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GC-MS analysis on methanolic seed extract of *Majidea zanguebarica* J. kirk

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Abstract
The present study was carried out to identify the chemical compounds of Methanolic seed extract of *Majidea zanguebarica* by GC-MS method. A major phytoconstituents has been studied in the name of classical chemistry, the GC-MS analysis revealed the presence of 20 compound in extract namely 1,4-Anhydro-d-mannitol, Cyclobutane carboxylic acid, cyclobutyl ester, 2,6-Dicyclopentyl-4-methylphenol, Methyl hexadec-9-enoate, l-(+)-Ascorbicacid 2,6-dihexadecanoate, 9-Octadecenal (Z), Butyl dodecanoate, Ethyl 2-methylcyclopropanecarboxylate, Oleic Acid; Methyl 18-methylnona-decanoate, Docosanoic acid, methyl ester, Oleic anhydride and Tetracosanoic acid, methyl ester etc.

Keywords: gas chromatography- mass spectrometry, phytochemicals, *Majidea zanguebarica*

Introduction
Medicinal plants have been played an essential role in the development of human culture. Medicinal plants have similar properties as conventional pharmaceutical drugs that human have used throughout history to either cure or lessen symptoms from the illness. Medicinal plants are the backbone of traditional medicines.
GC-MS is a technique consisting of two analytical procedures sequence, namely a Gas Chromatography (GC) separation followed by Mass Spectroscopy (MS) detection. The purpose of the GC step is to separate multiple compounds in a sample so that they reach MS detector one at a time. GC uses a high-resolution fused silica capillary column housed in a temperature-controlled oven (Divya *et al.*, 2018) [1]. It has been used as the wide applications on drug detection, fire investigation, environmental analysis, explosives investigation and identification of unknown samples.
Majidea zanguebarica is a small tree belonging to the Sapindaceae. The tree is native to East Africa and grows up to 5 meters (16ft) tall. The seeds are highly ornamental referred to as black pearl tree or velvet seed tree. It blooms with dense cluster of small green-red, fragrant flowers at the end of panicles. Fruit is spherical with three lobes 3cm (1.2 inches) long. The fruit splits open, showing the bright red interior, with three spherical, velvety blue -black seeds. Plant is used to treat fever, wound infections and intestinal disorders in traditional medicine as the pods and leaves have antibacterial properties. Hence, the present investigation was made an attempt to analyse the chemical compound present in the seeds of *Majidea zanguebarica*. Still now there is no literature available in this *Majidea zanguebarica* regarding GC-MS.

Materials and Methods
Collection of plant materials
The selected plant *Majidea zanguebarica* were collected in our college campus PSG College of Arts and Science, Coimbatore district, Tamil Nadu.

Preparation of Plant powder for extraction
The seeds were cleaned and shade dried for 10 days. The dried seeds were grounded into fine powder. The powder was subjected to extraction with methanol.

Methanolic extract
About 25 gms of seed powder was subjected to extraction with methanol using soxhlet apparatus for 24 hours and extract was condensed to remove solvent. The methanol extracts from the seeds was used for GC-MS analysis.

Instruments and chromatographic conditions
GC-MS analysis of the methanol extract of *Majidea zanguebarica* seed part was performed using Shimadzu Japan gas chromatography QP2010 plus with a fused gas chromatography

(GC) column coated with Polymethylsilicon (0.25nm x 50m) and the conditions were as follows: Temperature programming from 80-200°c held at 80°c for 1minute, rate 5°c/min and at 200°c for 20 minutes. Field ionization detector (FID) Temperature of 300°c, injection temperature of 220°c, carrier gas nitrogen at a flow rate of 1ml/min, spilt ratio of 1:75 gas chromatography mass spectrum was conducted using GCMS-QP 2010 plus Shimadzu Japan with injector temperature of 220 and carrier gas presence of 116.9kpa. The color length is 30m with a diameter of 0.25 mm and flow rate of 50ml/min. Elutes were automatically passed in to a mass spectrometer with a dictator voltage set at 1.5 KV and sampling rate 0.2sec. The mass spectrum was so equipped with a computer fed mass spectra bank. German Hermlez 233M-Z centrifuge used.

Identification of compound

The chemical compound was identified using the database of National Institute Standard and technology (NIST) having more than 62,000 patterns. The mass spectrum of the unknown components was compared with the spectrum of known components stored in the NIST and WILEY library (Rajeswari *et al.*, 2015) [4].

Results and Discussion

GC-MS chromatogram of the methanolic extract in the seeds of *Majidea zanguebarica* showed 20 peaks which indicates the presence of 20 active phytoconstituents. The 20 phytoconstituents with their retention time (RT), molecular formula and molecular weight (MV) which presents in *Majidea zanguebarica* are presented in Table-1 and Fig.1.

The GC-MS results revealed the presence of 20 chemical compounds like ($C_6H_5O_{12}$) 1,4-Anhydro-d-mannitol, ($C_6H_{10}O_5$) 1,6-Anhydro,Beta-D-Glucopyranose, ($C_9H_{14}O_2$) Cyclobutane carboxylic acid, cyclobutyl ester, ($C_{17}H_{24}O$) 2,6-Dicyclopentyl-4-methylphenol, ($C_{22}H_{40}O_2$) cis-11-Eicosenoic acid, methyl ester, ($C_{17}H_{32}O_2$) Methyl hexadec-9-enoate, ($C_{17}H_{32}O_2$) 9-Hexadecanoic acid, methyl ester, ($C_{38}H_{68}O_8$) l-(+)-Ascorbic acid 2,6-dihexadecanoate, ($C_{18}H_{34}O$) 9-Octadecenal (Z), ($C_{16}H_{32}O_2$) Butyl dodecanoate, ($C_7H_{12}O_2$) Ethyl 2-methylcyclopropanecarboxylate, ($C_{18}H_{34}O_2$) Oleic Acid, ($C_{21}H_{42}O_2$) Methyl 18-methylnona-decanoate, ($C_{20}H_{38}O_2$) cis-10-Nonadecenoic acid, methyl ester, ($C_{23}H_{46}O_2$) Docosanoic acid, methyl ester, ($C_{36}H_{66}O_3$) Oleic anhydride, ($C_{25}H_{50}O_2$) Tetracosanoic acid, methyl ester, ($C_{18}H_{36}O_2$) Heptadecanoic acid, methyl ester, ($C_{29}H_{48}O$) Stigmasterol and ($C_{19}H_{34}O_2$) Octadeca-9,12-Dienoic acid, methyl ester.

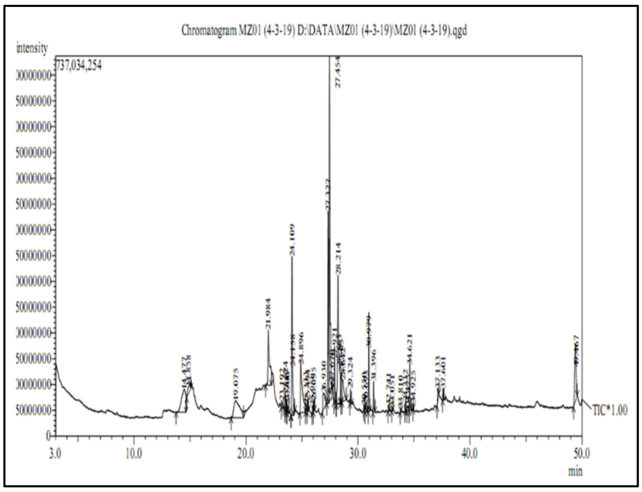
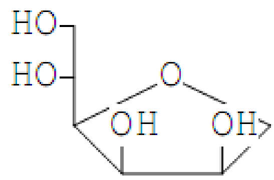
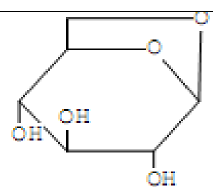
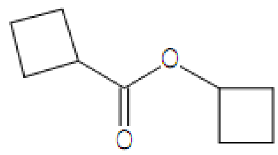
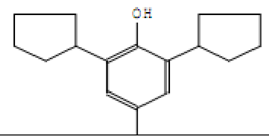
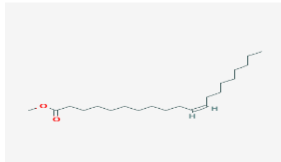
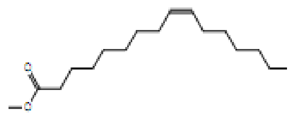
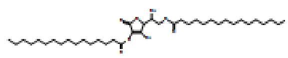
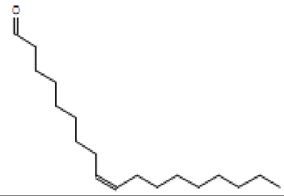
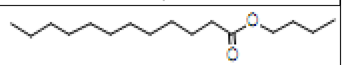
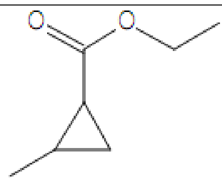
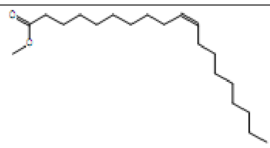
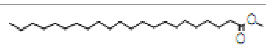
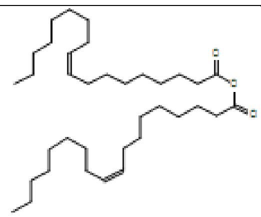
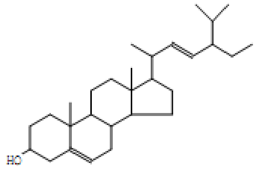


Fig 1: GC-MS Analysis in Methanolic extract of *Majidea zanguebarica*. J. kirk

Table 1: Phytocompounds identified in the Methanolic extract of the seeds of *Majidea zanguebarica*. J. kirk by GC-MS

S. No	RT	Compound name	Chemical formula	Molecular Weight (g/mol)	Structure
1.	14.477	1,4-Anhydro-d-mannitol	$C_6H_5O_{12}$	164	
2.	14.858	1,6-Anhydro,Beta-D-Glucopyranose	$C_6H_{10}O_5$	162	
3.	23.192	Cyclobutane carboxylic acid, cyclobutyl ester	$C_9H_{14}O_2$	154	

4.	23.524	2,6-Dicyclopentyl-4-methylphenol	$C_{17}H_{24}O$	244	
5.	23.617	cis-11-Eicosenoic acid, methyl ester	$C_{22}H_{40}O_2$	324	
6.	23.7	Methyl hexadec-9-enoate	$C_{17}H_{32}O_2$	268	
7.	24.109	9-Hexadecanoic acid, methyl ester	$C_{17}H_{32}O_2$	268	
8.	24.896	l-(+)-Ascorbic acid 2,6-dihexadecanoate	$C_{38}H_{68}O_8$	652	
9.	25.494	9-Octadecenal, (Z)	$C_{18}H_{34}O$	266	
10.	25.95	Butyl dodecanoate	$C_{16}H_{32}O_2$	256	
11.	26.93	Ethyl 2-methylcyclopropanecarboxylate	$C_7H_{12}O_2$	128	
12.	28.363	Oleic Acid	$C_{18}H_{34}O_2$	282	
13.	31.396	Methyl 18-methylnona-decanoate	$C_{21}H_{42}O_2$	326	
14.	34.232	cis-10-Nonadecenoic acid, methyl ester	$C_{20}H_{38}O_2$	310	
15.	34.621	Docosanoic acid, methyl ester	$C_{23}H_{46}O_2$	354	
16.	37.133	Oleic anhydride	$C_{36}H_{66}O_3$	546	

17.	37.601	Tetracosanoic acid, methyl ester	$C_{25}H_{50}O_2$	382	
18.	25.333	Heptadecanoic acid, methyl ester	$C_{18}H_{36}O_2$	284	
19.	49.467	Stigmasterol	$C_{29}H_{48}O$	412	
20.	27.327	Octadeca-9,12-Dienoic acid, methyl ester	$C_{19}H_{34}O_2$	294	

Conclusion

The Gas Chromatography-Mass Spectroscopy (GC-MS) analysis in the methanolic extract of *Majidea zanguebarica* showed 20 peaks indicating the presence of 20 compounds. Whereas few compounds exhibit high medicinal values like stigmasterol and oleic acid which can be used in further pharmacological studies.

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