



The GC MS Analysis of Ethyl Acetate Extract of One Herbal Plant, '*Terminalia arjuna*' Homoeopathic Mother Tincture

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Abstract: *Objective:* The present study dealt with the GC MS analysis of the ethyl acetate extract of the bark of one medicinally important plant, *Terminalia arjuna* which has multifarious medicinal roles. The *Terminalia arjuna*' Homoeopathic Mother Tincture was procured from SBL Homoeopathic pharmacy from India, *Terminalia arjuna*, commonly known as *Arjuna* belongs to the family of Combretaceae. Its bark decoction is being used in the Indian subcontinent for anginal pain, hypertension, congestive heart failure and dyslipidemia. It is used in the treatment of fractures, ulcers, hepatic and showed hypocholesterolemia, antibacterial, antimicrobial, antitumoral, antioxidant, anti-allergic and anti-oxidant antifertility and anti-HIV activities. *T. arjuna* is reported to possess strong hydro lipidemic properties *Methods:* The Mother tincture of *Terminalia arjuna* was collected from the SBL Homoeopathic Pharmacy from India. The ethyl acetate extract of the shade dried bark was collected after 48 h of soaking. The extract was evaporated and the dried powder was used for GC-MS analysis by standard procedures It was suitably processed before subjecting it to GC MS analysis. *Result:* The GC MS profile the presence of some compounds such as Disulfide, di-tert-dodecyl, Docosanoicacid, docosylester, 7-Methyl-Z-tetradecen-1-olacetate, Hexadecanoicacid, ethylester, 12-Methyl-E, E-2, 13-octadecadien-1-ol, 6-Octadecenoicacid, Oxiraneoctanoicacid, 3-octyl-cis-, OleicAcid, Dodecanoicacid, 1,2,3-propanetriylester etc. *Conclusions:* To prevent tachycardia and blood pressure. It also supports to reduces the serum cholesterol level. And prevent the myocardial infarction, which have far reaching medicinal effect as shown in Table 1. From these results it is evident that *Terminalia arjuna* Mother Tincture have excellent medicinal roles.

Keywords: *Terminalia arjuna*, GC MS, Disulfide, di-tert-dodecyl, Docosanoicacid, Docosylester, 7-Methyl-Z-tetradecen-1-Olacetate, Hexadecanoicacid, Ethylester

1. Introduction

In Homoeopathy *Terminalia arjuna*, commonly known as *Arjuna* belongs to the family of Combretaceae. Its bark decoction is being used in the Indian subcontinent for anginal pain, hypertension, congestive heart failure and dyslipidemia. It is used in the treatment of fractures, ulcers, hepatic and showed hypocholesterolemic, antibacterial, antimicrobial, antitumoral, antioxidant, anti-allergic and anti-feedant, antifertility and anti-HIV activities. *T. arjuna* is reported to possess strong hydro lipidemic properties. It is also known to protect cardiovascular diseases and very helpful in regulating the hormonal system of the body. Ailments like eczema, itching, rashes scars and serious skin conditions like psoriasis etc. can be treated with *T. arjuna*. Meena *et al*, 2021 have

reported the antioxidant properties of this plant. Soni and Singh, 2019 have reviewed the efficacy of *Terminalia arjuna* in Indian Herbal drug research. The use of plants as medicine is time immemorial and of late the scientific evidence of their medicinal roles is being documented. The present workers also reported the GC MS study results of many plants and the present work is one more step in this direction. [1-5] The ethyl acetate extract of *Terminalia arjuna* Mother tincture was performed in the present work. Presence of antioxidant molecules to enhance the action of cardiac activity.

2. Materials and Methods

The Mother tincture of *Terminalia arjuna* was collected from the SBL Homoeopathic Pharmacy from India. The ethyl

acetate extract of the shade dried bark was collected after 48 h of soaking. The extract was evaporated and the dried powder was used for GC-MS analysis by standard procedures.

2.1. GC-MS Procedure

Instrument: GC (Agilent: GC: (G3440A) 7890A. MS/MS: 7000 Triple Quad GCMS) was equipped with MS detector.

2.2. Sample Preparation

About 100 ml sample was dissolved in 1 ml of suitable solvents. The solution was stirred vigorously using vortex stirrer for 10s. The clear extract was determined using GC for analysis.

2.3. GC-MS Protocol

Column DB5 MS (30 mm × 0.25 mm ID × 0.25 µm, composed of 5% phenyl 95% methylpolysiloxane), electron impact mode at 70 eV; helium (99.999%) was used as carrier gas at a constant flow of 1 ml/min injector temperature 280°C; auxiliary temperature: 290°C ion-source temperature 280°C.

The oven temperature was programmed from 50°C (isothermal for 1.0 min), with an increase of 40°C/min, to 170°C (isothermal for 4.0 min), then 10°C/min to 310°C (isothermal for 10 min) fragments from 45 to 450 Da. Total GC running time is 32.02 min. The compounds are identified by GC-MS Library (NIST and WILEY). [6-20]

3. Results

The results of the GC-MS analysis of the ethyl acetate extract of *Terminalia arjuna* bark, along with the possible medicinal role of each molecule of *Terminalia arjunais* tabulated in Table 1. Figure 1 represents the GC-MS profile of ethyl acetate extract of the whole plant of *Terminalia arjuna*. The identification of metabolites was accomplished by comparison of retention time and fragmentation pattern with mass spectra in the NIST spectral library stored in the computer software (version 1.10 beta, Shimadzu) of the GC-MS along with the possible pharmaceutical roles of each bio molecule as per Dr. Duke's Phytochemical and ethnobotanical data base (National Agriculture Library, USA) and others as shown in Table 1.

Table 1. Depicts the details of the GC MS profile of *Terminalia arjuna* mother tincture ethyl acetate extract.

Compound Name	RT	Mol. Formula	Mol. Wt.	% Peak Area	Possible Medicinal Role
Disulfide, di-tert-dodecyl	5.009	C ₂₄ H ₅₀ S ₂	402.8	0.44	Antidote, Coronary dilator, Diuretic, digestive, increases Super oxide dismutase activity
Docosanoic acid, docosylester	5.069	C ₄₄ H ₈₈ O ₂	649.2	0.28	Acidifier, Arachidonic acid Inhibitor, Increases Aromatic Amino acid decarboxylase activity, Inhibits production of uric acid
Nonane,2,2,4,4,6,8,8-heptamethyl-	5.975	C ₁₆ H ₃₄	226.44	1.03	Not Known
Heptadecane,2,6,10,15-tetramethyl-	6.164	C ₂₁ H ₄₄	296.58	1.12	Not Known
1-(2-Acetoxyethyl)-3,6-diazahomoadamantan-9-one	6.478	C ₁₃ H ₂₀ N ₂ O ₃	267.32	0.10	Not Known
tert-Hexadecanethiol	8.428	C ₁₆ H ₃₄ S	258.51	0.31	Not Known
7-Methyl-Z-tetradecen-1-olacetate	8.507	C ₁₇ H ₃₂ O ₂	268.4	0.16	Increases Zinc bioavailability, Catechol o methyl Transferase inhibitor, methyl donar, methyl guanidine inhibitor
Hexadecanoic acid, ethylester	8.692	C ₁₈ H ₃₆ O ₂	284.5	0.37	Acidifier, Arachidonic acid Inhibitor, Increases Aromatic Amino acid decarboxylase activity, Inhibits production of uric acid
12-Methyl-E,E-2,13-octadecadien-1-ol	10.221	C ₁₉ H ₃₆ O	280.5	0.69	Anticancer, Anti-tumor, Cytochrome-P450-2E1-Inhibitor, Decreases C telopeptide excretion, decrease deoxypyridinoline excretion, decreases endothelial leukocyte adhesion, decrease endothelial platelet adhesion, decrease epinephrine production, decreases oxalate excretion
6-Octadecenoic acid	10.286	C ₁₈ H ₃₄ O ₂	282.5	0.56	Acidifier, Arachidonic acid Inhibitor, Increases Aromatic Amino acid decarboxylase activity, Inhibits production of uric acid
Oxiraneoctanoic acid,3-octyl-,cis-	10.557	C ₁₈ H ₃₄ O ₃	312.5	0.22	Acidifier, Arachidonic acid Inhibitor, Increases Aromatic Amino acid decarboxylase activity, Inhibits production of uric acid
9,12,15-Octadecatrienoic acid,2,3-dihydroxypropylester, (Z,Z,Z)-	13.21	C ₂₁ H ₃₆ O ₄	292.45	0.28	Not Known
Oleic Acid	13.284	C ₁₈ H ₃₄ O ₂	282.46	0.55	Acidifier, Arachidonic acid Inhibitor, Increases Aromatic Amino acid decarboxylase activity, Inhibits production of uric acid
9,12-Octadecadienoic acid (Z,Z)-	13.804	C ₁₈ H ₃₂ O ₂	280.4	3.41	Not Known
Dodecanoic acid,1,2,3-propanetriylester	26.828	C ₃₉ H ₇₄ O ₆	639.00	84.30	Acidifier, Arachidonic acid Inhibitor, Increases Aromatic Amino acid decarboxylase activity, Inhibits production of uric acid
1-Monolinoleoylglyceroltrimethylsilylether	27.337	C ₂₇ H ₅₄ O ₄ Si ₂	500.9	6.20	Not Known

DataFile	HR120922047.D	SampleName	TerminaliaArjuna
SampleType	Mother Tincture (Liquid)	Position	16
InstrumentName	GC-MS MS Online	UserName	
AcqMethod	Screening MethodNew.M	AcquiredTime	28-09-2022PM5:06:00
IRMC CalibrationStatus	Not Applicable	DAMethod	Screening.m
Comment			

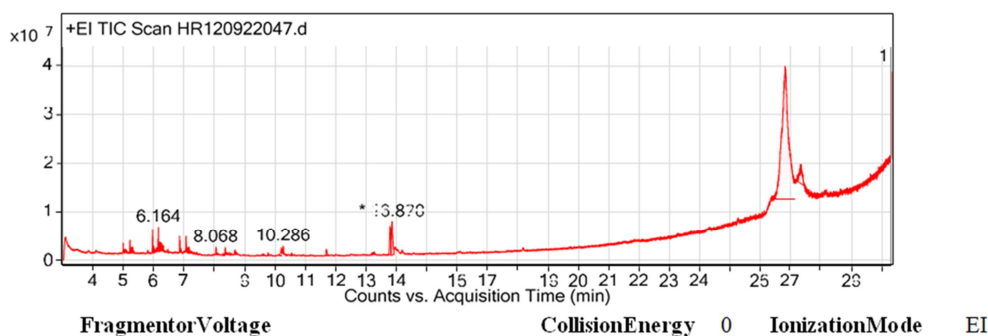


Figure 1. Depicts the GC MS profile of Terminalia arjuna. bark ethyl acetate extract.

4. Discussion

It was observed in the GC MS profile of *Terminalia arjuna* mother tincture, some compounds such as Disulfide, di-tert-dodecyl, Docosanoicacid, docosylester, 7-Methyl-Z-tetradecen-1-olacetate, Hexadecanoicacid, ethylester, 12-Methyl-E,E-2,13-octadecadien-1-ol, 6-Octadecenoicacid, Oxiraneoctanoicacid, 3-octyl-, cis-, OleicAcid, Dodecanoicacid, 1,2,3-propanetriylester were present. These biomolecules are reported to have far reaching medicinal roles as is shown in Table 1. These medicinal roles include Coronary dialation, diureti, digestive, antioxidant, arachidonic acid inhibition, increase of aromatic aminoacid decarboxylase activity, increase of zinc bio-availability, inhibition of Cvatachol O methyl tranferase, anticancer, antitumor, Cytochrome-P450-2E1-Inhibition, Decrease of C telopeptide excretion, decrease of deoxypyridinoline excretion, decrease of endothelial leukocyte adhesion, decrease of endothelial platelet adhesion, decrease of epinephrine production, decrease of oxalate excretion etc. Such far reaching medicinal roles could be ascribed to the role of Terminalia arjuna as a tree with excellent medicinal role of various dimensions.

5. Conclusion

The presence of Antioxidant molecule such as Disulfide, di-tert-dodecyl, Docosanoicacid, docosylester, 7-Methyl-Z-tetradecen-1-olacetate, Hexadecanoicacid, ethylester, 12-Methyl-E,E-2,13-octadecadien-1-ol, 6-Octadecenoicacid, Oxiraneoctanoicacid, 3-octyl-, cis-, OleicAcid, Dodecanoicacid, 1,2,3-propanetriylester which helps to Regulates the cardiac activity. To prevent tachycardia and blood pressure. It also supports to reduces the serum cholesterol level. And prevent the myocardial infarction.

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