min to 280°C, ending with a 9min isothermal at 280°C. Mass spectra were taken at 70 eV; a scan interval of 0.5 seconds and fragments from 45 to 450 Da. Total GC running time was 36 minutes. The relative % amount of each component was calculated by comparing its average peak area to the total areas, software adopted to handle mass spectra and chromatograms was a Turbomass.

Interpretation on mass spectrum GC-MS was conducted using the database of National Institute Standard and Technology (NIST) having more than 62,000 patterns. The spectrum of the unknown component was compared with the spectrum of the known components stored in the NIST library. The Name, Molecular weight and

structure of the components of the test materials were ascertained.

## RESULT AND DISCUSSION

The components present in the ethanol extract of rhizome of *Curculigo orchioides* were identified by GC-MS analysis (Figure 1). The active principles with their retention time (RT), molecular formula, molecular weight (MW) and concentration (%) in the ethanol extract of rhizomes of *Curculigo orchioides* are presented in Table 1. Six compounds were identified in the ethanol extract of *Curculigo orchioides* rhizome. The prevailing compounds were Hexadecane, 5-butyl (26.28%), Benzoic acid, 4-ethoxy-, ethyl ester (26.28%), Ethyl iso-allocholate (20.14%), Dodecane 2,6,11-trimethyl- (11.95%).

**Table 1: Components detected in *Curculigo orchioides* rhizome extract**

No	Rt	Name of the Compound	Molecular Formula	MW	Peak Area
1.	4.94	Decane 2,3,5,8- tetramethyl-	C <sub>14</sub> H <sub>30</sub>	198	10.92
2.	5.53	Dodecane 2,6,11- trimethyl-	C <sub>15</sub> H <sub>32</sub>	212	11.95
3.	7.62	Hexadecane,5- buty-	C <sub>20</sub> H <sub>42</sub>	282	26.28
4.	8.21	Benzoic acid, 4-ethoxy-,ethyl ester	C <sub>11</sub> H <sub>14</sub> O <sub>3</sub>	194	26.28
5.	22.13	Docosanoic acid 1,2,3-propanetriyl ester (Tribehenin)	C <sub>69</sub> H <sub>134</sub> O <sub>6</sub>	1058	4.44
6.	15.71	Ethyl iso-allocholate	C <sub>26</sub> H <sub>44</sub> O <sub>5</sub>	436	20.14

**Table 2: Activity of phytochemicals identified in the ethanol extracts of rhizome of *Curculigo orchioides* by GC-MS**

No	Name of the Compound	Molecular Formula	Compound Nature	** Activity
1.	Decane 2,3,5,8- tetramethyl-	C <sub>14</sub> H <sub>30</sub>	Alkane Compound	No Activity reported
2.	Dodecane 2,6,11- trimethyl-	C <sub>15</sub> H <sub>32</sub>	Alkane Compound	No Activity reported
3.	Hexadecane,5- buty-	C <sub>20</sub> H <sub>42</sub>	Alkane Compound	No Activity reported
4.	Benzoic acid, 4-ethoxy-,ethyl ester	C <sub>11</sub> H <sub>14</sub> O <sub>3</sub>	Aromatic acid ester	Antimicrobial Preservative
5.	Docosanoic acid 1,2,3-propanetriyl ester (Tribehenin)	C <sub>69</sub> H <sub>134</sub> O <sub>6</sub>	Fatty acid ester	Skin Conditioning Agent Emulsifying agent Surfactant
6.	Ethyl iso-allocholate	C <sub>26</sub> H <sub>44</sub> O <sub>5</sub>	Steroid compound	Antimicrobial Antiasthma Anti-inflammatory Anticancer Diuretic

\*Source: Dr.Duke's: Phytochemical and Ethnobotanical Database

Fig 1: GC-MS chromatogram of the ethanol extract of *Curculigo orchioides* rhizome

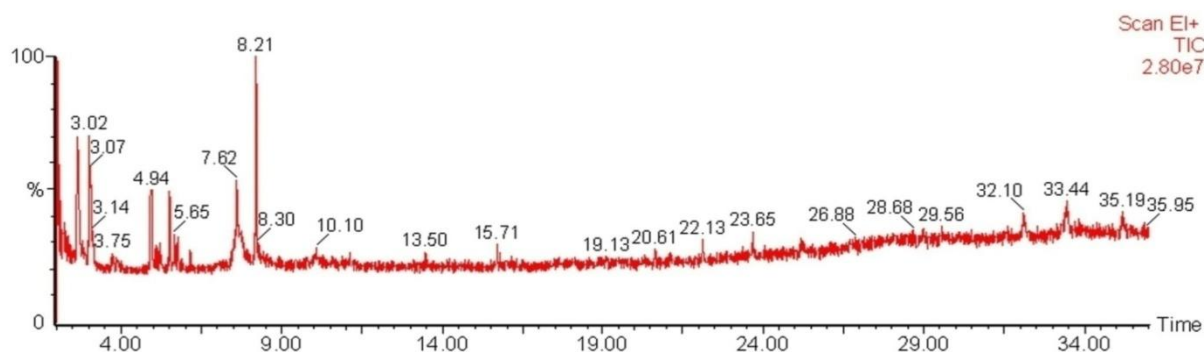


Fig. 2: Mass spectrum of Benzoic acid, 4- ethoxy-,ethyl ester

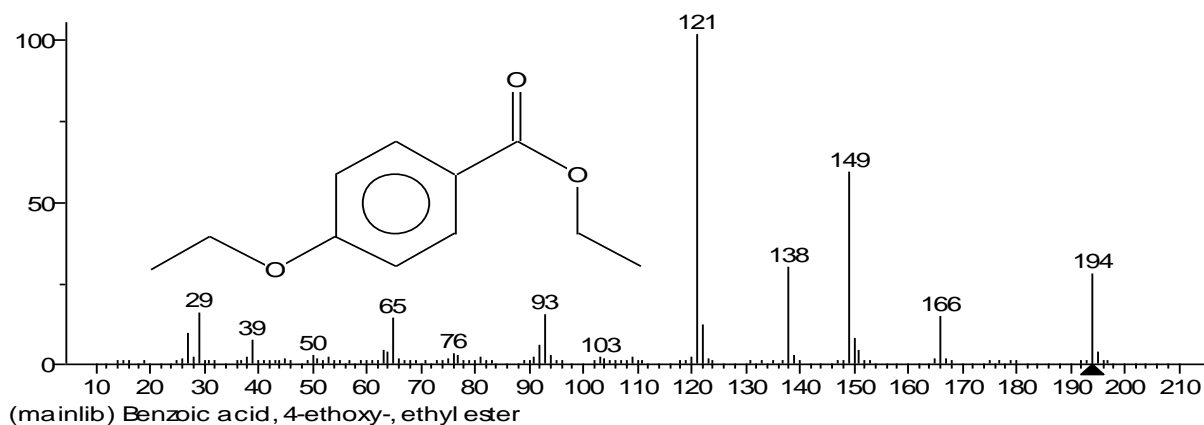
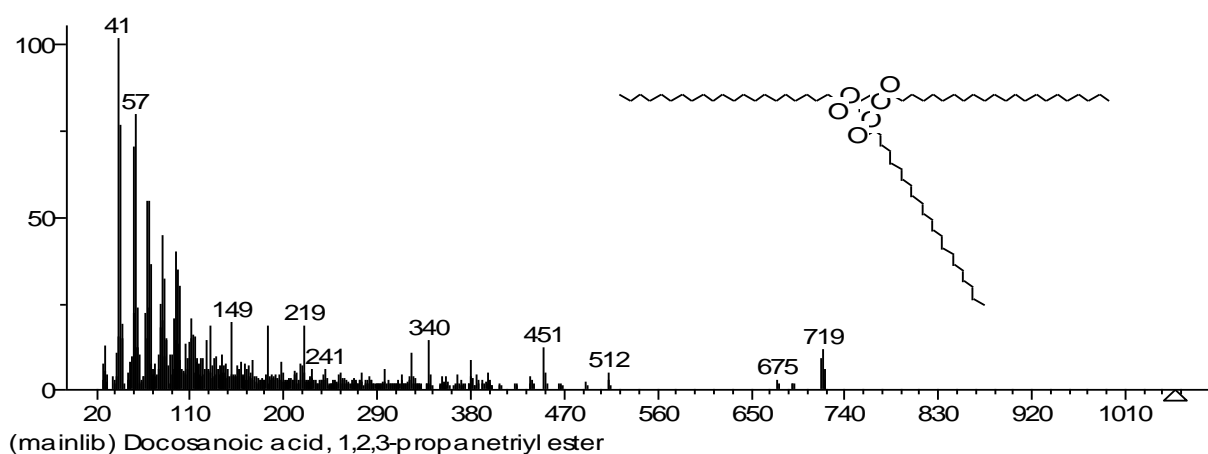


Fig. 3: Mass spectrum of Docosanoic acid 1,2,3-propanetriyl ester



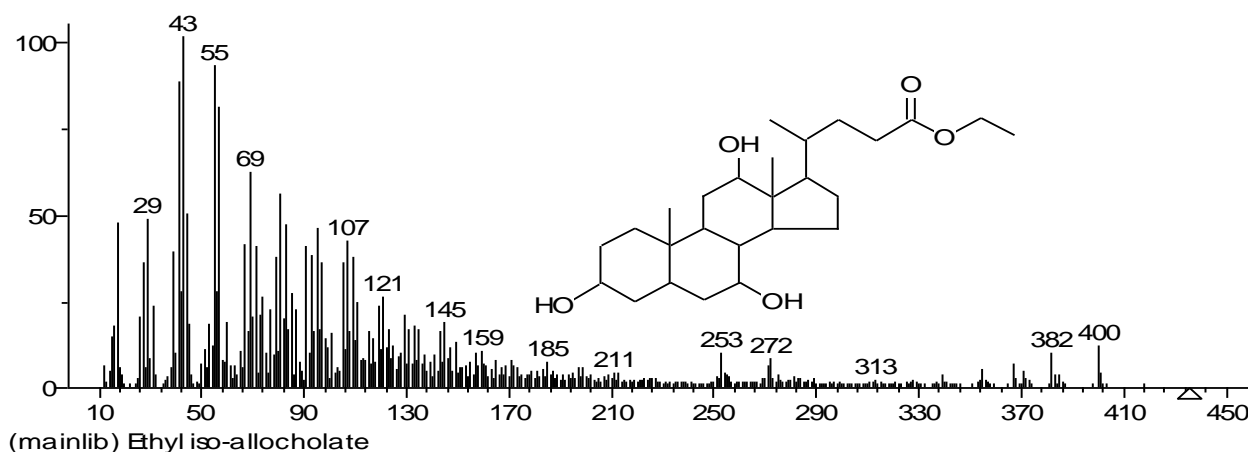
**Fig. 4: Mass spectrum of Ethyl iso-allocholate**

Figure 2, 3 and 4 shows the mass spectrum and structure of Benzoic acid, 4-ethoxy-,ethyl ester, Docosanoic acid 1,2,3-propanetriyl ester (tribehenin) and Ethyl iso-allocholate. Table 2 listed the major phytocompounds and it's biological activities through GC-MS study of *Curculigo orchoides* rhizome.

#### CONCLUSION

In the present study, 6 compounds from tuber of the *Curculigo orchoides* were identified by Gas Chromatography-Mass Spectrometry (GC-MS) analysis. The presence of various bioactive compounds justify the use of this plant for various

ailments by traditional practitioners. However, isolation of individual phytochemical constituents and subjecting to biological activity will definitely give fruitful results.

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#### CONFLICT OF INTEREST STATEMENT

We declare that we have no conflict of interest.

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