

PHYTOCHEMICAL SCREENING AND GC-MS ANALYSIS OF BIOACTIVE COMPOUNDS FROM *MIMUSOPS ELENGI*

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ABSTRACT

Plant kingdom represents an enormous reservoir of biologically active compounds and the knowledge of such constituents would further be valuable in discovering the actual value of folkloric remedies. In the present study the phytochemical screening of the aqueous leaf extract of *Mimusops elengi* was screened wherein the presence of alkaloid, tannin, phenol, flavanoid, steroids, terpenoids were detected. The total antioxidant activity and radical scavenging activity were performed and the scavenging activity increased with the increasing concentration of the extract. The thin layer chromatography was done and confirmed the presence of phenol and flavanoid. The bio constituents were investigated by GCMS analysis. Qualitative identification of the different pharmacologically active constituents was performed by composition of the relative retention times and mass spectra with those of authentic reference compounds by retention indices (RI) and mass spectra.

Keywords: *Mimusops elengi*, antioxidants, phytochemicals, thin layer chromatography.

INTRODUCTION

For past few decades compounds from natural sources have been gaining importance because of the vast chemical diversity that they offer. This had led to phenomenal increase in the demand for herbal medicines in the last two decades and or need has been felt for ensuring the quality, safety and efficacy of herbal drugs. The use of traditional plant extracts as well as other alternative forms of medical treatments has been getting momentum since the 1990s. Natural antioxidants, especially phenolic and flavonoids are safe and also bioactive. Therefore, as source of natural antioxidant much attention is being paid to plants and other organisms. Thus interested in antioxidants of plant origin has greatly increased in recent years. In recent years, there has been much interest in natural antioxidants, especially in plant polyphenols and numerous articles about their beneficial effects on health have been published. Therefore, antioxidants with free radical scavenging activities may have great relevance in the prevention and therapeutics of diseases in which oxidants or free radicals are implicated (1).

The genus *Mimusops* (family: Sapotaceae) consists of 30 species of which, *Mimusops schimperi* A. Rich., *Mimusops laurifolia* Forssk. and *Mimusops elengi* Linn. are widely distributed throughout tropical and subtropical regions of Asia (2). *M. elengi* is an ornamental tree with sweet-scented flowers and grows wild in the southern India, Burma and Pakistan. The plant finds an important place in the indigenous system of and its various parts are used as a febrifuge, astringent, purgative and stimulant (3). *Mimusops elengi* Linn commonly known as Bakul (in India) belongs to the family *Sapotaceae* and is a small to large evergreen tree found all over the different parts of Bangladesh, Pakistan and India. The bark and fruit of this plant are used in the treatment of diarrhea and dysentery, and a decoction of the bark is used as a gargle. The saponins of fruit are reported to have anti-inflammatory activity. Earlier report reveals that the fruits are used in chronic dysentery, constipations; flowers are used as snuff to relieve headache, lotion for wounds and ulcers (4). In the present study the aqueous extract of *Mimusops elengi* was subjected to phytochemical screening, whereas the bioactive compounds were detected by thin layer chromatography and GC-MS analysis.

MATERIALS AND METHODS

Identification and Collection of Plant Materials:

The fresh leaves of *Mimusops elengi* Linn were collected from the herbal gardens of Nehru Arts and Science College, Coimbatore. The plant was identified taxonomically and authenticated by Botanical survey of India [BSI] with the reference number BSI/SRC/5/23/2012-13/Tech. 1509 and were deposited in their herbarium. The leaves were washed thoroughly with 2-3 times and shade dried powdered and stored in polypropylene air-tight containers under proper conditions for further uses.

Kingdom: Plantae
Unranked: Angiosperms
Unranked: Eudicots
Unranked: Asterids
Order: Ericales
Family: Sapotaceae
Genus: *Mimusops*
Species: *Mimusops elengi* L

Preparation of Extracts:

The crude powdered sample of *Mimusops elengi* leaves (20 g) were weighed and subjected to solvent extraction for 8-10hrs repeatedly. The extract were then concentrated at 40-45°C and air dried. The dried samples were then stored in air tight bottles at 4°C.

Phytochemical Screening of *Mimusops elengi*:

Phytochemical analysis was carried out on ethanolic, extracts of leaf of *Mimusops elengi* using standard procedure described by (5), (6), (7). The presence of alkaloids, saponin, tannin, anthraquinone, flavanoid, phenol, steroids, terpenoids, proteins and sugar were carried out.

Anti-Oxidant Activity:

Total anti-oxidant capacity: The total anti-oxidant capacity measured according to spectrophotometric method of (8).

Hydrogen peroxide scavenging activity: The hydrogen peroxide scavenging assay was carried out following the procedure of (9).

Thin Layer Chromatography:

The silica gel slurry plates (1:2) were prepared. The sample was loaded onto the plates using capillary tube and the stationary phase used was ethanol: chloroform (2:1, v/v) as mobile phase. The phenol was detected and for visualization, plates were sprayed with Folin ciocalceteau reagent.

Gas Chromatography:

The sample collected from the thin layer chromatography was subjected to GC-MS analysis. Prior to analysis the sample was washed thrice with ethanol and a clear solution deprived of silica gel was subjected to GC-MS analysis.

The sample [Sample ID: EM-739] was analysed at The South India Textile Research Association (SITRA), Coimbatore, Tamil Nadu, India. The equipment thermo GC - Trace Ultra Ver: 5.0, thermo ms DSQ II with DB 35 - MS capillary standard non - polar column was used. Helium was employed as carrier gas (1 mL /m). The GC oven temperature was programmed wherein the column held initially at 70 °C / m (isothermal) and then increased by at 8 °C /m to 260°C / m min⁻¹ (isothermal). Qualitative identification of the different constituents was performed by composition of the relative retention times and mass spectra with those of authentic reference compounds by retention indices (RI) and mass spectra.

RESULT AND DISCUSSION

The leaves of *Mimusops elengi* were used for the present study. The ethanolic extract of the leaf was prepared by the soxhlet extraction. The extract was further

subjected to antioxidant, thin layer chromatography and compound analysis by GCMS. All the phytochemicals were detected in the leaf extract except saponin and anthraquinone [Table.1]. The antioxidant activity reflected by total antioxidant assay and hydrogen peroxide radical scavenging was clearly observed for ethanolic extract. For total antioxidant activity increasing scavenging activity with increasing concentration of drug (200µl, 400µl, 600µl, 800µl, 1000µl) was observed. In case of hydrogen peroxide activity also with the increasing concentrations rise in scavenging activity were found. The thin layer chromatography was performed wherein the presence of phenol and flavanoid was detected using Folin cio - calteau reagent. The bioactive compound was then further subjected to GCMS analysis [Table 2].

Sample ID:	EM-739	Low Mass(m/z):	50	Sample Name:	MIMUSOPS ELENGI
Operator:	RD	High Mass(m/z):	650	Comments:	
Run Time(min):	42.84	Instrument Name:	DSQ	Acquisition Date:	03/19/12 02:40:59 PM

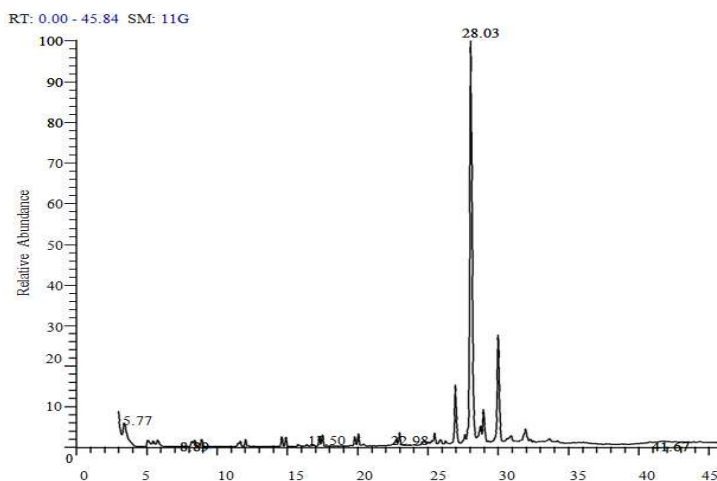
EQUIPMENT : THERMO GC - TRACE ULTRA VER: 5.0, THERMO MS DSQ II

COLUMN: DB 35 - MS CAPILLARY STANDARD NON - POLAR COLUMN

DIMENSION: 30 Mts, ID : 0.25 mm, FILM : 0.25 µm

CARRIER GAS: He, FLOW : 1.0 ML/Min

TEMP PROG: OVEN TEMP 80 C RAISED TO 250 C AT 6 C /MIN



From the analysis the medically important bio-constituents were detected. Isocoumarins and 3,4-dihydroisocoumarins are a class of natural products that often occur as microbial metabolites and that have been found to exhibit interesting biological properties, including anti-fungal, anti-inflammatory, anti-allergic, necrotic, anti-angiogenic, anti-malaria(10), anti-bacterial (11), anti-cancer, anti-virus (12) and anti-microbial activities (13). According to (14) seven new naturally occurring 3-butylisocoumarins were isolated and identified from the lipophilic extracts of aerial as well as underground parts of Asteraceae Anthemideae. Tetra deca methyl cycloheptasiloxane is a silicone fluid

commonly used in cosmetics such as deodorants, sunblocks, hair sprays, skin care products. It is becoming more common in hair conditioners, as it makes the hair easier to brush without breakage. It is also used as part of silicone based personal lubricants. Phthalate [Phthalic acid, ethyl pentyl ester] and adipate esters are widely used as surfactants and in food and personal care products as plasticizers. Chalcones, precursors of open chain flavonoids and isoflavonoids present in edible plants, and their derivatives have attracted increasing attention due to numerous potential pharmacological applications. (15) reported that among the chalcones tested, the most active compound was 3-(3,4-dimethoxyphenyl)-1-(2-hydroxy-4-methoxy-phenyl)propan-1-one showing 100% inhibition against *P. falciparum*. This compound also showed strong cytotoxicity against FM3A cells, a model of the host, with relatively low EC₅₀ values (>3.3 µg/ml). According to (16) benzoic acid is a constituent of Whitefields ointment which is used for the treatment of fungal skin diseases such as tinea, ringworm and athletes foot. Benzoic acid was used as an expectorant, analgesic, and antiseptic in the early 20th century.

Table.1: Phytochemical Screening Leaf Extract of *Mimusops elengi*

Phytochemicals	Leaf extract
Alkaloids	+
Saponin	-
Tanin	+
Flavonoids	+
Phenol	+
Steroids	+
Terpenoids	+
Anthraquinone	-
Proteins	+
Sugars	+

Table.2: GC-MS analysis of leaf extract of *Mimusops elengi*

S.No	Compound Name	Molecular Formula	Molecular Weight	Area %
1.	3,7,8 Trimethylpyrido[2,3-d]pyrimidine(3H)-4(8H)-dione	C ₁₀ H ₁₁ N ₃ O ₂	205	50.80
2.	1,2-Benzenedicarboxylic acid, dibutyl ester (CAS)	C ₁₆ H ₂₂ O ₄	278	50.80
3.	2-(p-Methoxyphenyl)-2-methyl-1-phenylpropan-1-one	C ₁₇ H ₁₈ O ₂	254	50.80
4.	3-t-Butylisocoumarin	C ₁₃ H ₁₄ O ₂	202	50.80
5.	t-Butyl 2-methoxy-6-methylphenyl ketone	C ₁₃ H ₁₈ O ₂	206	50.80
6.	Tetradecamethylcycloheptasiloxane	C ₁₄ H ₄₂ O ₇ Si ₇	518	2.52
7.	Benzoic acid, 4-(methylamino)-Propanedioic acid, [2-[(4-methylphenyl)sulfonyl]ethylidene]-dimethyl ester	C ₈ H ₉ NO ₂	151	1.82
8.	Phthalic acid, ethyl pentyl ester	C ₁₄ H ₁₆ O ₆ S	312	0.97
9.	4-Amino-2,3,5,6-tetrafluorobenzaldehyde	C ₇ H ₃ F ₄ NO	264	0.40
10.			193	0.67

CONCLUSION

The further studies should be carried out to find the active bioactive principles in the extract which could be developed to a novel drug with antioxidant properties. This may have great relevance in the prevention and therapeutics of diseases in which the oxidants or free radicals are implicated.

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