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Rapid Identification of Fatty Acids from *Leptadenia reticulata* Areal Parts by GC-MS

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The investigation was carried out to identify the various fatty acids present in the areal parts of *Leptadenia reticulata*, one of the important medicinal plants of India. Non-polar (Petroleum Ether) extract of areal parts was used for this study. Saponification was carried out using dried extract to obtain fatty acids. Further esterification of saponifiable fraction was performed to obtain fatty acid methyl ester. Extracted fatty acid methyl esters were analyzed by gas chromatography and mass spectrometry (GC-MS) technique using NIST library. From GC-MS analysis, 14 components were identified in areal parts of *Leptadenia reticulata*. This study reveals that *L. reticulata* is a good source of fatty acids with medicinal properties. This methodology has the advantage of excellent identification of Non polar moiety of medicinal plant.

Keywords: GC-MS, Jivanti, *Leptadenia reticulata*, Methyl esters

Introduction

Fatty acids have countless and different roles in plants and most important role to provide a substantial reserve of free energy, in structural component of membrane lipids. Fatty acids have major influence in plant growth, development.[1] due to insufficiency of fatty acids in daily food increases the possibility of cardio vascular, cancer, arthritis, schizophrenia, autoimmune diseases and different pathologies in child growth.[2] Fatty acids are too important in food nutrition for pharmacology, various diseases and also have definite role.[3,4] Fatty acids of some plants are also useful for production of bio-fuel.[4,5]

Leptadenia reticulata is also significant medicinal plants to show its activity of different parts.[6] A number of chemical constituents were reported in *Leptadenia reticulata* plant.[7,8] So, it is necessary to distinguish which fatty acids are presents in *L. reticulata* plant. For that purpose, many methods are available to separate lipids from plant.[9] The present study was undertaken to develop easy and rapid method for identification of fatty acid using GC-MS and which fatty acids are present in *L. reticulata* areal parts.

Materials and Methods

Chemicals and Reagents

Methanol, diethyl ether, petroleum ether, KOH, H_2SO_4, n-hexane, and ethyl acetate were purchased from Merck (India) Ltd.

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Plant Materials and Extracts

Leptadenia reticulata plant (areal parts) was brought from Vivan Healthcare Ltd., Ahmedabad. 157.800 gm dried plant powder was extracted with petroleum ether for 18 hr at 60°C and obtained 8.057 gm extract.

Experimental

Petroleum ether extract (8.057 gm) was taken and through saponification procedure saponifiable and unsaponifiable fraction was separated. Saponifiable fraction was further acidified and extracted with ether. Collected ether layer was washed with water followed by moisture removal using Na_2SO_4 from fraction. Fatty acid portion (100 mg) was obtained after evaporation of solvent.[10–12]

Esterification of fatty acid

Esterification procedure was followed to make esters from fatty acid portion.[12,13] Obtained product from reaction was dissolved in hexane and further GC-MS[14] analysis was performed.

Results and Discussion

The result showed that by saponification procedure fatty acids are converted in to the salt and it's soluble in water and fatty acids are separated in aqueous layer. Direct analysis of fatty acid using GC-MS is not possible. Therefore, fatty acids were converted in to their methyl esters. After methyl esterification, 14 different fatty acids

Retention Time	Name of the components	Molecular formula	Molecular weight	Peak area %
13.262	Octanoic acid methyl ester	$C_9H_{18}O_2$	158.2380	3.95
15.114	Nonanoic acid methyl ester	$C_{10}H_{20}O_2$	172.2680	1.80
15.430	Hexanedioic acid, dimethyl ester	$C_8H_{14}O_4$	174.1944	2.47
17.692	Heptanedioic acid, dimethyl ester	$C_9H_{16}O_4$	188.2209	1.36
18.523	Nonanoic acid, 9-oxo-, methyl ester	$C_{10}H_{18}O_3$	186.2481	2.64
18.765	Octanedioic acid, dimethyl ester	$C_{10}H_{18}O_4$	202.2475	4.37
21.175	Nonanedioic acid, dimethyl ester	$C_{11}H_{20}O_4$	216.2741	27.2
23.942	Decanedioic acid, dimethyl ester	$C_{12}H_{22}O_4$	230.3007	2.93
25.468	Tridecanoic acid, 12-methyl-, methyl ester	$C_{15}H_{30}O_2$	242.3975	1.04
25.899	Undecanedioic acid, dimethyl ester	$C_{13}H_{24}O_4$	244.3273	3.91
27.467	Dodecanedioic acid, dimethyl ester	$C_{14}H_{26}O_4$	258.3538	2.97
28.730	Hexadecanoic acid, methyl ester	$C_{17}H_{34}O_2$	270.4507	10.27
32.675	9-Octadecenoic acid (Z)-, methyl ester	$C_{19}H_{36}O_2$	296.4879	2.68
33.254	Methyl stearate	$C_{19}H_{38}O_2$	298.5038	1.37

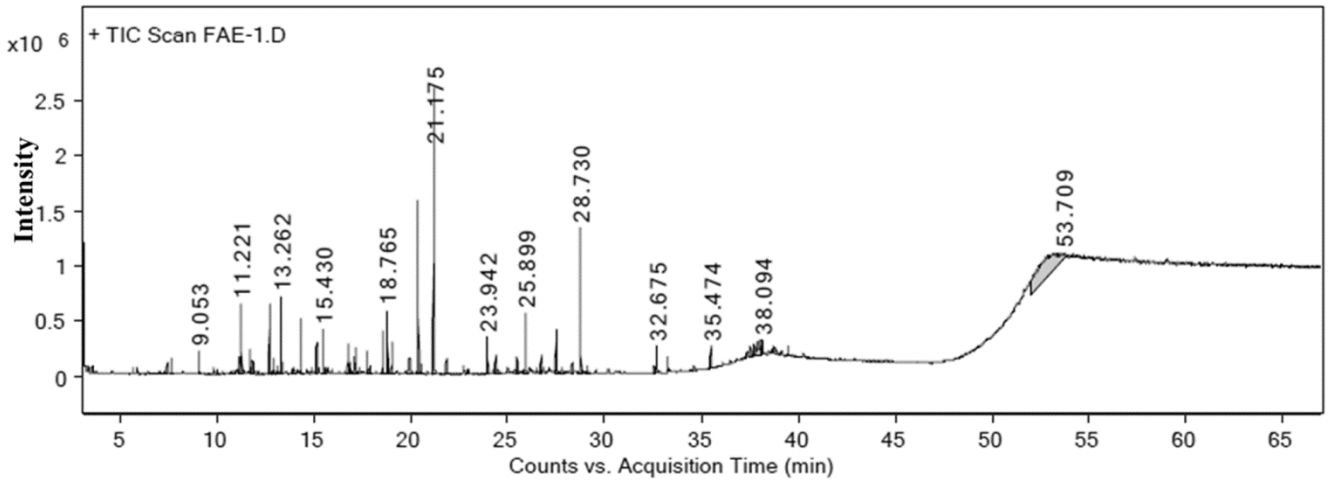

Fig. 1 — GC graph of fatty acid methyl esters

methyl esters were identified (Table 1). Esterified solution was injected into GC-MS (Fig. 1) and identified using NIST library.

Conclusions

Fatty acids are difficult to identify directly using chemical methods from plant. Hyphenated techniques of chromatography are the powerful tools for identify compound in small quantity of mixture. Simple and fast method was developed to identify fatty acid with use of GC-MS Method. Fatty acids are easily identified by this method it may be useful to food industry, pharma industry and research purpose.

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