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GC-MS DETERMINATION OF BIOACTIVE CONSTITUENTS OF *ARUMUGA CHENDOORAM*

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ABSTRACT

The investigation was carried out to determine the bioactive components of Arumuga chendooram using Perkin-Elmer Gas Chromatography–Mass Spectrometry, while the mass spectra of the compounds found in the Arumuga chendooram was matched with the National Institute of Standards and Technology (NIST) library. GC/MS analysis of Arumuga chendooram revealed the existence of Twelve compounds were identified in Arumuga chendooram by GC-MS analysis. The prevailing compounds were 1,2-cyclopentanediol, Hexadecancic acid,1,1-diethylethyl ester, n-Hexadecanoic acid, Hexadecanoic acid,1,1-dimethylethyl ester, 6-octadecenoic acid,(Z), Octadecanoic acid butyl ester and Oleic acid. This study explores the goodness of the Arumuga chendooram which has a commendable sense of purpose and can be advised as a herbo-mineral drug of pharmaceutical importance. The results of this study offer a platform of using Arumuga chendooram as herbo-mineral drug for various diseases.

KEYWORDS: Arumuga chendooram, GC/MS, Bioactive components.

INTRODUCTION

In many industrialized countries herbal medicines are gaining popularity as alternative and complimentary therapies. In developing countries, communities rely heavily on traditional herbal medicines in order to meet their primary health care needs. The secondary metabolites of plants provides humans with numerous biological active products which has been used extensively as drugs, foods, additives, flavors, insecticides, colorants, fragrances and chemicals Some of the plants are used as food or medicine. These plants exhibit a wide range

of biological and pharmacological activities such as anti-cancer, anti inflammatory, diuretic, oxytocic, laxative, antispasmodic, antihypertensive, anti-diabetic, and anti-microbial functions.[1]

Secondary metabolites are an important source with a variety of structural arrangements and properties. It has been shown that *in vitro* screening methods could provide the needed preliminary observations necessary to select crude plant extracts with potentially useful properties for further chemical and pharmacological investigations.[4]

Herbo-mineral drugs that are technologically produced from metals may be chosen for their high activity against a human disease. Herbo-mineral formulation uses the metals and minerals for chronic disorders in different combinations, dosage forms and at various levels of purities. Hence it is very essential to prepare it in a proper way. As per the reported data, there are so many herbo mineral formulations available in market which is useful in anemia, diabetes, cancer, liver diseases, skin diseases etc[5, 6]. Since there is no report on the bioactive constituents of *Arumuga chendooram,* it was chosen as the subject of this study. The aim of this study is to determine the organic compounds present in the active fraction of *Arumuga chendooram with* the aid of GC-MS Technique, which may provide an insight in its use in traditional medicine.

MATERIAL AND METHODS

Preparation of Arumuga chendooram

The Siddha medicine Arumuga chendooram was prepared at its different stages of preparation in departmental laboratory with the help of a traditional siddha medical practioners as per the IMCOPS method.

In the first stage of the preparation of Arumuga chendooram. Five parts of purified mercury (Suththi seitha rasam), nine parts of purified sulphur (Suththi seitha kanthakam), seven parts of purified lode stone (Suththi seitha kantham), twelve parts of purified iron filing (Sutht.hi seitha ayapodi), four parts of rock salt (Induppu) and eight parts of desiccated borax (Poriththa venkaram) were ground with sufficient quantity of aloe juice (Kumari charu for five days continuously. This was then made into small cakes and dried. It was then sArumuga chendooram d in discs and burnt for 24 hours. If the colour of the chendooram does not appear as dark purple the grinding and burning are usually repeated equal to pH and then attractive particle interations predominate which may influence the drug delivery.

GC –MS analysis

GC-MS analysis was carried out on a GC clarus 500 Perkin Elmer system comprising a AOC-20i autosampler and gas chromatograph interfaced to a mass spectrometer instrument employing the following conditions: column Elite-1 fused silica capillary column (30 x 0.25mm ID x 1µMdf, composed of 100% Dimethyl polydiloxane), operating in electron impact mode at 70eV; Helium gas (99.999%) was used as carrier gas at a constant flow of 1 ml /min and an injection volume of 0.5 µI was employed (split ratio of 10:1) injector temperature 250 ºC; ion-source temperature 280 ºC. The oven temperature was programmed from 110 ºC (isothermal for 2 min), with an increase of 10 ºC/min, to 200ºC, then 5ºC/min to 280ºC, ending with a 9min isothermal at 280ºC. Mass spectra were taken at 70eV; a scan interval of 0.5 seconds and fragments from 40 to 450 Da. Total GC running time is 36min. min. The relative percentage 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 Turbo Mass Ver 5.2.0

RESULTS AND DISCUSSION

The Siddha system has developed a rich and unique treasure of drug knowledge in which use of various types of herbs, metals, minerals and animal products is very much advocated. Apart from the vast herbal sources some idea about the depth of knowledge the system possesses in the field of mineral. There are 25 varieties of water-soluble inorganic compounds called Uppu. These are different types of alkalies and salts. There are 64 varieties of mineral drugs that do not dissolve in water but emit, vapors when put in fire. Thirty-two of these are natural and remaining are artificial. The system has a classification of metals and alloys, which melts on heating and solidifies on cooling. These include gold, silver, copper, tin, lead and iron. These are incinerated by special processes and are used in medicine (7).

Identification of components

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. The biological activities listed (Table 2) are based on Dr.Duke's Phytochemical and Ethnobotanical Databases by Dr. Jim Duke of the Agricultural Research Service/USDA.

GC-MS Analysis

Free radicals play a crucial role in the development of tissue damage in pathological events. The extraction method presented is simple, rapid and inexpensive, with reduced solvent consumption. GC-MS method used for the analysis of the obtained extracts can be an interesting tool for testing the amount of some active principles in herbs used in cosmetic, drugs, pharmaceutical or food industry. The *Arumuga chendooram* subjected to GC-MS investigation. It is evident from the table 1 that all fractions have a complex chemical composition. Some of the GC-MS peaks remained unidentified, because of lack of authentic samples and library data of corresponding compounds. Twenty compounds were identified in *Arumuga chendooram* by GC-MS analysis. The active principles with their retention time (RT), molecular formula, molecular weight (MW) and concentration (%) are presented in (Table 1 and Fig 1). The prevailing compounds were 1,2-cyclopentanediol, Hexadecancic acid,1,1-diethylethyl ester, n-Hexadecanoic acid, Hexadecanoic acid 1,1-dimethylethyl ester, 6-octadecenoic acid, Octadecanoic acid butyl ester and Oleic acid. The biological activities of prevailing compounds are summarized in table 2.

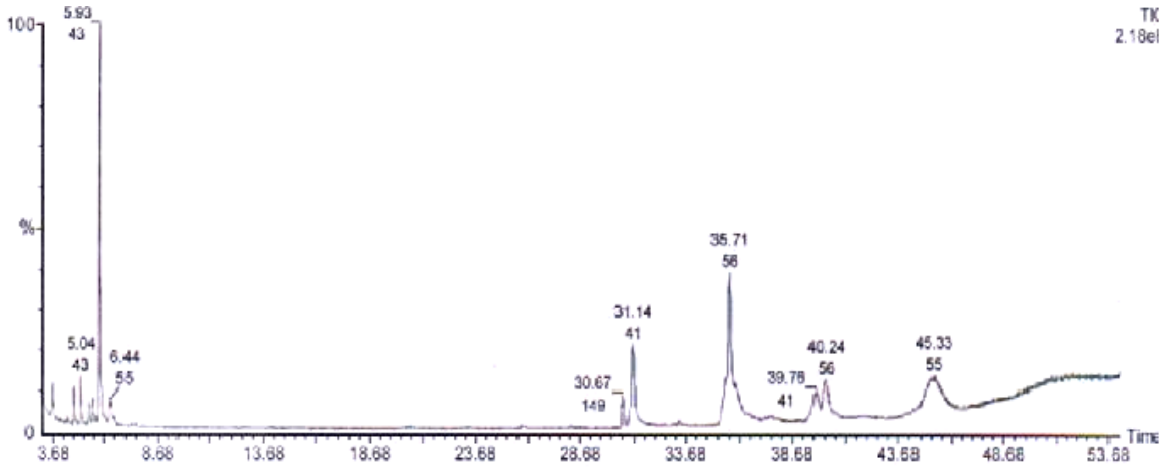

Figure 1: Chromatogram obtained from the GC/MS with *Arumuga chendooram*

Table 1: shows the components identified in *Arumuga chendooram* (GC MS study)

Peak#	R. Time	Peak area	% peak area	Molecular formal	Name of the compounds
1	4.71	1218756	2.5381	$C_7H_{16}O$	3-Hexanol,5-methyl
2	5.04	1394043	2.9031	$C_2H_7N_3$	Guanidine, methyl
3	6.44	176682	0.3679	$C_8H_{14}O$	Oxabicyclo(6.1.0)nonane,cis
4	6.50	139208	0.2899	$C_5H_{10}O_2$	1,2-cyclopentanediol,trans
5	25.81	338971	0.7059	$C_{20}H_{40}O_2$	Hexadecancic acid,1,1-diethylethyl ester
6	30.67	1820713	3.7917	$C_{16}H_{22}O_4$	Dibutyl phthalate

7	31.14	8467109	17.6329	$C_{16}H_{32}O_2$	n-Hexadecanoic acid
8	33.36	217638	0.4532	$C_{16}H_{22}O_4$	1,4-Benzenedicarboxylic acid bis(2-methylpropyl)ester
9	35.71	8574738	17.8570	$C_{20}H_{40}O_2$	Hexadecanoic acid,1,1-dimethylethyl ester
10	39.76	4577651	9.5330	$C_{18}H_{34}O_2$	6-octadecenoic acid,(Z)
11	40.24	6495014	13.5259	$C_{22}H_{44}O_2$	Octadecanoic acid,butyl ester
12	45.33	14598416	30.4014	$C_{18}H_{34}O_2$	Oleic acid

Table 2: Bioactivity of components identified in Arumuga chendooram by GC-MS.

Peak#	R. Time	% of peak area	Name of the compounds	Biological activities**
1	25.81	0.7059	Hexadecancic acid,1,1-diethylethyl ester	Antioxidant, Antimicrobial activity
2	31.14	17.6329	n-Hexadecanoic acid	**Antioxidant**, **hypocholesterolemic** nematicide, pesticide, anti-androgenic flavor, hemolytic, 5- Alpha reductase inhibitor
3	35.71	17.8570	Hexadecanoic acid,1,1-dimethylethyl ester	Antioxidant, **hypocholesterolemic**, nematicide, pesticide, lubricant, anti androgenic, flavour, hemolytic-5-α reductase inhibitor.
4	39.76	9.5330	6-octadecenoic acid,(Z)	Antiviral, **antiinflammatory**, 5-α-reductase inhibitor, **hypocholesterolemic**, propecic, suppository, flavour and cream formulation 4
5	40.24	13.5259	Octadecanoic acid butyl ester	5-α reductase inhibitor, **hypo cholesterolemic**, suppository, cosmetic, lubricant, surfactant & softening agent, perfumery, propecic, flavour.
6	45.33	30.4014	Oleic acid	5-α reductase inhibitor, allergenic, α-reductase inhibitor, anti inflammatory, anti androgenic, cancer preventive, anemiagenic, anti alopecic, anti leukotriene-D4, choleretic, dermatitigenic, **hypocholestrolemic**, insectifuge, perfumery, propecic, flavour.

**Source: Dr.Duke's phytochemical and ethnobotanical databases [Online database].

The investigation concluded that Arumuga chendooram could have been produced number of active constituents responsible for many biological activities. So that those might be utilized for the development of traditional medicines and further investigation needs to elute novel active compounds from the Arumuga chendooram which may be created a new way to treat many diseases.

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