GC-MS ANALYSIS OF PHYTOCOMPONENTS IN THE METHANOLIC EXTRACT OF OCIMUM SANCTUM (TULSI)

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ABSTRACT

Ocimum sanctum, is locally called as “Tulsi” belongs to the family Lamiaceae. The present study was carried out to identify the phytocomponents present in the methanolic extract of the leaves of Ocimum sanctum by GC-MS analysis. From the GC-MS results three compounds were identified as major constituents, they are Benzene, 1, 2-dimethoxy-4-(2-propenyl)-, Isocaryophyllene and Eugenol.

KEYWORDS

Ocimumsanctum, Leaves, Lamiaceae, Methanolic, GC-MS and Phytocomponents.

INTRODUCTION

Plants are of the important sources of medicine & a large numbers of drugs in use are derived from plants. The therapeutic uses of plant are safe, economical & effective as their ease of availability 1. Among the plants known for medicinal values, plants of genus Ocimum belonging to family Lamiaceae are very important for their therapeutic potentials. Ocimum sanctum has two varieties i.e. black (Krishna Tulsi) and green (Rama Tulsi), their chemical constituents are similar2. Ocimum sanctum is widely distributed covering the entire Indian sub continent, ascending up to 1800 m in the Himalayas,
to as far as the Andaman and Nicobar Islands. Tulsi is a word of Sanskrit which means “the incomparable one” and has a very special place in the Hindu culture. Several medicinal properties have been attributed to the tulsi plant not only in Ayurveda and Siddha but also in Greek, Roman and Unani systems of medicine.

Ocimum sanctum plants are considered as one of the most important source of medicine and drugs with many secondary metabolites and essential oils recommended for treatment of malaria, diarrhea, bronchial asthma, dysentery, bronchitis, skin diseases, arthritis, painful eye disease, chronic fever and eye diseases etc. In addition, Ocimum sanctum also shows anticancerous, antifungal, antimicrobial, antifertility, hepatoprotective, antispasmodic, cardio protective, antiemetic, antidiabetic, analgesic, adaptogenic, and diaphoretic properties. The present communication deals with the GC-MS analysis of phytocomponents in the methanolic extract of the leaves of *Ocimum sanctum*.

**MATERIALS AND METHODS**

**Collection of the plant material**
The leaves of *Ocimum sanctum* were collected from GKVK, University of Agricultural Sciences, Bangalore-65, India.

**Extraction of Plant Material**
Plant material (leaves, 20 Gms) was extracted with 250 mL of methanol at 60°C for 8hrs in Soxhlet extractor. The methanolic extracts were filtered through Whatmann No. 1 filter paper. The filtrate was evaporated to dryness at 80°C and stored until further analysis.

**Preparation of stock solution**
The extracts were reconstituted in methanol. Methanolic extracts (1 µl) were injected for GC-MS analysis.

**Gas Chromatography-Mass Spectrometry analysis**
The methanolic extract of the leaves of *Emblica officinalis* Gaertn was subjected to GC-MS analysis on a GC-MS Clarus 500 Perkin Elmer system comprising a AOC- 20i autosampler and gas chromatograph interfaced to a mass spectrometer (GC-MS) instrument employing the following conditions: Restek Rx® – 5, (30 meter X 0.25 mm) (5% diphenyl / 95% dimethyl polysiloxane), running in electron impact mode at 70 eV; helium (99.999%) was used as carrier gas at a constant flow of 1ml/min and an injection volume of 1.0 µl was employed(split ratio of 10:1); injector temperature 280 0°C. The oven temperature was programmed from 40°C (isothermal for 5 min.), with an increase of 6 0°C / min to 280 0°C, then ending with a isothermal for 15min at 280°C. Mass spectra were taken at 70 eV; a 0.5 seconds of scan interval and fragments from 40 to 550 Da. Total GC running time was 60 minutes.

**Identification of Compounds**
Interpretation on mass spectrum GC-MS was conducted using the database of National Institute of Standard and technology (NIST).The mass spectrum of the unknown component was compared with the spectrum of the known components stored in the NIST library.

**RESULTS AND DISCUSSION**

**GC-MS analysis**
GC-MS chromatogram of the methanolic extract of *Ocimum sanctum* showed three major peaks (Figure No.1) and has been identified after comparison of the mass spectra with NIST library, indicating the presence of three phytocomponents. From the results, it was observed that presence of Benzene, 1, 2-dimethoxy- 4- (2- propenyl) - (synonym: Methyl-Isoeugenol), Isocaryophyllene (synonym: Caryophyllene) and Eugenol (Synonym: 2-Methoxy-4-(2-propenyl) phenol) were the major components in the extract. The phytochemicals that contribute to the medicinal property of the plant leaves is listed in Table No.1. Methyl-Isoeugenol has the property of Antifungal activity, Nematicidal activity and Antifeedant activity. Caryophyllene is well-known for its anti-inflammatory, cytotoxicity and antifungal activity. Eugenol is reported to possess Antimycotic, Antiviral, Desinsection, Antiparasitic, Antioxidant, Anticancer and Anti-insect activities.
Table No.1: Chemical constituents and its Activity of some of the phytocomponents identified in the methanolic extracts of the Leaves of *Ocimum sanctum* by GC-MS

<table>
<thead>
<tr>
<th>S. No</th>
<th>Retention Time</th>
<th>Name of the Compounds</th>
<th>Molecular Formula</th>
<th>Molecular Weight</th>
<th>Activity**</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>21.84</td>
<td>Benzene, 1, 2-dimethoxy-4-(1-propenyl) -</td>
<td>C_{11}H_{14}O_{2}</td>
<td>178.2</td>
<td>Antibacterial, Nematicide, Insect-attractant; Perfumery, Flavour</td>
</tr>
<tr>
<td>2</td>
<td>22.16</td>
<td>Caryophyllene</td>
<td>C_{15}H_{24}</td>
<td>204.3</td>
<td>Anti-tumor, Analgesic, Antibacterial, Anti-inflammatory, Fungicide</td>
</tr>
<tr>
<td>3</td>
<td>20.77</td>
<td>Eugenol</td>
<td>C_{10}H_{12}O_{2}</td>
<td>164.2</td>
<td>Acaricide, Antibacterial, Anti-inflammatory, Antioxidant, Cancer-Preventive, Antispasmodic, Antiviral, Insecticide</td>
</tr>
</tbody>
</table>

**Source: Dr. Duke’s phytochemical and ethnobotanical database (online database)**

Figure No.1: GC-MS chromatogram of the methanolic extract of the leaves of *Ocimum sanctum*
CONCLUSION
The presence of various bioactive compounds justifies the uses of the tulsi leaves for various ailments by local population. However, if individual phytochemical constituents are isolated from the plant and subjecting it to pharmacological activity will definitely give fruitful results.

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