

## GC-MS Analysis of the Polyherbal Mixture

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**ABSTRACT:** The aim of the study was to investigate the phytoconstituents of chloroform extract of polyherbal mixture containing *Argemone mexicana* leaves, *Echinops echinatus* roots and *Tricholepis glaberrima* aerial parts using GC-MS (gas chromatography-mass spectrometry). GC-MS analysis of polyherbal mixture was performed by using Agilent 6890 GC with 59739N MSD and GC-MS equipped with Elite-I fused with silica capillary column (Cpsil 8cb: 30mm x 25mm x 0.25mm). The result of analysis confirms the presence of 11 compounds. The most prevailing compounds of medicinal value are Azotensin, Thymol, Erythrocentaurin, Neophytadiene, Hexadecanoic acid, Cis-9,cis-12-Octadecadienoic acid, Squalene etc.

**Keywords:** Polyherbal mixture, *Argemone mexicana* leaves, *Echinops echinatus* roots and *Tricholepis glaberrima* aerial parts, GC-MS Analysis.

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### I. INTRODUCTION

Use of plants as a source of medicine has been inherited and is an important component of the health care system. India is the largest producer of medicinal herbs and is thus aptly called the “botanical garden of the world.”[1] At present a number of plants such as *Argemone mexicana*, *Echinops echinatus* and *Tricholepis glaberrima* are known by the trade name Brahmamandi. It is a well-known drug in the Indian system of medicine for the treatment of numerous diseases.[2]

*Argemone mexicana* (family - Papaveraceae) known as Ghamoya is an indigenous herb found in India. Ghamoya has occupied a pivotal position in Indian culture and folk medicine. It has been used in almost all the traditional system of medicine, such as in Ayurveda, Unani and Siddha. Traditionally, the plant is reported to be used as diuretic, purgative, anti-inflammatory, analgesic and believed to destroy worms, cures itching, various skin diseases and as antidote to various poisons. Some of the reported pharmacological activities are Wound healing, Anti-asthmatic, Anti-stress, Hepatoprotective, Anti-HIV, Anti-diabetic, Anti-inflammatory.[3]

*Echinops echinatus*, Indian Global thistle, belonging to the family Asteraceae is a shrub found in India, Pakistan and Sri Lanka. It contains various chemical constituents like carbohydrates, alkaloids, flavonoids, terpenoids, steroids etc. Traditionally, the plant is reported to be used in the treatment of fever, inflammation, asthma, sexual disorders, in brain disorders etc. The root is abortifacient and aphrodisiac. Some of the reported activities are Antifungal, Analgesic, Anti-inflammatory, Diuretic, Antioxidant, Wound Healing etc.[4]

*Tricholepis glaberrima* DC (Asteraceae), commonly known as “Brahmadandi” is an important medicinal plant used in our traditional system of medicine to treat various diseases. It is used in Ayurveda for nervine tonic, aphrodisiac, skin disease and in cough. It is used because of the broad area of biological activities like anti-inflammatory, urinary troubles, antiseptic activities. The plant is rich in many pharmaceutical active ingredients like flavonoids, triterpenoids, saponin glycosides and sterols.[5]

In the last few years, gas chromatography mass spectrometry (GC-MS) has become firmly established as a key technological platform for secondary metabolite profiling in both plant and non-plant species.[1] A detailed literature review on the polyherbal mixture containing *Argemone mexicana* leaves, *Echinops echinatus* roots and *Tricholepis glaberrima* aerial parts in investigation has shown that so far there are no published reports worldwide, related to the possible chemical components in the mixture. So, the present study was aimed to investigate the possible chemical components by first preparing the chloroform extract and identification of the compounds by subjecting it to GC-MS analysis.

### II. MATERIALS AND METHODS

#### 2.1 Collection and Authentication of Plant Material

The leaves of *Argemone mexicana*, roots of *Echinops echinatus* and aerial parts of *Tricholepis glaberrima* was collected from Chittoor District and was authenticated by Dr. K. Madhava Chetty, Plant Taxonomist (IAAT:357), Asst. Professor, Department of Botany, Sri Venkateshwara University, Tirupati.

## 2.2 Extraction

300gm of dried plant materials (1:1:1) was extracted with chloroform by maceration. The extract/mixture thus obtained was subjected to evaporation on water bath until it becomes semisolid, then was stored in air tight container for further use.

## 2.3 GC-MS (Gas Chromatography-Mass Spectrometry) Analysis

GC-MS analysis of polyherbal mixture were performed by using Agilent 6890 GC with 59739N MSD and GC-MS equipped with Elite -I, fused with silica capillary column (cpsil 8cb :30 mm x 25mm x 0.25 mm) composed of 100% Dimethyl polysiloxane. For GC-MS detection an electron ionization system with ionizing energy of 70 eV was used. Hydrogen (99.99%) was used as the carrier gas at a flow rate of 1.5 ml and an injection volume of 2 micro litres. It was employed with split ratio of 10:1, initial injection temp of 40° C to final 280° C, ion source temp 230° C. The oven temp was programmed from 110° C (isothermal for 2 minute) with a rate of 10° C per min to 300° C and a scan interval 0.5 sec and fragments from 20-200 Dalton. Total GC running time was 36 minutes. The relative average peak area and retention time, molecular formula with that of molecular weight were obtained. The interpretation on mass spectrum GC-MS was conducted by using the data base of national institute standard and technology (NIST), having 62,000 patterns. The spectrum of unknown component was compared with spectrum of known component stored in NIST library. The name, molecular weight and structure of the components of the sample material were identified.

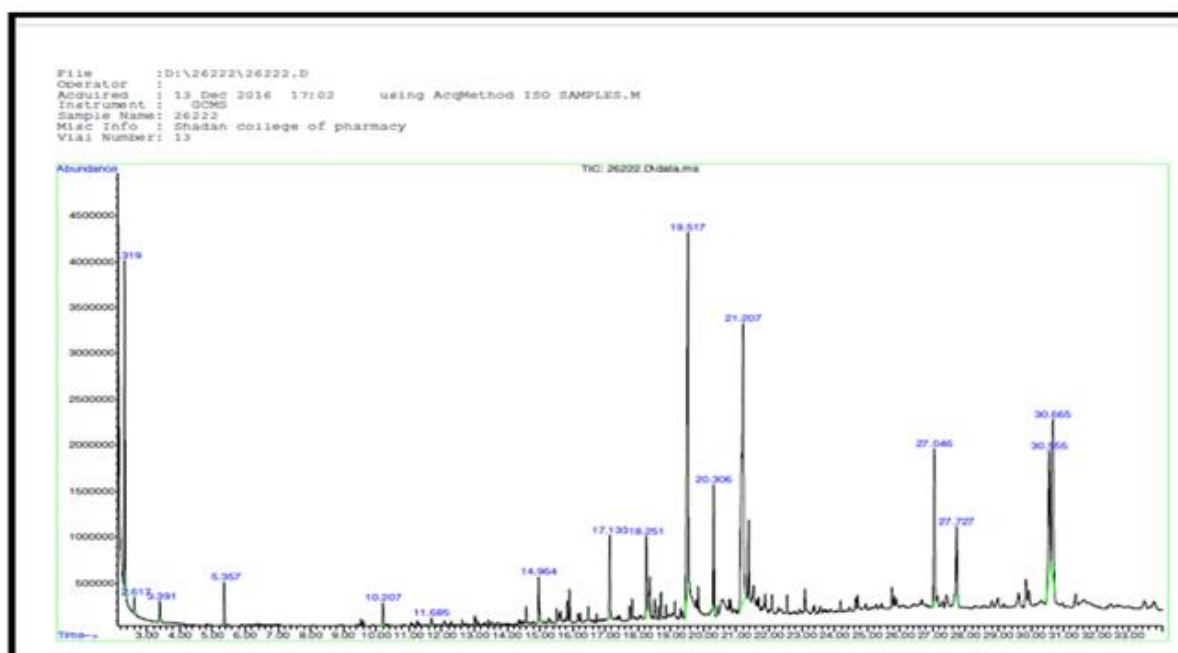
## III. RESULTS

### 3.1 Extraction

The % yield of chloroform extract of polyherbal mixture was found to be 6.27%.

### 3.2 GC-MS (Gas Chromatography-Mass Spectrometry) Analysis

GC-MS spectrum of chloroform extract of polyherbal mixture containing leaves of *Argemone mexicana*, roots of *Echinops echinatus* and aerial parts of *Tricholepis glaberrima* is shown in Graph 1. The GC-MS analysis of polyherbal mixture revealed 11 phytochemical constituents namely, Azotensin; Thymol; Erythrocentaurin; Neophytadiene; Hexadecanoic acid; Cis-9, Cis-12-Octadecadienoic acid, Squalene which may contribute to the medicinal activity of the extract. The major phytochemical constituents identified by GC-MS with their biological activity are presented in TABLE 1.



Graph 1: GC-MS Spectrum of Chloroform extract of Polyherbal Mixture

Table 1: Compounds identified by GC-MS in Chloroform extract of Polyherbal Mixture

S.No.	RT (min)	Name	Mol. Formula	M.W. (g/mol)	Peak Area%	Biological Activity
1	2.319	Benzene/Annulene	C <sub>6</sub> H <sub>6</sub>	78.11	10.081	Carcinogenic
2	2.617	Trichloroethylene/ Trichloroethene	C <sub>2</sub> HCl <sub>3</sub>	131.39	0.385	Once used as an anaesthetic for surgery
3	3.391	Toluene/Methyl Benzene	C <sub>7</sub> H <sub>8</sub>	92.14	0.673	CNS depressant
4	5.357	1,3-dimethyl benzene/m-Xylene	C <sub>8</sub> H <sub>10</sub>	106.17	1.286	Laboratory chemical, used in paints & coatings
5	10.207	Bicyclo [5,3,0] decapentaene/ Azulene/Azotensin	C <sub>10</sub> H <sub>8</sub>	128.17	0.718	Block the synthesis of Prostaglandins; anti-inflammatory, analgesic, antipyretic
6	11.685	Thymol/5-methyl-2-(1-methylethyl)phenol	C <sub>10</sub> H <sub>14</sub> O	150.22	0.295	Antibacterial, Anti-infective, Antifungal
7	17.133	3,4-Dihydro-1-oxo-1H-2-benzopyran-5-carbaldehyde/ Erythrocentaurin	C <sub>10</sub> H <sub>8</sub> O <sub>3</sub>	176.17	2.949	Laxative, Antimicrobial, Antiinflammatory
8	18.251	7,11,15-Trimethyl, 3-methylene-1-Hexadecene/ Neophytadiene	C <sub>20</sub> H <sub>38</sub>	278.52	2.847	Antiinflammatory, Antimicrobial, Antioxidant
9	19.517	Hexadecanoic acid/Palmitic acid	C <sub>16</sub> H <sub>32</sub> O <sub>2</sub>	256.42	19.219	Enzyme Inhibitors
10	21.207	Cis-9, Cis-12-Octadecadienoic acid/Linoleic acid	C <sub>18</sub> H <sub>32</sub> O <sub>2</sub>	280.45	25.251	Used in biosynthesis of Prostaglandins/ Reduces body fat in animals/ Antiinflammatory
11	27.046	Squalene	C <sub>30</sub> H <sub>50</sub>	410.73	7.533	Anticancer, Antiproliferative, Intermediate in biosynthesis of cholesterol

#### IV. CONCLUSION

The presence of various bio-active compounds detected after GC-MS analysis using the chloroform extract of polyherbal mixture containing leaves of *Argemone mexicana*, roots of *Echinops echinatus* and aerial parts of *Tricholepis glaberrima* justifies the use of whole plant for various elements by traditional practitioner. However, isolation of individual phytochemical constituents and subjecting it to the biological activity will definitely give fruitful results and will open a new area of investigation of individual components and their pharmacological potency. From these results, it could be concluded that chloroform extract of polyherbal mixture containing leaves of *Argemone mexicana*, roots of *Echinops echinatus* and aerial parts of *Tricholepis glaberrima* contains various bio-active compounds which has varied pharmacological activities for which study has to be done. Therefore, it is recommended as a plant of phytopharmaceutical importance.

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