



**PHYTOCHEMICAL SCREENING AND GC-MS ANALYSIS OF *ANDROGRAPHIS ECHIOIDES* LEAVES EXTRACT**

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**ABSTRACT**

Medicinal plants have had a crucial role in human culture and civilization. *Andrographis echioides* belongs to Acanthaceae family, used for various medicinal purposes in South Asia particularly India and China. This is commonly known as False water willow. The phytochemical compounds like alkaloids, flavonoids, steroids, glycosides, tannin, phenolic compounds and steroids are found in plants. This plant possess pharmacological properties include antimicrobial activity, anti-inflammatory, diuretic, anthelmintic, analgesic, antipyretic, hepatoprotective activities and antioxidant effect. In the present investigation was carried out to determine the qualitative phytochemical was identified using GC-MS analysis.

**KEYWORDS:** *Andrographis echioides* (L) Nees, Acanthaceae, Leaves, Chloroform, GC-MS and phytochemical analysis.

**INTRODUCTION**

Traditional knowledge of medicinal plants has always guided the search for new cures. In spite of the advent of modern high throughput drug discovery and screening techniques, traditional knowledge systems have given clues to the discovery of valuable drugs.<sup>[1]</sup> Traditional medicinal plants are often cheaper, locally available and easily consumable, raw or as simple medicinal preparations. Nowadays, traditional medicinal practices form an integral part of complementary or alternative medicine. Although their efficacy and mechanisms of action have not been tested scientifically in most cases, these simple medicinal preparations often mediate beneficial responses due to their active chemical constituents.<sup>[2]</sup> Many plant secondary metabolites are potential free radical scavengers, including flavonoids, anthocyanins, carotenoids, dietary glutathione, polyphenols, vitamins, and endogenous metabolites. Many active phyto compounds have been derived from plant secondary metabolites, such as vinca alkaloids and Taxol, which may effectively treat cancer.<sup>[3]</sup>

*Andrographis echioides* (Acanthaceae) which is commonly known as false water willow is a herb commonly found throughout India. The genus *Andrographis* is a native of India contains 28 species of small annual shrubs essentially distributed in tropical Asia. The plants from genus *Andrographis* are used in goiter, liver diseases<sup>[4]</sup>, fever, fertility problems, bacterial<sup>[5]</sup>, malarial, helminthic, fungal, diarrhea and

larvicidal disorders.<sup>[6,7]</sup> Leaf juice boiled with coconut oil used to control falling and graying of hair.<sup>[8]</sup> In previous literatures are reported to only flavonoids as a major component in *Andrographis echioides* (L) Nees extracts.<sup>[9-12]</sup> Several *Andrographis* species (about 40 species) has been used in treatment of influenza, malaria, dyspepsia and respiratory diseases. The *Andrographis* species also used to antidote for poisonous stings of some insects.<sup>[13,14]</sup> In the present study focuses on the leaves of *Andrographis echioides* in chloroform extract to determine their phytochemical screening and GC-MS analysis.

**MATERIALS AND METHODS**

**Collection and Drying of plant materials**

Mature leaves of *Andrographis echioides* was collected from sengippatti, Tamil Nadu. The leaves was washed thoroughly three times with water and once with distilled water. The plant materials was air dried and powdered. The powdered samples was hermetically sealed in separate polythene bags until the time of extraction.<sup>[15]</sup>

**Preparation of Plant Extracts**

Crude plant extract was prepared by Soxhlet extraction method. About 50g of powdered plant material was uniformly packed into a thimble and extracted with all solvent, extraction continues for 18 hours or till the solvent in siphon tube of an extractor become colorless. After that the extract was taken in a beaker and kept in a hot plate and heated at 30-40 °C till all the solvent got

evaporated. Dried extract was stored in refrigerator at 4 - °C. The extract was tested for the presence of bioactive compounds by using standard methods.<sup>[16]</sup>

### Phytochemical Screening

The preliminary phytochemical analysis of *Andrographis echinoides* (L) Nees was carried out as per standard methods (Table 1).

### GC-MS analysis

GC-MS analysis was carried out on a Perkin elmer clarus 680 GC-MS instrument employing the following condition: column elite-5MS (30.0m, 0.25 mm ID, 250 µm, operating in electron impact mode; helium was used as a carrier gas at a constant flow and split ratio is 10:1 ; injector temperature is 260°C; flow rate was 1 ml/min;

oven temperature was initially 60°C for 2.80 min, ramp 10°C/min to 300°C, hold for 6 min. Total run time was 32.00 min The molecular weight and structure of the compounds were ascertained by interpretation using the database of National Institute Standard and Technology NIST-Library.<sup>[17]</sup>

### RESULT AND DISCUSSION

#### Phytochemical screening of *Andrographis echinoides*

The raw material of *Andrographis echinoides* leaf was extracted for various solvents in increasing order of polarity from using chloroform extract was chemically tested for phytochemical constituents using standard procedures recommended by (Sofowora,1994)<sup>[18]</sup> and (Trease and Evans,1989).<sup>[19]</sup>

**Table 1: Preliminary phytochemical analysis on *Andrographis echinoides* leaves extract.**

Phytochemical constituents	Name of test	Aqueous	Chloroform	Petroleum ether	Acetone	Ethanol
Alkaloids	Mayer's test	+	-	+	+	+
	Dragondraff test	+	-	-	+	+
	Wagner Test	+	-	+	+	+
	Hager's test	-	-	+	+	+
Flavonoids	Alkaline reagent test	+	+	+	+	+
	Lead acetate test	+	+	+	+	+
Steroids	Lieberman's test	-	+	-	+	-
	Salkowski's test	-	+	-	+	-
Glycosides	Keller-Killiani	-	-	-	-	-
Phenol	Ferric chloride test	+	+	+	+	-
	Lead acetate test	+	+	+	-	+
Saponins	Foam test	+	+	+	+	+
Carbohydrate	Molisch's test	+	-	-	-	-
	Fehling's test	-	-	-	-	-
	Barfoed's test	-	-	-	-	-
Proteins	Xanthoproteic test	-	-	-	-	-
	Biurer test	-	-	-	-	-
	Millions's test	-	-	-	-	-
Amino acids	Ninhydrin test	-	-	-	+	+
Saponins	Froth test	+	+	-	+	+
	Foam test	-	+	+	+	+
Tannins	Lead acetate test	+	+	+	+	-
	Ferric chloride test	+	+	+	+	+

+ = Positive      - = Negative

The studies of the active principles in the chloroform extract of *Andrographis echinoides* by GC-MS analysis showed the presence of compounds. The active principles with their retention time (RT) and percent relative composition are presented in Table 2.

**Table 2: Qualitative analysis of Chloroform extract of *Andrographis echioides*.**

S.NO	RT	Name of the compound	Molecular formula	Molecular weight	Area %	Activity
1	19.530	TETRAHYDROIONONE	C <sub>13</sub> H <sub>24</sub> O	196	40.373	Eye drops lubricant and hypertension, bradycardia, rebound hypotension, and possibly arrhythmias activity.
2	20.726	1,6;3,4-DIANHYDRO-2-DEOXY-.BETA.-D-LYXO-HEXOPYRANOSE	C <sub>6</sub> H <sub>8</sub> O <sub>3</sub>	128	2.940	Anti microbial and anti bacterial activity
3	21.921	N-HEXADECANOIC ACID	C <sub>16</sub> H <sub>32</sub> O <sub>2</sub>	256	1.983	Anti inflammatory and anti microbial activity Antioxidant, hypocholesterolmic, nematocide, pesticide, lubricant, Antiandrogenic, flavor, hemolytic.
4	25.172	DI-N-DECYLSULFONE	C <sub>20</sub> H <sub>42</sub> O <sub>2</sub> S	346	2.189	No activity reported
5	25.713	6-HYDROXY-7-NONADECYLMERCAPTO-5,8QUINOLINDIONE	C <sub>28</sub> H <sub>43</sub> O <sub>3</sub> N <sub>2</sub> S		2.042	No activity reported
6	25.858	2,4,4-TRIMETHYL-3-HYDROXYMETHYL-5A-(3-METHYL-BUT-2-ENYL)-CYCLOHEXEN	C <sub>15</sub> H <sub>26</sub> O	222	16.696	Anti microbial and Antieczematic activity
7	26.423	CYCLOTRISILOXANE, HEXAMETHYL-	C <sub>6</sub> H <sub>18</sub> O <sub>3</sub> Si <sub>3</sub>	222	2.868	Anti bacterial and anti oxidant activity
8	27.018	CYCLOTRISILOXANE, HEXAMETHYL-	C <sub>6</sub> H <sub>18</sub> O <sub>3</sub> Si <sub>3</sub>	222	3.618	Anti bacterial and anti oxidant activity
9	27.684	1,2-BIS(TRIMETHYLSILYL)BENZENE	C <sub>12</sub> H <sub>22</sub> Si <sub>2</sub>	222	7.260	No activity reported
10	28.174	TRIMETHYL[4-(1,1,3,3-TETRAMETHYLBUTYL)PHENOXY]SILANE	C <sub>17</sub> H <sub>30</sub> O <sub>2</sub> Si	278	4.929	No activity reported
11	28.429	2,6-LUTIDINE 3,5-DICHLORO-4-DODECYLTHIO-	C <sub>19</sub> H <sub>31</sub> NC <sub>2</sub> S	375	4.918	No activity reported
12	29.359	3,3-DIISOPROPOXY-1,1,1,5,5,5-HEXAMETHYLTRISILOXANE	C <sub>12</sub> H <sub>32</sub> O <sub>4</sub> Si <sub>3</sub>	324	5.864	No activity reported
13	29.464	SILICIC ACID, DIETHYL BIS(TRIMETHYLSILYL)ESTER	C <sub>10</sub> H <sub>28</sub> O <sub>4</sub> Si <sub>3</sub>	296	1.671	No activity reported
14	30.140	2,4,6-CYCLOHEPTATRIEN-1-ONE, 3,5-BIS-TRIMETHYLSILYL-	C <sub>13</sub> H <sub>22</sub> O <sub>2</sub> Si <sub>2</sub>	250	2.649	No activity reported

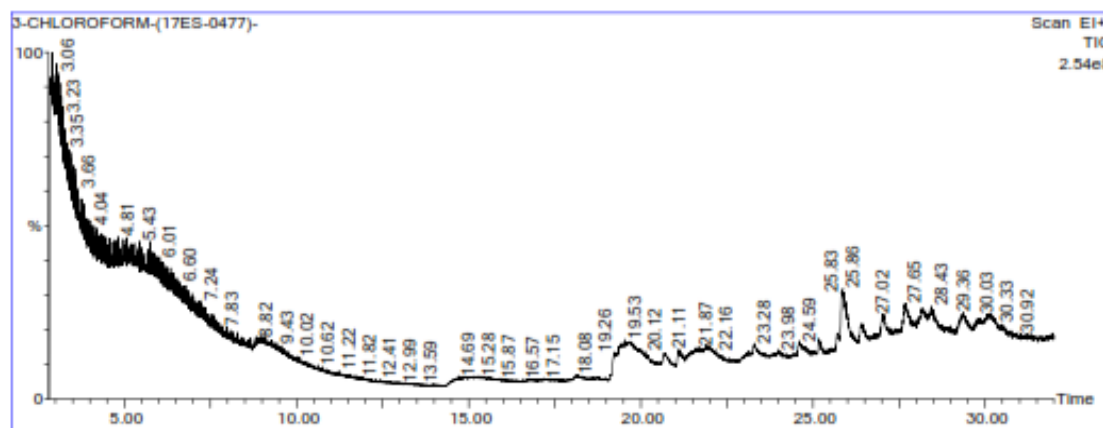


Figure 1: GC-MS analysis of *Andrographis echinoides* leaves.

The chloroform crude extract of from the leaf of *Andrographis echinoides* contained 14 different type of compound present in table-1. The chemical ingredients in the chloroform crude extract to be Tetrahydroione, 1,6,3,4-dianhydro-2-deoxy-.beta.-D-Lyxohexopyranose, N-Hxadecanoic acid, Di-N-decylsulfone, 6-Hydroxy-7-Nonadecylmercapto-5,8quinolindione, 2,4,4-Trimethyl-3-Hydroxymethyl-5A-(3-methyl-but-2-enyl)-cyclohexen, Cyclotrisiloxane, Hexamethyl-, 1,2-bis(Trimethylsilyl) benzene, 2,6-Lutidine 3,5-dichloro-4-Dodecylthio-, Trimethyl[4-(1,1,3,3,-Tetramethylbutyl)Phenoxy]Silane, 2,6-Lutidine 3,5-Dichloro-4-Dodecylthio-, 3,3-Diisopropoxy-1,1,1,5,5,5-Hexamethyltrisiloxane, Silicic acid, Diethyl Bis(Trimethylsilyl) ester, 2,4,6-Cycloheptatrien-1-one, 3,5-Bis-Trimethylsilyl.

Phytochemical constituents which contribute to the medicinal activity of the *Andrographis echinoides* leaves extract. GC-MS analysis showed the revealed that existence of the compounds such as, 2,4,4-Trimethyl-3-hydroxymethyl-5A-(3-methyl-but-2-enyl)-cyclohexen.

Hexadecanoic acid and compounds have the property of antioxidant, antimicrobial, hypocholesterolemic, antiarthritic, anti-inflammatory property of the plant leaves.<sup>[20]</sup> Cyclotrisiloxane, hexamethyl is a cyclic and unsaturated compound. Hence play a major role in the free radical scavenging activity. The degree of unsaturation in the cyclic compound are greater than that of the enediol grouping (COH=COH-) present in L – Ascorbic acid, making the former a better antioxidant agent than the later.<sup>[21]</sup> The study was revealed the presence of many bioactive compounds. Further study is need in isolation and identification of bio active compounds.

## CONCLUSION

Our present study showed that the *Andrographis echinoides* leaves extract was presence of major phytochemical such as phenol, alkaloids, flavonoids, steroids, saponins and amino acid which are secondary metabolites. Secondary metabolites will be rich in the plants which are widely used in traditional medicine to

treat and cure various ailments as well as in the modern medicine. This study was focused on phytochemical screening and characterization of bio active compounds of *Andrographis echinoides* by GC-MS analysis. Further studies aim to identify. The pharmacological activities which may be exploited in herbal formulation.

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