

# Phytochemical Profiling of Ethanolic Leaves Extract of *Ipomoea sepiaria* (Koenig Ex. Roxb)

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**ABSTRACT:** India is one of the richest countries in the world with large and wide varieties of medicinal plants and considered to be the motherland for many traditional plants of medicinal values. Nature has been a source of medicinal agents for thousands of years and a remarkable number of modern drugs have been isolated from them, many based on their use in traditional medicine. They have the capacity to produce a large number of bioactive compounds with complex structural diversity known as secondary metabolites. The present study was carried out to investigate the potential bioactive compounds present in ethanol extract of *Ipomoea sepiaria* leaves using phytochemical analysis and Gas Chromatography - Mass Spectrometry analysis. The GC-MS analysis revealed the presence of 20 compounds and many of these compounds have antimicrobial, antidiabetic, anti-inflammatory, antioxidant and anticancer activities. Medicinal plants with these components are very essential for treating various diseases and disorders.

**KEYWORDS:** *Ipomoea sepiaria*, Ethanol extract, GC-MS analysis, Bioactive compounds.

## I. INTRODUCTION

Medicinal plant products are considered to be the most important components of diet for a good health. Plants as the source of medicine plays an important role in the health services around the globe [1]. About three quarters of the world's population relies on plant and their extracts for good health care. A good number of our population particularly those living in rural areas depend largely on herbal remedies for the treatment of different types of diseases [2]. Higher 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.

A knowledge of the chemical constituents of plants is desirable not only for the discovery of therapeutic agents but also because such information may be of great value in disclosing new sources of economic phytochemicals for the synthesis of complex chemical substances and for discovering the actual significance of folkloric remedies [3]. A new branch of science has emerged for validation of the herbal drugs and to prioritize the standards of the natural drugs and products where most of the phytochemicals have overlapping mechanism of action.

These phytoconstituents are identified by using GC-MS technique. It has been widely heralded as a "gold standard" for forensic substance identification because it is used to perform a specific test. A specific test positively identifies the actual presence of a particular substance in a given sample [4]. Gas chromatography coupled to mass spectrometry is a adaptable, flexible and multifaceted tool to separate, quantify and identify unknown (volatile) organic compounds.

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*Ipomoea sepiaria* Koenig Ex. Roxb. belongs to the family Convolvulaceae is a herb, perennial climber growing on the bank of rivers, streams, specially over hedges and traditionally possess number of therapeutic properties like good antidote to arsenic, uterine tonic, aphrodisiac, diuretic tonic and cures ulcers [5]. It is also used in case of burning sensation, hyperdipsia, general debility and sterility in women [6], laxative [7] and diabetes [8]. Medicinal plants are at great interest to the researcher in the field of life science especially biotechnology where most of the pharmaceutical industries depend on the plant parts for the production of pharmaceutical drugs. Hence the present study focused on phytochemical screening and analysis of bioactive compounds from ethanol extract of *Ipomoea sepiaria* (Koenig Ex. Roxb) leaves using Gas Chromatography and Mass Spectrometry.

## II. MATERIALS AND METHODS

### 2.1. Collection of Plant material

The leaves of *Ipomoea sepiaria* were collected from the farm field of Saliyamangalam region of Thanjavur, Tamilnadu, India. It was taxonomically identified and authenticated by Rev Dr. S. John Britto SJ, Director, The Rapinat Herbarium and Centre for Molecular Systematics, St. Joseph's College (Autonomous), Tiruchirappalli, Tamilnadu, India. The voucher specimens are deposited at the Rapinat herbarium and the voucher number is JS 001.

### 2.2. Preparation of extract

The plant leaves were cleaned and shade dried. The dried leaves were reduced to fine particles using dry blender and passed through the 20  $\mu$  mesh sieve. Then the powdered leaves was extracted successfully with ethanol by using soxhlet apparatus and the extraction was carried out for 24 hrs at room temperature. The extract were filtered and concentrated at 45 °C using rotary vacuum evaporator. The extract obtained was vacuum dried and used for further investigation.

### 2.3. Phytochemical analysis tests

Phytochemical analysis of the isolated fractions from ethanolic extract of *I.sepiaria* leaves for secondary metabolites such as alkaloids, flavonoids, carbohydrates, proteins, phenols, saponins, tannins, terpenoids, phytosterols and phlobatannins was done using standard methods [9].

### 2.4. Gas Chromatography-Mass Spectrometry (GC-MS) analysis

The GC-MS analysis of the sample was performed using a Shimadzu GCMS-QP2010 gas chromatograph-mass spectrometer interfaced with a Turbo Mass quadrupole mass spectrometer, fitted with an Rtx-5 fused silica capillary column (30 X0.25 mm, with 1 Cm film thickness). The oven temperature was programmed from 100°C to 320°C at 100°C/min and a hold for 10 min. Helium was used as carrier gas at flow 1.0 mL/min. The injector temperature was 250 °C, injection size 1  $\mu$ L neat, with split ratio 1:10. The interface and MS ion source were maintained at 320°C and 200°C respectively and the mass spectra were taken at 70eV with a mass scan range of 40-700 amu (atomic mass unit). Data handling was done using GCMS solution software.

### 2.5. Identification of Compounds

Interpretation of mass spectrum of GC-MS was conducted using the mass spectral database of National Institute of Standard and Technology (NIST) having more than 62,000 patterns. The spectrum of the unknown component was compared with the spectrum of the known components stored in the NIST library. The name, molecular weight and structure of the components of the test materials was ascertained.

## III. RESULTS AND DISCUSSION

Plants and their products have been used for many years for human health. There are still many plants which have various medicinal values but still not explored and used. Plants contain many novel compounds with medicinal values which need scientific exploration. Phytochemical are very important in medicine and constitute most of the

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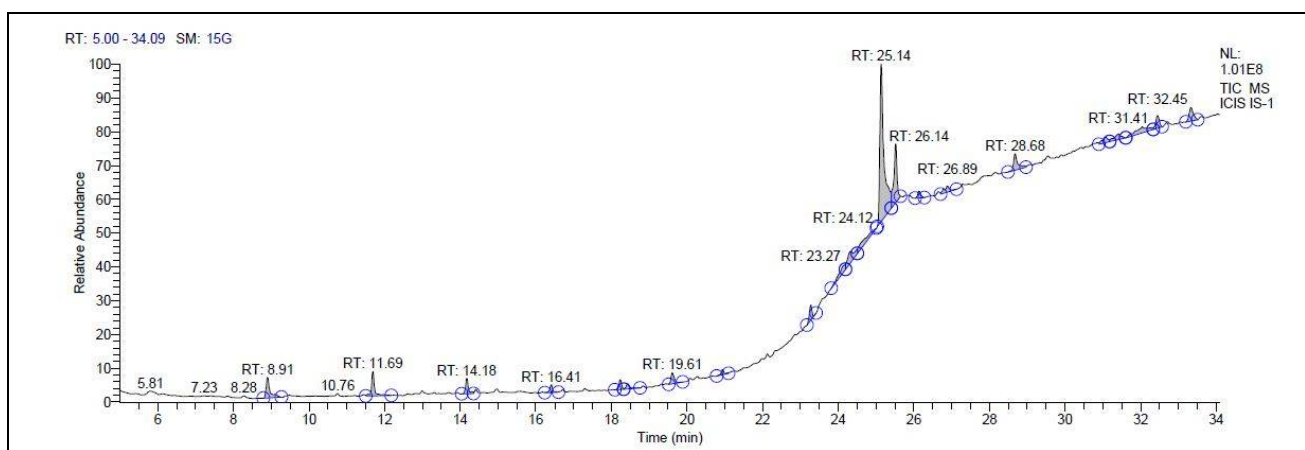
valuable drugs. Several chemicals which are derived from plants acts as a drug that are currently used in more countries in the world [10].

Table 1: Phytochemical Analysis Of *Ipomoea sepiaria* Koenig Ex. Roxb Leaves

S.No	Tests	Results
1.	Alkaloids	+
2.	Flavonoids	+
3.	Carbohydrates	+
4.	Proteins	+
5.	Phenol	+
6.	Saponins	+
7.	Terpenoids	+
8.	Tannins	+
9.	Phytosterols	+
10.	Phlobatannins	-

The present study reveals that ethanol extract of *I.sepiaria* leaves exhibited the presence of alkaloids, flavonoids, carbohydrates, proteins, tannins, terpenoids, phenol, saponins and phytosterols (Table 1).

Figure 1: GC-MS Chromatogram of *Ipomoea sepiaria* Koenig Ex. Roxb Leaves



The various phytocomponents have been identified from the GC-MS chromatogram (Figure 1) and compared with the NIST library. It showed the presence of 1-Dodecene; 1-Hexadecanol; 1-Hexadecene; 2-Hexadecanol; Dibutyl phthalate; 9-Hexacosene; 3,7,11,15-Tetramethyl-2-hexadecen-1-ol; Cyclononasiloxane, octadecamethyl-; 1-Monolinoleoylglycerol trimethylsilyl ether; Octasiloxane, 1,1,3,3,5,5,7,7,9,9,11,11,13,13,15,15-hexadecamethyl-; Cyclodecasiloxane, eicosamethyl-; Hexasiloxane, 1,1,3,3,5,5,7,7,9,9,11,11-dodecamethyl-; 13-Docosenamide, (Z)-; Squalene; Octadecane, 3-ethyl-5-(2-ethylbutyl)-; Glycine, N-[(3a,5a,7a,12a)-24-oxo-3,7,12-





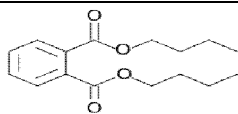

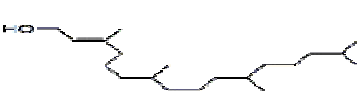
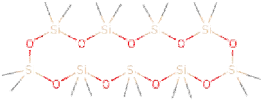
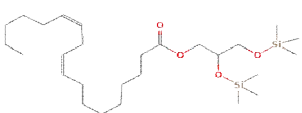
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tris(trimethylsilyl)oxy]cholan-24-yl]-, methyl ester; Campesterol; Stigmasterol; Hexatriacontane;  $\zeta$ -Sitosterol. These compounds are tabulated with their nature, retention time, molecular weight, formula, structure and activities (Table 2).

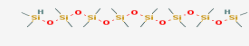

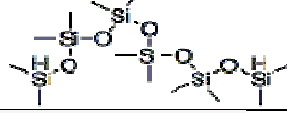



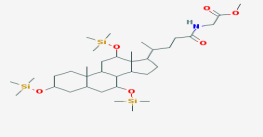
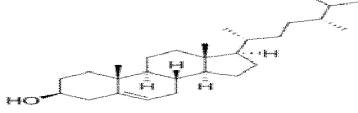
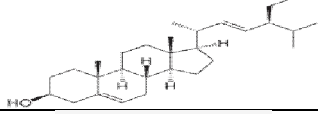

Table 2: GC-MS Analysis of *Ipomoea sepiaria* Koenig Ex. Roxb Leaves

S.No	Name of the Compound	Nature of the Compound	Structure	Retention Time	Mol. weight g/mol	Activity / Uses
1.	1-Dodecene C <sub>12</sub> H <sub>24</sub>	Alkene (alpha-olefin)		8.91	168.32	Antimicrobial and used in production of mercaptans, flavours and fragrances, alkyl metals, halides, alkyl silanes and detergents
2.	1-Hexadecanol C <sub>16</sub> H <sub>34</sub> O	Fatty alcohol		11.69	242.44	Antioxidant
3.	1-Hexadecene C <sub>16</sub> H <sub>32</sub>	Alkene (alpha-olefin)		14.18	224.42	Antimicrobial, Antioxidant, used in production of linear plasticizers, oxo-alcohols, motor fuels, lubricants, automotive additives, biodegradable surfactants
4.	2-Hexadecanol C <sub>16</sub> H <sub>34</sub> O	Long Chain Aliphatic alcohol		16.41	242.44	Antimicrobial, Antioxidant
5.	Dibutyl phthalate C <sub>16</sub> H <sub>22</sub> O <sub>4</sub>	Plasticizer		18.23	278.34	Antibacterial and Antifouling
6.	9-Hexacosene C <sub>26</sub> H <sub>52</sub>	Alkene		18.43	364.69	Analgesic, Antiinflammatory, Antinociceptive
7.	3,7,11,15-Tetramethyl-2-hexadecen-1-ol C <sub>20</sub> H <sub>40</sub> O	Terpene alcohol		19.61	296.53	Antimicrobial, Antiinflammatory
8.	Cyclononasiloxane, octadecamethyl- C <sub>18</sub> H <sub>54</sub> O <sub>9</sub> Si <sub>9</sub>	Volatile organic compound		20.94	667.38	Antioxidant
9.	1-Monolinoleoyl glycerol trimethylsilyl ether C <sub>27</sub> H <sub>54</sub> O <sub>4</sub> Si <sub>2</sub>	Steroid		23.27	498.88	Antimicrobial Antioxidant Antiinflammatory Antiarthritic Antiasthma, Diuretic, Antidiabetic

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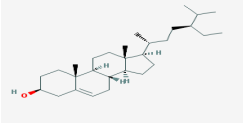
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10.	Octasiloxane, 1,1,3,3,5,5,7,7,9,9,11,11,13,13,15,15-hexadecamethyl- $C_{16}H_{50}O_7Si_8$	Volatile organic compound		24.12	579.248	Antimicrobial
11.	Cyclodecasiloxane, eicosamethyl- $C_{20}H_{60}O_{10}Si_{10}$	Volatile Aromatic compounds		24.30	741.53	Antimicrobial
12.	Hexasiloxane, 1,1,3,3,5,5,7,7,9,9,11,11-dodecamethyl- $C_{12}H_{38}O_5Si_6$	Hydride groups		24.59	430.94	Antimicrobial
13.	13-Docosenamide, (Z)- $C_{22}H_{43}NO$	Amide group		25.14	337.58	Antimicrobial
14.	Squalene $C_{30}H_{50}$	Triterpene		25.52	410.73	Antibacterial, Antioxidant, Pesticide, Antitumor, Cancer preventive, Immunostimulant, Chemo preventive, Lipxygenase-inhibitor
15.	Octadecane, 3-ethyl-5-(2-ethylbutyl)- $C_{26}H_{54}$	Higher alkanes		26.14	366.70	Antifungal, Antioxidant, Antiinflammatory
16.	Glycine, N-[(3a,5a,7a,12a)-24-oxo-3,7,12-tris(trimethylsilyloxy)cholane-24-yl]-, methyl ester $C_{36}H_{69}NO_6Si_3$	Esters		26.89	696.192	Antibacterial, antiperspirant
17.	Campesterol $C_{28}H_{48}O$	Phytosterols		31.41	400.69	Hypocholesterolemic, Antiatherosclerotic, Antiasthma, Antiarthritic, Antioxidant
18.	Stigmasterol $C_{29}H_{48}O$	Phytosterols		32.04	412.69	Antihepatotoxic, Antiviral, Antioxidant, Anticancer, Hypocholesterolemic
19.	Hexatriacontane $C_{36}H_{74}$	Higher alkanes		32.45	506.97	Antimicrobial and Antioxidant

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20.	$\zeta$ -Sitosterol C <sub>29</sub> H <sub>50</sub> O	Steroid		33.33	414.706	Antimicrobial, Anticancer, Antiarthritic, Antiasthma, Diuretic, Antiinflammatory.
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Alkaloids are rich in medicine and constitute most of the valuable drugs. They have physiological effect on animals [11]. 1-Dodecene and 1-Hexadecene are olefins or alkenes which have antimicrobial properties which are used in the production of detergents and biodegradable surfactants respectively [12].

Dibutyl phthalate (DBP) is a member of the group of chemicals commonly known as phthalates, used worldwide as solvents (to dissolve other substances) and plasticisers (to make other substances softer or more flexible). DBP has antibacterial and antifouling properties [13]. DBP is also used as an ectoparasiticide. It is also used as a softener in varnishes, adhesives and printing inks. It is used in cosmetics as a perfume solvent and lubricant for aerosol valves; an anti-foamer; a skin emollient and plasticiser in nail polish and fingernail elongators (extensions).

1-hexadecanol is a fatty alcohol which are used in the cosmetic industry as an opacifier in shampoos or as an emulsifier or thickening agent in the manufacture of skin creams and lotions (pharmaceutical preparations) [14]. It is one of the active ingredient in some "liquid pool covers".

3,7,11,15-Tetramethyl-2-hexadecen-1-ol is a diterpene alcohol which can be used as a precursor for the manufacture of synthetic forms of Vitamin E [15] and Vitamin K1 [16]. They have anti-inflammatory activity and a constituent of chlorophyll which is converted to phytanic acid and stored in fats [17].

1-Monolinoleoylglycerol trimethylsilyl ether, a steroid compound with molecular formula C<sub>27</sub>H<sub>54</sub>O<sub>4</sub>Si<sub>2</sub> has many biological activities such as antimicrobial, antioxidant, antiarthritic, anti-inflammatory, antiasthma and diuretic [18].

Octasiloxane, 1,1,3,3,5,5,7,7,9,9,11,11,13,13,15,15-hexadecamethyl- is a volatile organic compound which has antimicrobial activity [19] is available in the herbal extract of *I.sepiaria*.

Octadecane, 3-ethyl-5-(2-ethylbutyl)- of molecular formula C<sub>26</sub>H<sub>54</sub> with molecular weight 366.70 g/mol has antioxidant, antifungal and anti-inflammatory activities [20]. Glycine, N-[(3a,5a,7a,12a)-24-oxo-3,7,12-tris[(trimethylsilyl)oxy]cholan-24-yl]-, methyl ester has antibacterial activity [21] and can be used as antiperspirants [22].

Stigmasterol and Campesterol are a group of phytosterols. Stigmasterol is an unsaturated plant sterol occurring in the plant fats or oils of soybean, calabar bean and rape seed, and in a number of medicinal herbs. Edible oils contains higher amount of stigmasterol than vegetables [23]. It act as an intermediate in the biosynthesis of androgens, estrogens, and corticoids. It is also used as the precursor of Vitamin D3 [24]. It is also useful in prevention of certain cancers including ovarian, prostate, breast and colon cancers. It also possesses potent antioxidant, hypoglycemic and thyroid inhibiting properties [25]. Stigmasterol is precursor of anabolic steroid boldenone. Boldenone undecylenate is commonly used in veterinary medicine to induce growth in cattle, but it is also one of the most commonly abused anabolic steroids in sports [26, 27].

Squalene is a hydrocarbon, triterpene, natural and vital part of the synthesis of all plant and animal sterols, including cholesterol, steroid hormones, and vitamin D in the human body. All plants and animals produce squalene as a biochemical intermediate, including humans. Squalene is one of the most common lipids produced by human skin cells [28]. Squalene is used in cosmetics, and more recently as an immunologic adjuvant in vaccines. It is a chemopreventive substance that protects people from cancer [29, 30].

#### IV. CONCLUSION

The present investigation revealed the presence of medicinal bioactive compounds by GC-MS. This study also helped to identify the formula and structure of biomolecules which can be used as a drug. The preliminary screening of ethanol extract of *Ipomoea sepiaria* leaves indicates the presence of alkaloids, flavonoids, carbohydrates, proteins, phenols, saponins, tannins, terpenoids, phytosterols and moreover acidic compounds are absent in these leaves. The



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results obtained from the phytochemical screening and GC-MS analysis suggested to do further investigations which may lead to the development of drug formulation.

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