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GC-MS ANALYSIS OF PHYTOCHEMICAL COMPOUNDS PRESENT IN THE WHOLE PLANT OF *ARGYREIA IMBRICATE*

V.Sebastin[1]*, Chaithanya A P[1], Ajith Babu T K[1], Anoob Kumar K.I[2], Sreejith.M[3]

[1]Department of Pharmaceutical Chemistry, Malik Deenar College of Pharmacy, Kasaragod, Kerala, India.
[2]Department of Pharmaceutical Chemistry, DM WIMS College of Pharmacy, Meppadi, Wayanad, Kerala, India
[3]Department of Pharmaceutical Chemistry, Nazareth College of Pharmacy, Thiruvalla
Pathanamthitta-689546, Kerala, India.

ABSTRACT
Medicinal plants are of great importance to researchers in the field of pharmacology, as most pharmaceutical industries rely on medicinal plants as raw materials. *Argyreia imbricata* belongs to the family Convolvulaceae and is known for its medicinal properties. The present study was carried out to evaluate the antioxidant activity and possible bioactive components in the methanolic fraction of *Argyreia imbricata*. Phytochemical analysis of methanolic methanol fraction of *Argyreia imbricata* plant revealed the presence of flavonoids, tannins, phenols, saponins, alkaloids, glycosides, terpenoids and steroids. The GC-MS analysis revealed the presence of 13 bioactive compounds, including eicosanoic acid, lauroyl peroxide, octadecanoic acid, 2-oxo, methyl ester, spiro[androst-5-en-17,1'-cyclobutan]-2'-one, pseduosarsasapogenin-5,20-diene. Phytochemical and GC-MS profiling of the methanolic methanol fraction of the plant *Argyreia imbricata* revealed the presence of bioactive compounds with important medicinal properties. Therefore, the presence of these phytochemicals could be responsible for the therapeutic effect of the plant.

Keywords: Argyreia imbricate, GC-MS, Tannins, Saponins.

INTRODUCTION

Plants are used as medicines in various cultures and serve as a source of many effective drugs for the pharmaceutical industry due to the presence of certain bioactive compounds [1]. They can be a source of chemical compounds of biological and pharmacological importance. History shows that plants are sources of successful drugs and will continue to be important for screening new lead compounds in the future [2]. An essential part of plant research is the identification of biologically active compounds present in the plant leading to further biological and pharmacological studies [3-5]. The genus Argyreia is one of the larger genera belonging to the wind family (Convolvulaceae) and consists of about 220 species widely distributed in Asian countries, including all of India. *Argyreia imbricata* is traditionally used by the indigenous people of the country for the treatment of cough and quinsy (leaves), wounds caused by dog bites and burns (tribal latex) and also used by tribal people for the treatment of diabetics [6]. Gas chromatography-mass spectroscopy (GC-MS) is a combined analytical technique for the determination and identification of compounds in a plant sample [7]. GC-MS plays an essential role in the phytochemical analysis and chemotaxonomic study of medicinal plants containing biologically active components [8].

MATERIAL AND METHODS

Chemicals

All the chemicals and reagents used for the research were of analytical grade.

Collection of plant materials

The whole plants of *Argyreia imbricata* were collected in Tirunelveli (Tamilnadu). The plant material

Corresponding Author: - **Dr. V.Sebastin** Email: seba.pharm@gmail.com

was taxonomically identified by Botanist V. Chelladurai, Research Officer-Botany (Scientist-C) Central Council of Research in Ayurveda & Siddha Govt of India, Thirunelveli - Tamilnadu and dried in shade for about 10 days, pulverised using a mechanical grinder and stored in an airtight container.

Preparation of plant materials

Extraction of the dried powder of *Argyreia imbricata* was carried out with the aid of a Soxhlet apparatus using methanol as solvent. 2 extraction runs were performed. About 25 g of the dried powder was weighed, moistened with the respective solvent and placed in the Soxhlet extractor and then extracted with 500 ml of methanol [9]. The extracts were then filtered, the solvent distilled off, and finally the dry extract was obtained. The percentage yield of each extract was calculated. . The crude extracts and the separated layers were analyzed using GC-MS.

GC-MS Analysis

GC-MS the analysis was performed using a Perkin Elmer Turbo Mass Spectrophotometer (Norwalk, CTO6859, USA), which includes a Perkin Elmer AutoSampler XLGC. The Clarus 680 GC used for the analysis employed a quartz column packed with Elite-5MS (5% biphenyl, 95% dimethylpolysiloxane, 30 m × 0.25 mm ID × 250μm df), and the components were separated using helium as the carrier gas at a constant flow of 1 ml/min. The injector temperature was set at 260°C during the chromatographic run. When 1 μl of the extract sample was injected into the instrument, the oven temperature was set as follows: 60 °C (2 min), followed by 300 °C at a rate of 10 °C min-1 and 300 °C, where it was maintained for 6 min. The conditions for the mass detector were: Transfer line temperature 230 °C; ion source temperature 230 °C; ionization mode electron impact at 70 eV, a scan time of 0.2 s, and a scan interval of 0.1 s. The fragments ranged from 40 to 600 Da. The spectra of the components were compared with the database of spectra of known components stored in the library GC-MS NIST (2008). Peak areas were measured and data processing was performed using Turbo-MassOCPTVS-Demo SPL software [10-11].

RESULTS

Phytochemical screening of methanolic fraction of *Argyreia imbricata* revealed the presence of alkaloids, flavonoids, saponins, tannins, phenols, steroids, and terpenoids as shown in Table 1.

Gas chromatography-mass spectroscopy analysis

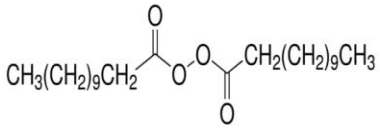
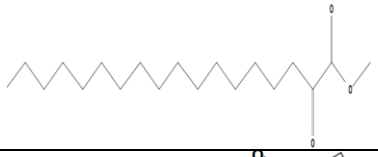
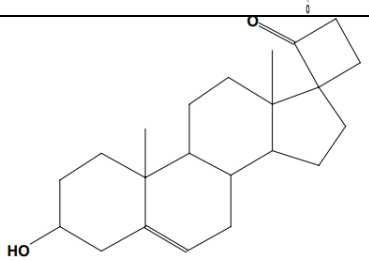
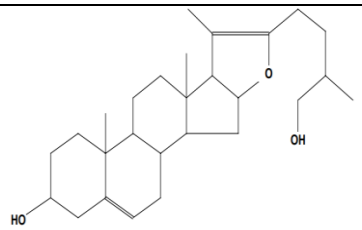
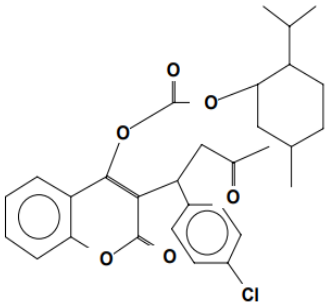
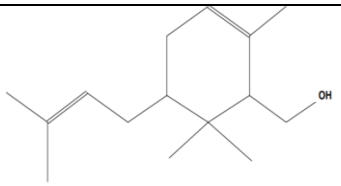
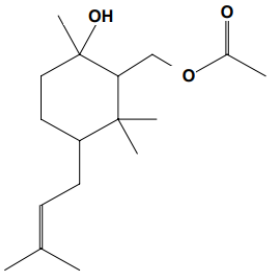
In the GC-MS analysis of the methanol fraction of *Argyreia imbricate*, a total of 23 compounds were identified, showing different phytochemical activities. The chromatogram is shown in Fig. 1, while the chemical constituents with their retention time (RT), molecular formula, molecular weight (MW) and concentration (%) in MFHAL are listed in Table 2. The following bioactive compounds were found in the GC-MS analysis of the methanol fraction of *Argyreia imbricata*: Eicosanoic acid, lauroyl peroxide, octadecanoic acid, 2-oxo, methyl ester, spiro[androst-5-ene-17,1'-cyclobutane]-2'-one, pseduosarsasapogenin-5,20-diene, docosane, 1,22-dibromo, 2-isopropyl-5-methylcyclohexyl-3-(1-(4-chlorophenyl)-3-oxobutyl)coumarin-4-yl carbonate, 2,4,4-trimethyl-3-hydroxymethyl-5a-(3-methyl-but-2-enyl)-cyclohexene, 2r-acetoxymethyl-1,3,3-trimethyl-4t-(3-methyl-2-buten-1-yl)-1t-cyclohexanol, 9,19-cyclolanost-24-en-3-ol, acetate, (3β)-, 1,3,3-trimethyl-2-hydroxymethyl-3,3-dimethyl-4-(3-methylbut-2-enyl)-cyclohexene, 9,19-cycloergost-24(28)-en-3-ol, 4,14-dimethyl acetate, 2,6,10-dodecatrien-1-ol, and 3,7,11-trimethyl-9-(phenylsulfonyl).

Table 01: Preliminary phytochemical evaluation of the dried extract of whole plant Argyreia imbricate.

S.No	Name of the Phytochemical	Methanolic Extract
1	Alkaloid	Present
2	Glycosides	Present
3	Phenolic compounds	Present
4	Flavonoids	Present
5	Protein and aminoacids	Absent
6	Terpenoids	Present
7	Steroids	Present

Table 2 Bioactive compounds found methanolic extract of Argyreia imbricate

S.No	RT (Min)	Name of the compound	Molecular formula	Molecular weight	Peak area	Structure of the compound
1	**21.236**	Eicosanoic Acid	$C_{20}H_{40}O_2$	**312**	**6.927**	

2	**22.576**	lauroyl peroxide	**$C_{24}H_{46}O_4$**	**398**	**3.458**	
3	**25.893**	octadecanoic acid, 2-oxo- methyl ester,	$C_{19}H_{36}O_3$	**312**	**2.080**	
4	**26.423**	spiro[androst-5-ene-17,1'-cyclobutan]-2'-one	$C_{22}H_{32}O_2$	**328**	**5.138**	
5	**26.753**	pseduosarsasapogenin-5,20-dien	**$C_{27}H_{42}O_3$**	**411**	**3.374**	
6	**26.928**	docosane, 1,22-dibromo	$C_{22}H_{44}Br_2$	**466**	**12.114**	
7	**27.533**	2-isopropyl-5-methylcyclohexyl 3-(1-(4-chlorophenyl)-3-oxobutyl)-coumarin-4-yl carbonate	$C_{30}H_{33}O_6Cl$	**524**	**6.827**	
8	**28.039**	2,4,4-trimethyl-3-hydroxymethyl-5a-(3-methyl-but-2-enyl)-cyclohexene	$C_{15}H_{26}O$	**222**	**4.624**	
9	**28.214**	2r-acetoxymethyl-1,3,3-trimethyl-4t-(3-methyl-2-buten-1-yl)-1t-cyclohexanol	$C_{17}H_{30}O_3$	**282**	**24.982**	

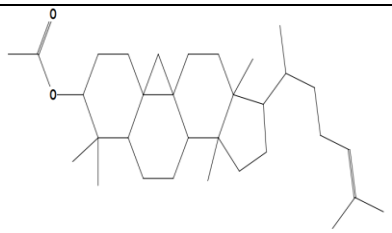
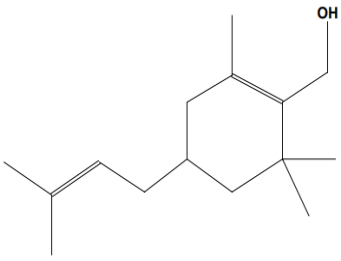
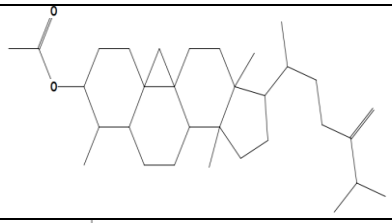
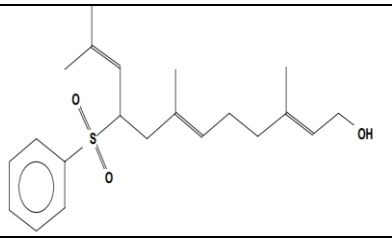
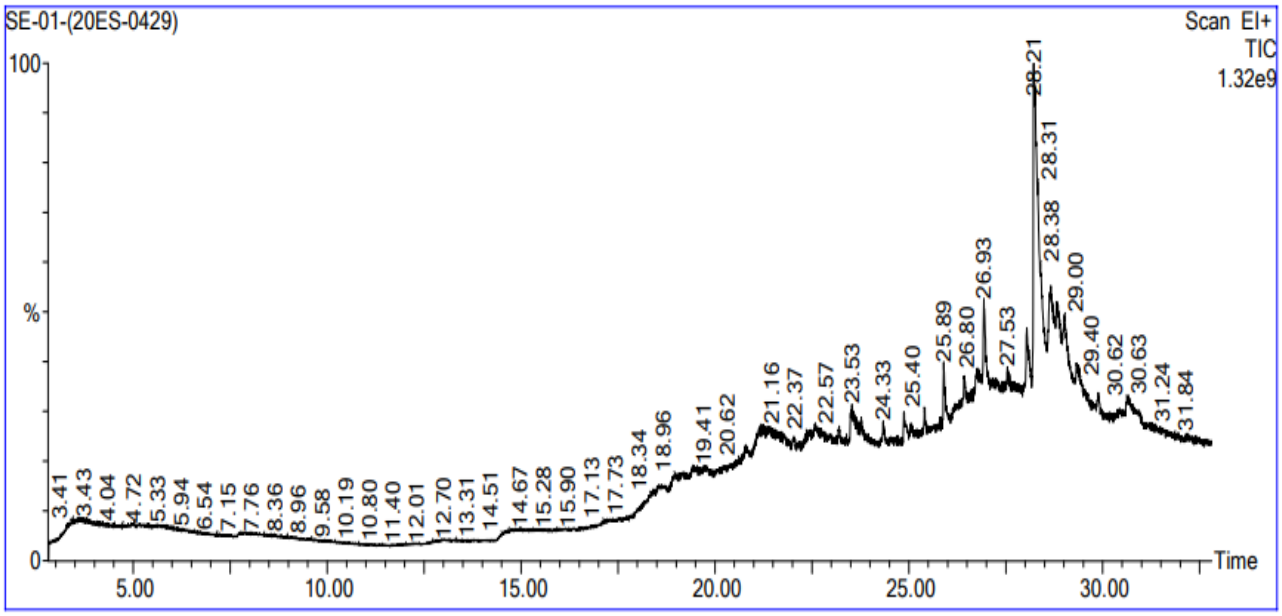
10	**28.654**	9,19-cyclolanost-24-en-3-ol, acetate, (3.BETA.)	$C_{32}H_{52}O_2$	**468**	**8.781**	
11	**28.809**	1,3,3-trimethyl-2-hydroxymethyl-3,3-dimethyl-4-(3-methylbut-2-enyl)-cyclohexene,	$C_{15}H_{26}O$	**222**	**6.268**	
12	**29.004**	9,19-cycloergost-24(28)-en-3-ol, 4,14-dimethyl acetate	$C_{32}H_{52}O_2$	**466**	**7.368**	
13	**30.630**	2,6,10-dodecatrien-1-ol, 3,7,11-trimethyl-9-(phenylsulfonyl)	$C_{21}H_{30}O_3S$	**362**	**2.401**	

Fig. 1 GC-MS chromatogram of methanolic extract of Argyreia imbricate.



DISCUSSION

GCMS analysis of various compounds from Argyreia imbricate extracts was performed using a Perkin Elmer Elite 5 capillary column; typical total ion chromatograms (TIC) of each sample are shown in Fig. 1. Phytochemical screening of the methanolic fraction of *Argyreia imbricate* revealed the presence of phyto-compounds that have been shown to have antioxidant and other activities. Flavonoids have been shown to be highly effective scavengers of most oxidizing molecules, including singlet oxygen, and various free radicals involved in various diseases. Flavonoids have antioxidant and mucosal protective effects. Flavonoid-rich vegetables are widely used functional foods because they can be used to treat cardiovascular diseases [11]. Terpenoids have been reported to relax cardiac smooth muscle by inhibiting Ca2+ influx into vascular smooth muscle or quenching reactive oxygen species (ROS) and stimulating nitric oxide synthesis (NO). Among the identified bioactive components, 2r-acetoxymethyl-1,3,3-trimethyl-4t-(3-methyl-2-buten-1-yl)-1t-cyclohexanol has the highest percent peak area. This compound has antioxidant, antidiabetic and antibacterial properties. Octadecanoic acid has antioxidant, 5-alpha-reductase inhibitor, antifibrinolytic, hemolytic, and antimicrobial activity. pseduosarsasapogenin-5,20-diene is used in cardiovascular disease. Docosane, 1,22-dibromo reports anti-inflammatory activity.

CONCLUSION

In the present study, *Argyreia imbricate* was shown to contain various secondary metabolites that possess many pharmacological properties, of which antioxidant activity is one. The GC-MS analysis revealed the presence of 13 phytochemical constituents that contribute to activities such as antimicrobial, antioxidant, anticancer, hypercholesterolemic, anti-inflammatory and others. This study explores the benefits of the whole plant Argyreia imbricate, which has a commendable sense and can be recommended as a plant of phytopharmaceutical importance.

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