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Gc-Ms analysis of bioactive compounds in Terminalia Arjuna Root

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Abstract
The aim of the present study is to evaluate the effect of ethyl acetate extract of *Terminalia Arjuna* root. The present investigation was carried out to determine the possible bioactive components of *Terminalia Arjuna* root using GC-MS analysis. Thirteen bioactive compounds and more than 25 compounds were identified from root of *Terminalia Arjuna*. The identified compounds are majorly phenolic derivatives included Hydrocarbons, Alcoholic compounds, Flavanoids, Alkaloids, Ketones, Carbohydrates, Fatty acid ester, Alkenes compounds, Fatty acids. The present study is therefore an effort to give detailed information on phytochemical studies and GC-MS analysis of *T. Arjuna root.*

Keywords: Phytochemicals, GC-MS analysis, Alcoholic compounds and fatty acids

1. Introduction
Medicinal plants are the local heritage with the global importance. World is endowed with a rich wealth of medicinal plants. Medicinal plants also play an important role in the lives of rural people, particularly in remote parts of developing countries with few health facilities. The present review reveals that *Terminalia Arjuna* is utilized for the treatment of some common diseases. In the present review we have congregated information pertaining to botanical, phytochemical, pharmacological studies. The plant has been studied for their various pharmacological activities like antioxidant, antihyperglycemic, antihyperlipidemic, cardio protective, immune modulatory effects, hepato protective, in hyperthyroidism, hyperglycemia and lipid peroxidation, analgesic and anti-Inflammatory, anthelmintics, antinorciceptive activity studies have also been studied. Therefore it is necessary to exploit its maximum potential in the field of medicinal and pharmaceutical sciences for novel and fruitful application.
Terminalia Arjuna is well known for its medicinal properties. It was introduced in to Ayurveda as a treatment of heart disease by Vagbhata (7 century A.D). It is traditionally prepared as a milk decoction. In the Ashtanga Hridayam, Vagbhata mentions Terminalia Arjuna in the treatment of wounds, haemorrhages and ulcers, applied topically as a powder.
From the Ayurvedic perspective, *T. Arjuna* is a lymph mover for the heart. Under the protective shiny layer of the bad lie reddish, more active constituents. If you have read my articles on lymph, you know that most of the herbs that were traditionally used to dye things red are considered to be natural lymph movers.
In many traditions, the heart is considered the ruler of the body. Ironically, it is often a body system that is overlooked until it is in crisis. Treat your heart like the ruler that it is by practicing a heart healthy lifestyle.
Flavanoids are important phytochemicals in plants. They act as antioxidant, hepato protective and anticarcinogenic agent in many parts of the body. So now day's flavonoids compounds are used as hemotheraphatic agent in medicinal field.
In the present work *Terminalia Arjuna* root was selected for many phytochemical work specially GC-MS work was done for identification of flavonoids from ethyl acetate extract.

2. Materials and methods
Plant materials collection: *Terminalia Arjuna* roots were collected from Lagoon area of Muthupet, Thiruvarur district during the period of September - 2014 to October - 2014.

Preparation of Plant material: *Terminalia Arjuna* plant root was collected from Lagoon area of Muthupet, Thiruvarur district and cut into small piece dried under the shed for 3 weeks at room temperature. The plant was shaded and dried for grinding to get crude powder.

Preparation of plant extract using Soxhlet apparatus: 10 g of crude powdered drug were taken and shifted into filter paper thimble. 250 ml of Ethyl acetate were poured into round bottom flask (1000 ml capacity) followed by fitting in on Soxhlet apparatus. The powdered drug was extracted with Ethyl acetate for 24 hours. A semisolid extract was obtained after completed elimination of ethyl acetate under reduced pressure. The extract was stored in refrigerator until use.

Preparation of extract for GC-MS Analysis

Take 2µl of the ethyl acetate extract of *Terminalia Arjuna* was introduced for GC-MS analysis.

Required Conditions for operating GC-MS

GC-MS analysis was carried out on a GC Clarus 500 Perkin Elmer system comprising a AOC - 20i autosampler and gas chromatograph interfaced to a mass spectrometer (GC-MS) instrument employing the following conditions, column Elite-1, fused silica capillary column (30 X0.25 mm ID X 1 µMdf, composed of 100% Dimethyl poly siloxane), operating in electron impact mode at 70 eV, helium gas (99.99%) was used as carrier gas at a constant flow rate 1mL/min and an injection volume of 2 µL was employed (split ratio of 10:1) injector temperature 250 ˚C. The oven temperature was programmed from 110 ˚C (isothermal for 2 min), with an increase of 10 ˚C /min, to 200 ˚C/ min to 280 ˚C/min, ending with a 10 min isothermal at 280 ˚C. Mass spectra were taken at 70 eV, a scan interval of 0.5 s and fragments from 50 to 950 Da. Total Gas Chromatogram running time was 25 minutes. The relative percentage amount of each component was calculated by comparing its average peak area to the total areas, software adopted to handle mass spectra and chromatograms.

Identification of components

Interpretation of mass spectrum of GC- MS was done using the database of 1 ml/min and an injection volume of 0.5 EI having more than 75,000 patterns. The mass spectrum of the unknown component was compared with the spectrum of the known components stored in the National Institute of Standard and Technology (NIST) library. The name, molecular weight and structure of the components of the test materials were ascertained.

3. Result and discussion

The compounds present in the ethyl acetate extract of *Terminalia Arjuna* root by GC-MS analysis as shown Graph: 1 the active principles with their retention time (RT), Molecular Formula, Molecular Weight and percentage of Concentration in the ethyl acetate extract of Terminalia Arjuna.

Graph 1:

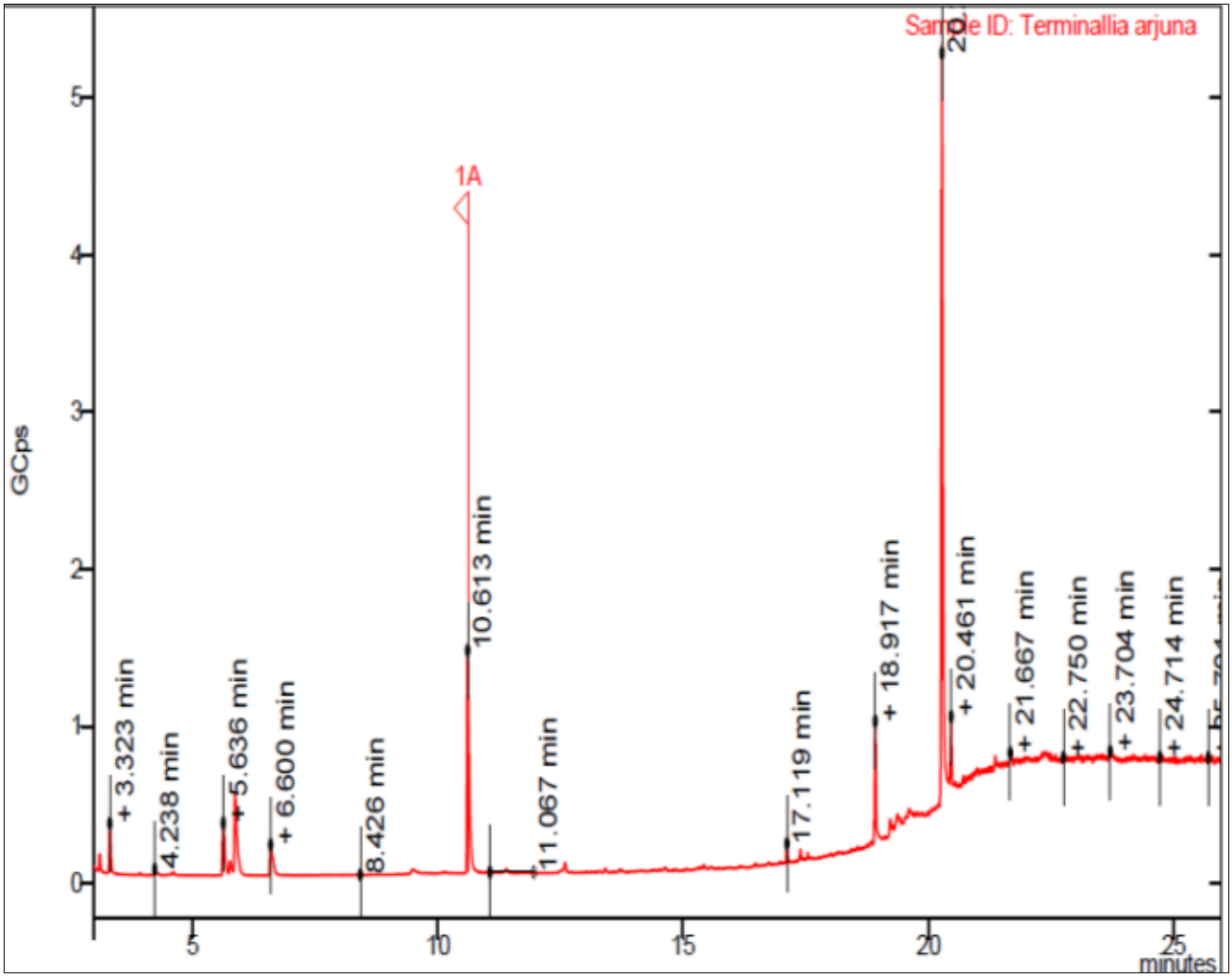

Fig 1: GC-MS Chromatogram of ethyl acetate extract of *Terminalia arjuna* root

In the present study chemical constituents have been identified from ethyl acetate extract of *Terminalia Arjuna* root by GC-MS analysis. GC-MS chromatogram of the ethyl acetate extract of *Terminalia Arjuna root showed 15 peaks indicating the presence of phytochemical constituents. On comparison of the mass spectra of the constituents with the NIST library the phyto constituents were characterize and identified (Table-1)*

Table 1:

S. No	Rt	Plant Part	Name of Compounds	Molecular Formula	Molecular Weight	Peak Area %
1	3.09	Root	2-Fluro Propane	C_3H_7F	62	3.32
2	4.14		9-Octadecenoic acid (z),hexyl ester	$C_{24}H_{46}O_2$	336	4.23
3	4.49		Ethyl Benzene	C_8H_{10}	106	5.63
4	4.66		P – Xylene	C_8H_{11}	106	6.60
5	5.58		Norpseudoephedrine	$C_9H_{13}NO$	151	8.42
6	6.45		O – Xylene	C_8H_{10}	106	10.61
7	9.41		Acetic Acid, methoxy, anhydride	$C_8H_{10}O_5$	162	11.06
8	9.84		6- Methyl Octadecane	$C_{19}H_{41}$	268	17.11
9	10.52		Phenol	C_6H_6O	94	18.91
10	11.24		2,4-Dimethyl 1- Pentene 3- ol	$C_7H_{14}O$	114	20.27
11	11.78		Biclclo (3.3.1) non -6- ene 3- carboxylic acid	$C_{10}H_{14}O_2$	166	21.66
12	12.46		2- Bromo 4- Chloro aniline	C_6H_5NClBr	205	22.75
13	13.61		Diethyl thalate	$C_{12}H_{14}O_4$	222	23.70

From the results, it was observed that 9- Octadecenoic acid (z), hexyl ester, 2, 4- Dimethyl-1-penten -3- ol, Bicyclo (3.3.1) non -6- ene -3- Carboxylic acid, Phthalic acid, 6-methyl Octadecane, Acetic acid, Norpseudoephedrine were the major components in the ethyl acetate extract.

The compound 9- Octadecenoic acid (z), hexyl ester were used as an emollient and anti-inflammatory, hypocholesterolemic, cancer preventive, hepato protective, nematicide, insectifuge, antihistaminic, anticoronary, antiarthritic, activity, P-xylene are used as nonvomiting agent, Norpseudoephedrine are used an anorective agent (that is a diet pill), Acetic acid, methoxy, anhydride are used for treating the infection reduces pain and swelling in the ear and stopping the growth of bacteria and fungus and also treat an outer ear infection (external otitis). Majorly phenolic compounds are used for treatment of ingrown nails, neurolytic agent, relieve spasms and chronic pain and dermatology for chemical face peeling. 2, 4- Dimethyl-1-penten -3- ol (trade name is Topanol A) is used an antioxidant, Bicyclo (3.3.1) non -6- ene -3- Carboxylic acids are used an antimicrobial activity. Phthalic acids derivatives are used as fragrances and cosmetic products.

The presence of various bioactive compounds justifies the use of plant root for isolation of individual phytochemical constituents and subjecting it to biological activity will definitely give good results. The present study, which reveals the presence of components in *Terminalia Arjuna* root suggest that the contribution of these compounds on the pharmacological activity should be evaluated.

4. Conclusion

The plant root of *Terminalia Arjuna* screened for bioactive compounds seemed to have the potential to act as a source of useful drug and also to improve the health status of the consumers as a result of the presence of a various compounds that are vital for good health.

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