



International Journal of Pharmaceutical Research and Development (IJPRD)

Platform for Pharmaceutical Researches & Ideas

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ANALYSIS OF BIOACTIVE COMPONENTS OF *ABUTILON INDICUM* LINN. ROOTS BY GC-MS

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ABSTRACT

Plant Abutilon indicum Linn. belongs to the family Malvaceae is well known in Indian system of medicine for its traditional uses. Abutilon indicum Linn. is the major source of ayurvedic medicines and it is widely used in preparation of various ayurvedic formulations. In the present study we have taken out possible bioactive components of roots of Abutilon indicum Linn. using GC-MS analysis. Five compounds were identified from the roots of the plant. The prevailing compounds of the ether extract of roots of Abutilon indicum Linn. were Caprylic acid (C₇ H₁₅ COOH), Palmitic acid (C₁₅ H₃₁ COOH), Myristic Acid (C₁₃ H₂₇ COOH), Oleic Acid (C₁₇H₃₃COOH), β-Carotene (C₄₀H₅₆). β-Carotene is noble compound found in the roots of Abutilon indicum Linn. The petroleum ether extract obtained from the root of Abutilon indicum containing linoleic, oleic, stearic, palmitic, myristic, lauric, capric, caprylic and other fatty acids showed analgesic activity. In recent resources it is also suggests carotenoids are important antioxidant molecules and affording protection against some forms of cancer.

Keywords:- *Abutilon indicum Linn, GC-MS, extract, β-Carotene etc.*

INTRODUCTION

Abutilon indicum Linn. is the major source of ayurvedic medicines and it is widely used in preparation of various ayurvedic formulations. It is found throughout the tropical parts of the world including India. It is a tomentose perennial herb or shrub and is found in abundance in sub Himalayan region upto 1200 meter. The plant is very common in almost every region of India and other neighboring countries like Sri Lanka, Pakistan, Nepal, etc. The medicinal use of this plant in the

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traditional system of medicine. The plant has been described in the vedic literature of Athraveda in *plad sahmita 5/9/1.*

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The roots of the plant is used to remove Poison. Vata–Pitta, eye diseases, heart problems, bily blood and uterine disorders. In fever its seeds and root both are used in the form of decoction i.e., powdered plant material dissolve in water or any

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other solvent¹. The preliminary chemical studies revealed the presence of cyanogenetic glycosides, saponins, cardiac glycosides, tannins, phenolic compounds and alkaloids in leaves, stem, and root of the species². The root of *A. indicum* contain flavonoids, steroids, sterols, terpenes and terpenoids³. The plant is used in the neurological disorders, epistaxis and heart diseases⁴ as astringent, diuretic demulcent⁵, in rheumatism⁶ and post delivery complaints in cattle⁷. Roots of plant are antipyretic and used in uterine haemorrhagic discharge⁸, leprosy, leucorrhoea and menorrhagia, toothache⁹ as an antiepileptic¹⁰ and in cuts and wounds¹¹. The fatty acids are identified by the GC-MS useful for the cure of diseases found by literature search.

Terpenes and their derivatives terpenes constitute a broadly spread group of substances. Although terpenes show wide structural diversity, they have general characteristics. The triterpenes have six isoprene units and shows antiviral, bactericidal activities. Tetraterpene (C₄₀H₈₀) composed of eight isoprene units and comes under carotenes. Carotenes are the pigments and widely distributed into higher plants in these β -carotene found generally. β -carotene shows anticancer property to fight against free radicals. The wide medicinal use of this plant, the petroleum ether extract of roots of *Abutilon indicum* Linn. were analyzed for the first time using GC-MS. The analysis work will help to identify the compounds of medicinal importance.

EXPERIMENTAL

The plant *Abutilon indicum* Linn. was collected from local areas of district Meerut and identified at Botanical Survey of India (BSI), North Circle, Dehradun, India. The shade dried **powdered roots** of *Abutilon indicum* were extracted with petroleum ether (60–80°C) in a Soxhlet extractor. The extract was filtered and the solvent was distilled off leaving behind the extracted material, yielded 2% of mixture component composition obtained which is dried and kept for sample analysis of the

material. The solvent used were of Merck HPLC grade. The purity of solvents was tested by GC-MS.

GC-MS technique

A Perkin Elmer Clarus-500 gas chromatography coupled with a Perkin Elmer Clarus-500 mass spectrometer was used. The compound mixture was separated on a fused silica capillary column in a temperature program from 50°C kept for 10 minutes to 350°C, kept for 5 minute with a ramp of 20°C min⁻¹. The interface keeping the capillary column and into the ion source block was kept at 300°C. The length of column was 30m×0.32 mm. The mass selective detector was operated in the electron impact (EP) mode at 70 eV of electron energy. Helium gas was used as a carrier gas at constant flow rate.

RESULTS AND DISCUSSION

Natural fats and essential oils, terpenes consist of hydrocarbons, long chain aliphatic terpenoids, the results obtained have been discussed on the basis of the percentage of constituents obtained by GC-MS analysis. The compounds were identified from the recorded mass spectrum by comparing the spectra with mass NIST library. The chromatogram obtained shown the different peaks due to the mixture of compounds on GC-MS are presented in table-1. The results of the GC-MS obtained are mostly of fatty acids and carotene which are summarized in the following table-1. Therapeutic uses of biologically active compounds identified in the mixture of plant roots extract are given in table-2.

The natural product contains fatty acids and terpenes, sterols, carotene etc. The extracted material obtained from the plant *Abutilon indicum* Linn., contains saturated and unsaturated fatty acids and terpenes. The mixture was run on the TLC plate. Fatty acids analysis was carried out by GC-MS indicates the caprylic, palmitic, myristic and Oleic acids are in sufficient amount.

Table-1Compounds identified in the mixture of petroleum ether extract of *Abutilon indicum*:

S.N	Retention Time (R _t)	Compound	Molecular ion (M ⁺)	Fragments of Characteristic ion
1	7.20	Caprylic acid	144	60 73 43 41 55 84 65 32 101 37
2	12.25	Palmitic acid	256	43 73 60 41 57 55 31 69 71 67
3	12.35	Myristic Acid	228	73 43 60 41 55 57 39 129 69 73
4	13.96	Oleic Acid	278	55 43 41 98 69 97 83 113 81 32
5	18.96	B-Carotene	536	43 69 55 41 105 91 119 537 81

Table -2Therapeutic use of biologically active compounds identified in the mixture of roots extract of *Abutilon indicum*:

S.N.	Compound name	Molecular formula	Medicinal uses
1	Caprylic acid	C ₇ H ₁₅ COOH	Decrease cholesterol, Antibacterial,
2	Palmitic acid	C ₁₅ H ₃₁ COOH	Antioxidant, pesticide, lubricant, anti-androgenic
3	Myristic Acid	C ₁₃ H ₂₇ COOH	Used for gene delivery.
4	Oleic Acid	C ₁₇ H ₃₃ COOH	Anti-cancer
5	β-Carotene	C ₄₀ H ₅₆	Heart disease and cancer

The petroleum ether extract obtained from the root of *Abutilon indicum* containing linoleic, oleic, stearic, palmitic, myristic, lauric, capric, caprylic and other fatty acids showed analgesic activity¹². Five different components were identified by the GC-MS analysis i.e. caprylic, palmitic, myristic, oleic acid and β-carotene. The chromatograms obtained from different ingredients were recorded by comparison with mass spectra. The caprylic acid at retention time 7.20 shows base peak 144 and fragments of 60, 73, 43, 41, 55, 85, 64, 64, 29, 101 and 27. At retention time 12.25 palmitic acid shows Mass peak 256 and fragments at 43, 73, 60, 41, 57, 55, 29, 69, 71 and 61. Myristic acid at retention time 12.35 gives the large chromatographic peak and mass peak 228 and fragments at 73, 43, 60, 41, 55, 57, 29, 129, 69 and 71. Oleic acid obtained at the 13.96 R_t and mass peak at 216 which have

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given fragments at 55, 43, 41, 98, 69, 97, 84, 113, 81 and 29. All the four compounds except β-carotene had been reported in roots of *Abutilon indicum*. B-carotene was also found in the roots along with the four compounds β-carotene identified through GC-MS by the library (NIST) searching. The peak obtained in the retention time 18.96 contains β-carotene which is a tetraterpene and is noble compound obtained from the plant in the petroleum ether in front where as the results obtained from the spectral analysis of the peaks obtained at 43, 69, 59, 41, 105, 91, 119, 537 and 81 provides the nature of chromatographic peaks. Approximately values obtained for the relative peaks over all of normally substituted bicyclic carotenoids i.e. β-carotenes¹²⁻¹³. In recent resources it is also suggests carotenoids are important antioxidant molecules in humans.

Quenching singlet oxygen and scavenging peroxy radicals thus minimizing cell damage and affording protection against some forms of cancer. It is taken in general diet. All the other compounds as acids (caprylic, palmitic, myristic and Oleic acids) except β -carotene are previously reported in roots. Rest of the peaks could not be identified by matching the spectra with literature. The interpretation on mass spectrum GC-MS was conducted database of National Institute of Standard and Technology (NIST) having more than 62000 patterns. Spectrum of the unknown compound was compared with the spectrum of known compounds stored in the NIST library. The Name, Molecular weight and structure of the compounds of the test material were ascertained. Among the identified phytochemicals caprylic acid has the property of antibacterial and decrease cholesterol. Palmitic acid have the activity of antioxidant and anti androgenic as reported in the early literature¹⁴. Myristic acid has been found to be essential for normal gene delivery. Oleic acid and β -carotene are effective in cancer treatment. β -carotene may play important role in the treatment of heart disease. *Abutilon indicum* Linn, the medicinally important plant and found effective in different stages of diseases.

CONCLUSION

In this study, plant *Abutilon indicum* Linn., roots were subjected under identification by Gas Chromatography- Mass Spectroscopy (GC-MS). Five compounds were identified by the technique. The presence of various bioactive compounds justifies the use of the plant for various ailments in traditional system of medicine. B-carotene is noble compound found first time in this plant by the GC-MS analysis. However, the isolation of individual compound and subjecting it to the pharmacological studies will definitely give the fruitful results. It could be concluded that, *Abutilon indicum* Linn., contains various bioactive components. Therefore it is recommended as a Ayurvedic medicine to cure the various ailments and used by Vaidas since old time.

ACKNOWLEDGEMENTS

The Author is grateful to the Chemistry Department, IIT Roorkee for providing the facilities to carry out this GC-MS study..

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