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GC-MS ANALYSIS OF BIOACTIVE COMPONENETS OF BARK OF *SARACA ASOCA* (Roxb.) Will. FABACEAE

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ABSTRACT

Saraca asoca (Roxb.) Willde.belongs to the family Fabaceae. It is commonly Asoka tree.Te investigation was carried out to determine the bioactive compounds of bark of *Saraca asoca* using Perkin-Elmer Gas Chromatography – Mass Spectrometry, while the mass spectra of the compounds found in the extract was matched with the National Institute of Standards and Technology(NIST). GC-MS analysis of ethanolic extract of *Saraca asoca* bark revealed the existence of sixteen compounds. Among these the major compounds are1,3-Benzenediol, 4-propyl- (30.03%), 2-Hydroxy-5-methylisophthalaldehyde (22.06%), Homovanillic acid (8.60%), Methyl 4-O-methyl-d-arabiopyranoside (7.34%), Methoxyolivetol (6.79%), n-Hexadecanoic acid (6.00%) and the minor compounds are β-Sitosterol (4.04%), 9,12-Octadecenoic acid (Z, Z)- (3.41%), 9-Octadecenoic acid (Z)-, methyl ester (2.45%), Isoquinolin-6,7-diol-1-carboxylic acid, N-acetyl-l-methyl- (0.77%), Butorphanol (0.62%). The results of this study offer a platform of using *Saraca asoca* bark as herbal alternative for various diseases.

KEYWORDS: *Saraca asoca*, GC-MS, Bioactive components, Benzenediol.

INTRODUCTION

Medicinal plants also play an important role in the lives of developing countries with few health facilities. India has a rich heritage of using medicinal plants for indigenous uses and practices. Some of the country's best herbal medicines have also been introduced worldwide, and new applications have been found for them in different parts of the world. These plants exhibit a wide range of biological and pharmacological activities such as anti-cancer, anti inflammatory, diuretic, oxytocic, laxative, antispasmodic, antihypertensive, anti-diabetic, and anti-microbial functions. The secondary metabolites of plants provides humans with numerous biological active products which has been used extensively as drugs, foods, additives, flavors, insecticides, colorants, fragrances and chemicals.[1] Plants are a rich source of secondary metabolites with interesting biological activities. In general, these secondary metabolites are an important source with a variety of structural arrangements and properties.[2] Distinguished examples of these compounds include flavonoids, phenols and phenolic glycosides, saponins and cyanogenic glycosides.[3] *Saraca asoca* (Roxb.) Willd. is one of the most ancient tree of India, frequently known as a " Ashok briksh", or "Ashoka" belonging to family Fabaceae means "without sorrow" or which that gives no grief. Ashoka tree has been mentioned in some of the oldest Indian text apart from Ayurveda. Across India, Ashoka tree is believed to be sacred and apart from Ramayana, Ashoka tree is mentioned in Buddhism and Jainism as well. Charaka Samhita which is believed to have been composed in 1000 BC describes about Ashoka tree and its medicinal benefits.[3] *Saraca asoca* has been greatly used as traditional medicine for women related problems, such as leucorrhoea, menorrhagia, dysfunctional uterine, bleeding and bleeding haemorrhoids. The plant have pharmacological activity such as antimicrobial activity, anti-inflammatory activity, antimenorrhagic activity, CNS depressant activity, antidiabetic activity, anthelmintic activity, uterine tonic activity, analgesic activity, larvicidal activity and antiulcer activity.[4]

MATERIALS AND METHODS

Collection of plant Material

The bark of *Saraca asoca* (Roxb.) Willd was collected from Citraruvi, Courtllam, Western Ghats,Tamil Nadu. With the help of local flora, voucher specimen were identified and preserved in P.G. & Research department of Botany, Sri Parasakthi College for Women, Courtallam, Tamil Nadu for further references.

Preparation of plant sample extraction

The leaves and bark were cleaned, shaded dried and pulverized to powder in a mechanical grinder. Required quantity of powder was weighed and transferred to Stoppard flask and treated with ethanol until the powder is fully immersed. The flask was shaken every hour for

the first 6 hours and then it was kept aside and again shaken after 24 hours. This process was repeated for 3 days and then the extract was collected and evaporated to Dryness using a vacuum distillation unit. The final residue thus obtained was then subjected to GC-MS analysis.

GC-MS Analysis

GC-MS analysis of these extracts was performed using a Perkin- Elmer GC Clarus 500 system and Gas Chromatograph interfaced to a Mass spectrometer (GC-MS) equipped with Elite –I, fused silica capillary column (30mmX0.25mm 1D X 1 µMdf,composed of 100% Di methyl poly siloxane). For GC-MS detection, an electron ionization energy of 70eV was used. Helium gas (99.999%) was used as the carrier gas at constant flow rate 1ml/ min and an injection volume of 2µl was employed (split ratio of 10:1); Injector temperature 250^{o}C; Ion- source temperature 280^{o}C. The oven temperature was programmed from 110^{o}C(isothermal for 2 min), with an increase of 10^{o}C/min, to 200^{o}C, then 5^{o}C /min to 280^{o}C, ending with a 9 min isothermal at 280^{o}C. Mass spectra were taken at 70eV; a scan interval of 0.5 seconds and fragments from 45 to 450 Da. Total GC running time was 36 minutes. The relative % amount of each component was calculated by comparing its average peak area to the total areas, software adopted to handle mass spectra and chromatograms was a Turbomass.

Identification of Compounds

Interpretation on mass spectrum GC-MS was conducted using the database of National Institute Standard and Technology (NIST) having more than 62,000 patterns. The spectrum of the unknown component was compared with the NIST library. The Name, Molecular weight and structure of the components of the test Material were ascertained.

RESULT AND DISCUSSION

The components present in the ethanol extract of bark of *Saraca asoca* was identified by GC-MS analysis (Fig 1). Name of the compound, RT(retention time), molecular formulae, molecular weight, percentage of peak area of compounds detected using GC-MS analysis of bark ethanolic extract of *Saraca asoca*.1,3-Benzenediol, 4-propyl- (30.03%), 2-Hydroxy-5-methylisophthalaldehyde (22.06%), Homovanillic acid (8.60%), Methyl 4-O-methyl-d-arabiopyranoside (7.34%), Methoxyolivetol (6.79%), n-Hexadecanoic acid (6.00%) are the major compounds. β-Sitosterol (4.04%), 9,12-Octadecenoic acid (Z, Z)- (3.41%), 9-Octadecenoic acid (Z)-, methyl ester (2.45%), Isoquinolin-6,7-diol-1-carboxylic acid, N-acetyl-l-methyl- (0.77%), Butorphanol (0.62%) are the minor compounds (Table 1).

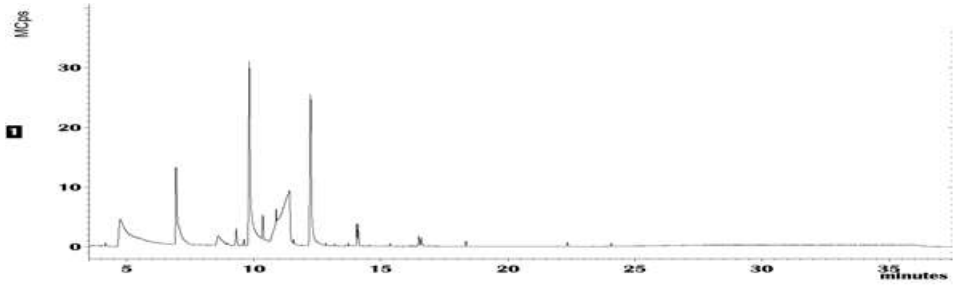

Fig.1: GC- MS Chromatogram of bark ethanolic extract of *Saraca asoca.*

Table: 1Compounds detected in the GC-MS analysis of bark ethanolic extract of *saraca asoca.*

No.	RT	Name of the compound	Molecular Formulae	Molecular Weight	Peak Area %
1.	4.13	4H-Pyran-4-one, 2,3-dihydro-3,5-dihydroxy-6-methyl-	$C_6H_8O_4$	144	0.45
2.	4.77	Catechol	$C_6H_6O_2$	110	0.86
3.	6.98	Phenol, 2-propyl-	$C_9H_{12}O$	136	3.74
4.	8.54	β-D-Glucopyranose, 1,6-anhydro-	$C_6H_{10}O_5$	162	0.62
5.	9.31	Benzoic acid, 4-hydroxy-3-methoxy-	$C_8H_8O_4$	168	2.21
6.	9.82	1,3-Benzenediol, 4-propyl-	$C_9H_{12}O_2$	152	30.03
7.	10.35	Homovanillic acid	$C_9H_{10}O_4$	182	8.60
8.	10.88	Methoxyolivetol	$C_{12}H_{18}O_2$	194	6.79
9.	11.39	Methyl 4-O-methyl-d-arabinopyranoside	$C_7H_{14}O_5$	178	7.34
10.	12.23	2-Hydroxy-5-methylisophthalaldehyde	$C_9H_8O_3$	164	22.06
11.	14.11	n-Hexadecanoic acid	$C_{16}H_{32}O_2$	256	6.00
12.	16.51	9,12-Octadecadienoic acid (Z,Z)-	$C_{18}H_{32}O_2$	280	3.41
13.	16.59	9-Octadecenoic acid (Z)-, methyl ester	$C_{19}H_{36}O_2$	296	2.45
14.	18.34	Isoquinolin-6,7-diol-1-carboxylic acid, N-acetyl-1-methyl-	$C_{13}H_{15}NO_5$	265	0.77
15.	24.06	Butorphanol	$C_{21}H2_9NO_2$	327	0.62

16.	35.90	β-Sitosterol	$C_{29}H_{50}O$	414	4.04

Table 2: Nature And Biological Activities Of Detected Compounds In Bark Of Saraca Asoca.

S.NO	RT	NAME OF THE COMPOUND	ACTIVITY
1	4.13	4H-Pyran-4-one,2,3-dihydro-3,5-dihydroxy-6-methyl	Antimicrobial,Anti inflammatory
2	4.77	Catechol	Antioxidant, Antibacterial
3	6.98	Phenol,2-propyl-	Anoretic activity, Antireserpine, Anti convulsant, Antiarrhythmic effect,Antimicrobial and cytotoxicity activity
4	8.54	β-D-Glucopyranose,1,6-anhydro-	Anticoagulant activity, Anti HIV activity
5	9.31	Benzoic acid,4-hydroxy-3-methoxy-	Antioxidant,Antimicrobial,Antifungal
6	9.82	1,3-Benzenediol,4-propyl-	Antibact erial activity,Anti-Quorum activity
7	10.35	Homovanillic acid	Dopaminergic activity, Antipsychotic activity
8	10.88	Methoxyolivetol	Hypoglycemic activity, Antifungal activity,Antimicrobial,Antioxidant activity
9	11.39	Methyl 4-0-methyl-d-arabinopyranoside	Antifertility activity, Anticancer agents
10	12.23	2-Hydroxy-5-methylisophthalaldehyde	Antibacterial activity, Antifangal activity
11	14.11	n-Hexadecanoic acid	Antioxidant,Hypocholesterolemic,Antiinflammatory, Antibacterial activity
12	16.51	9,12-Octadecadienoic acid (Z,Z)-	Hypocholesterolemic, Antibacterial,Hepato protective, Antihistaminic, Antiarthritic,Anticoronary, Anti-inflammatory
13	16.59	9-Octadecenoic acid (Z)-,methyl ester	Antitumor, Antibacterial activity
14	18.34	Isoquinolin-6,7-diol-1-carboxylic acid,N-acetyl-1-methyl-	Antibacterial,Antimicrobial, Antifungal activity
15	24.0 6	Butorphanol	Analgesic activity, Antagonist activity, Pharmacological activity
16	35.90	β-Sitosterol	Anti-inflammatory activity,Antimicrobial activity,Anagiogenic activity

Interpretation on mass spectrum GC-MS was conducted using the database of National Institute Standard and Technology (NIST) having more than 62,000 patterns. The spectrum of the unknown component was compared with the spectrum of the known stored in the NIST library. The name, molecular weight and structure of the components of the tests materials were ascertained. The biological activities listed (Table 2) are based on Dr. Duke's Phytochemical and Ethnobotanical Databases by Dr. Jim Duke of the Agricultural Research Service/USDA.

CONCLUSION

The present study has been found useful in the identification of several constituents present in ethanolic extract of the bark of *Saraca asoca.* The presence of various bioactive compounds (identified as sesquiterpenoids, alcohols, heterocyclic compounds) justify the use of the whole plant for various ailments by traditional practitioners. Among the various compounds, the major compounds and reported to be antioxidant, Anticoagulant activity, Anti HIV activity anti-timorous, anti-inflammatory, analgesic, antibacterial, sedative, fungicides, cancer preventive, immunostimulant, chemo preventive and pesticide.[5-10] So that those might be utilized for the development of traditional medicines and further investigation needs to elute novel active compounds from the medicinal plants which may be created a new way to treat many incurable diseases.

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