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DETERMINATION OF BIOACTIVE COMPONENTS FROM METHANOL LEAF EXTRACT OF *CIPADESSA BACCIFERA* (ROTH) MIQ. BY GC-MS ANALYSIS

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Abstract
Plants serve as a basis of traditional medicinal systems for thousands of years. *Cipadessa baccifera* (Roth) Miq. is one of the important medicinal plant belonging to family Meliaceae and commonly called as Narang. It is much branched shrub grows up to a height of 4 metres. Traditionally leaves of this plant are used in the treatment of urine stone, snake bite, dog bite and to cure psoriasis. The present investigation was carried out to determine the chemical components in the leaves of *C. baccifera*by GC-MS technique. It is observed that n-Hexadecanoic acid (14.15%); Phytol (10.86%) and Sclareoloxide (29.17%) are found as the major compounds while Lauric anhydride (5.27%); Tetradecanoic acid (1.09%); 9-Eicosyne (3.73%); 3,7,11,15-Tetramethyl-2-hexadecen-1-ol (0.78%); 1,4-Eicosadiene (0.99%); Pentadecanoic acid, 14-methyl-methyl ester (3.33%); 1H-Naptho (2,1-b) pyran, 3-ethenyl dodecahydro-3, 4a, 7,7, 10a-pentamethyl (2.85%); 9,12,15-Octadecatrien-1-ol (6.37%); Octadecanoic acid (2.08%); 2,6,10-Dodecatrien-1-ol, 3,7,11-trimethyl (7.75%); Longifolenaldehyde (0.93%); 1-Heptatriacotanol (1.69%) and Squalene (6.66%) are found as minor compounds. Many of these phytocomponents have antimicrobial, anti inflammatory, hypocholesterolemic, antioxidant, analgesic and antipyretic properties which justify the folklore use of leaves in traditional system to cure various ailments.

Keywords: GC-MS analysis, phytocomponents, leaf, *Cipadessa baccifera*, ailments.

Introduction

The plants are indispensable to man for his life. Nature has provided a complete store house of remedies to cure all ailments of mankind. Higher plants as a source of bioactive compounds play important role in the maintenance of human health (Sermakkani *et al.*, 2012). Plants are rich source of secondary metabolites with interesting biological activities. In recent year's Gas chromatography - Mass Spectroscopy (GC-MS) studies have been increasingly applied for the analysis of medicinal plants as this technique has proved to be a valuable method for the analysis of various chemical compounds. *Cipadessa baccifera* (Roth) Miq. is one of the important medicinal plant belonging to family Meliaceae and commonly called as Narang. It is much branched shrub grows up to a height of 4 metres. Traditionally root, stem and leaves are used in the treatment of skin disease (Sivaranjani and Ramkrishnan, 2012). Leaf decoction is taken internally to treat snake bite, scorpion and insect bites (Ayyanar and Ignacimuthu, 2005). Ethanomedicinal studies of Kolhapur District reveals that leaves of *Cipadessa baccifera* are used in the treatment of urine stone, snake bite, dog bite and to cure psoriasis The objective of the present study is to identify the phytochemical constituents with the aid of GC-MS technique.

Materials and Methods

Plant Material

Plant material was collected from the forest of Kolhapur district, Maharashtra, India and identified with the help of local flora. (Yadav and Sardesai, 2002).

Preparation of plant extract

The leaves were dried and pulverized to powder in a mechanical grinder. Required quantity of plant sample was weighed, transferred to flask, treated with the methanol until the powder was fully immersed, incubated over night and filtered through a Whatmann No.41 filter paper. Filtrate is then concentrated till dry residue was remained. After weighing the residue, respective amount of methanol was added to make the final solution. This solution was further used for GC-MS analysis.

GCMS analysis of bioactive compounds from sample

The methanol leaf extract obtained from sample was subjected to Gas Chromatography and Mass Spectroscopy for the determination of bioactive volatile compounds. Some of the important features are summarized below.

GC-MS analysis of the sample was carried out using Shimadzu Make QP-2010 with non polar 60 M RTX 5MS Column. Helium was used as the carrier gas and the temperature programming was set with initial oven temperature at 40^{0}C and held for 3 min and the final temperature of the oven was 480^{0}C with rate at 10^{0}C [min.sup.-1]. 2 µL sample was injected with split less mode. Mass spectra was recorded over 35 - 650 amu range with electron impact ionization energy 70 eV. The total running time for a sample was 45 min. Quantitative

determinations were made by relating respective peak areas to TIC areas from the GC-MS.

Identification of phytoconstituents

Interpretation on mass spectrum of GC-MS was done using the database of National Institute Standard and Technology (NIST) having more than 62,000 patterns. The mass spectrum of the unknown component was compared with spectrum of known component stored in NIST library. Quantitative determinations were made by relating respective peak areas to TIC areas from the GC-MS. The name, molecular weight, retention time and peak area percentage of the test materials was ascertained.

Result and Discussion

The studies on the active principles in the methanolic leaf extract of *Cipadessa baccifera* by GC-MS analysis clearly shows the presence of seventeen compounds. The GC-MS chromatogram of the seventeen peaks of the compound detected is shown in the fig. 1 and the compounds with their retention time (RT), molecular formula (MF), molecular weight (MW) and concentration (peak area percentage) are presented in table- 1. It is observed that n-Hexadecanoic acid (14.15%); Phytol (10.86%) and Sclareoloxide (29.17%) are found as the major compounds while Lauric anhydride (5.27%); Tetradecanoic acid (1.09%); 9-Eicosyne (3.73%); 3,7,11,15-Tetramethyl-2-hexadecen-1-ol (0.78%); 1,4-Eicosadiene (0.99%); Pentadecanoic acid, 14-methyl-methyl ester (3.33%); 1H-Naptho (2,1-b) pyran, 3-ethenyl dodecahydro-3, 4a, 7,7, 10a-pentamethyl (2.85%); 9,12,15-Octadecatrien-1-ol (6.37%); Octadecanoic acid (2.08%); 2,6,10-Dodecatrien-1-ol, 3,7,11-trimethyl (7.75%); Longifolenaldehyde (0.93%); 1-Heptatriacotanol (1.69%) and Squalene (6.66%) are found as minor compounds.

Table- 2 listed the major phytocompounds and their medicinal and biological activities found in the leaves of *Cipadessa baccifera*. Among the identified components Octadecanoic acid, Sclareoloxide, Pentadecanoic acid, 14-methyl-methyl ester and 3,7,11,15-Tetramethyl-2-hexadecen-1-ol have antimicrobial and antioxidant activities. Tetradecanoic acid shows hypocholesterolemic, antioxidant, anti caner, antibacterial and antifungal activities. Phytol shows antimicrobial, diuretic, anti-inflammatory and anti cancer activities. Heterocyclic compound Sclareoloxide have antioxidant and antimicrobial activity and Squalene shows antibacterial, antioxidant, antitumor and immunostimulant activities. The presence of these various medicinal and biological active components in the leaves of the plant validates the use of the plant to treat various ailments by traditional rural practioners. Ayyanar and Ignacimuthu (2005) have done ethnobotanical study of 28 plant species belonging to 21 families used by the tribals of Tirunelvelli hills, Tamilnadu to treat poisonous bites and skin diseases. *Cipadessa baccifera* was one of them. Leaf decoction of *C. baccifera* was taken internally for 41 days to treat snake, scorpion and insect bites. In present work ethnobotanical information given by local rural practitioners (Vaidya) on above plant was different. *C. baccifera* leaves were used to treat urine stone, snake bite and dysentery while leaf and root paste was used to cure psoriasis.

Ethnobotanical study of *Cipadessa baccifera* was carried out by Khasim *et al.* (2013). The leaf paste of *C. baccifera* was used for cooling effect and leaf, root and bark paste was used for treating psoriasis. During present work it was observed that the leaves were used to treat urine stone, snake bite and dysentery while leaf and root paste was used to cure psoriasis.

Senthilkumar *et al.* (2012) have done GC-MS analysis of methanol leaf extract of *Trichilia cannaroides* which belongs to family Meliaceae. *T. cannaroides* has long been used as a traditional remedy in India and China. Leaf decoction was given to treat cholera. This plant has antibacterial, antifungal, antiviral, antimalerial and anticancerous activities. GC-MS analysis of leaves of above plant shows presence of 40 compounds. Authors have recorded 40 compounds with their retention time, molecular formula, molecular weight and the concentration (peak area percentage). n-Hexadecanoic acid (13.44%); Naphthalene (8.47%); Tetrahydroxy myrsenol (4.82%) and Oleic acid (3.57%) were found as major compounds. In present study GC-MS analysis of methanol leaf extract of *Cipadessa baccifera* belonging to same family was done. The result of the present work reveals presence of 17 different compounds. The predominant compounds were Sclareoloxide (29.17%); n-Hexadecanoic acid (14.15%); Phytol (10.86%); Squalene (6.66%) and Lauric anhydride (5.27%). From the result it was found that more number of chemical compounds were found in the leaves of *T. cannaroides* and n-Hexadecanoic acid and Phytol were present in both the plants of the family. It may be due to both plant species to belongs to same families.

Conclusion

In present study seventeen chemical constituent have been identified from methanol leaf extract of the *Cipadessa baccifera* by GC-MS analysis. These phytocompounds shows various

medicinal and biological activities. The presence of the various medicinal and bioactive compounds justifies the use of the plant leaf for various ailments by traditional practitioners. New scientific strategies for the evaluation of natural products with specific biological activities require the implementation of large screening process.

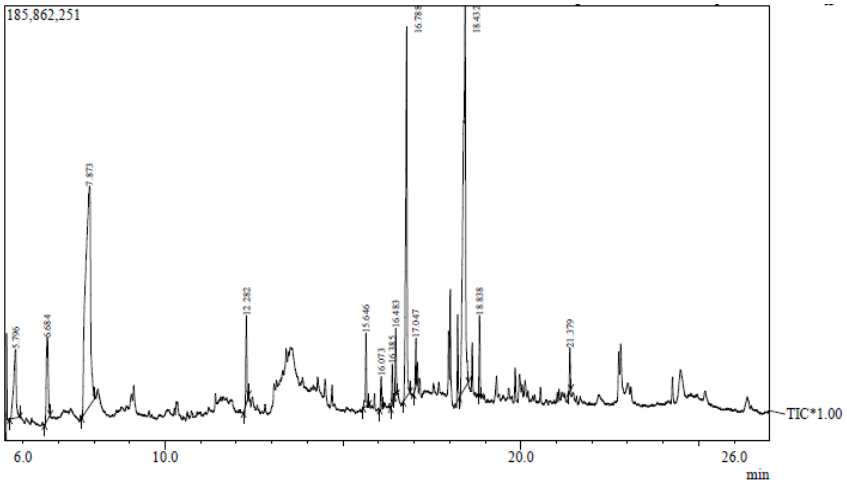

Figure 1: GC- MS Chromatogram of leaf extract of *Cipadessa baccifera* (Roth) Miq.

Table 1: Phyto constituentsnts identified in leaf extract of *Cipadessa baccifera* (Roth) Miq.

SN	RT	Name of compound	MF	MW	Peak area %
1	12.467	Lauric anhydride	$C_{24}H_{46}O_3$	382	5.27
2	14.694	Tetradecanoic acid	$C_{14}H_{28}O_2$	228	1.09
3	15.654	9-Eicosyne	$C_{20}H_{38}O$	278	3.73
4	15.894	3,7,11,15-Tetramethyl-2-hexadecen-1-ol	$C_{20}H_{40}O$	296	0.78
5	16.085	1,4-Eicosadiene	$C_{20}H_{34}$	278	0.99
6	16.390	Pentadecanoic acid, 14-methyl-methyl ester	$C_{17}H_{34}O_2$	270	3.33
7	16.762	n-Hexadecanoic acid	$C_{16}H_{32}O_2$	256	14.15
8	17.524	1H-Naptho (2,1-b)pyran, 3-ethenyldo-decahydro-3, 4a, 7,7, 10a-pentamethyl	$C_{20}H_{34}O$	290	2.85
9	18.228	Phytol	$C_{20}H_{40}O$	296	10.86
10	18.378	9,12,15-Octadecatrien-1-ol	$C_{18}H_{32}O$	264	6.37
11	18.618	Octadecanoic acid	$C_{18}H_{36}O_2$	284	2.08
12	18.862	2,6,10-Dodecatrien-1-ol, 3,7,11-trimethyl	$C_{15}H_{26}O$	222	7.75
13	19.392	Longifolenaldehyde	$C_{15}H_{24}O$	220	0.93
14	19.893	1-Heptatriacotanol	C37H76O	536	1.69
15	20.848	Sclareoloxide	$C_{18}H30O$	262	29.17
16	23.861	Not identified	-	-	2.30
17	24.271	Squalene	$C_{30}H_{50}O$	410	6.66

Table 2: Medicinal / Biological activity of compounds identified in leaf extract of *Cipadessa baccifera* (Roth) Miq.

SN	Name of compound	Compound nature	Medicinal / Biological activity
1	Tetradecanoic acid	Myristic acid	Hypocholesterolemic, nematicide, antioxidant, anti caner, antibacterial, antifungal (Uma *et al.*, 2011).
2	3,7,11,15-Tetramethyl-2-hexadecen-1-ol	Terpene alcohol	Antimicrobial, anti inflammatory (Sudha *et al.*, 2013).
3	Pentadecanoic acid, 14-methyl-methyl ester	Fatty acid	Antioxidant (Maruthupandian and Mohan., 2011).
4	n-Hexadecanoic acid	Palmitic acid	Antioxidant, hypocholesterolemic, nematicidal, pesticidal, hemolytic, antiandrogenic. (Kumar *et al.*, 2010).
5	Phytol	Diterpene	Antimicrobial, diuretic, anti-inflammatory, anti cancer (Kumar *et al.*, 2010).
6	9,12,15-Octadecatrien-1-ol	Unsaturated alcoholic compound	Antimicrobial (Kumar *et al.* 2010).
7	Octadecanoic acid	Stearic acid	Anti-inflammatory, used to produce dietary supplements (Maruthupandian and Mohan., 2011).
8	Sclareoloxide	Heterocyclic compound	Antioxidant, antimicrobial, antiviral (Gopalkrishnan., 2011).
9	Squalene	Triterpene compound	Antibacterial, antioxidant, antitumor, immunostimulant, chemo preventive, lipoxygenase inhibitor (Konovalova *et al.*, 2013).

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