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The GC MS Study of One Ayurvedic Medicine, Valiya Karpooradi Churnam

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ABSTRACT

The study deals with the GC MS analysis of one Ayurvedic formulation, Valiyakarpuradichurnam, which is prescribed for ailments such as cough, cold, anorexia, hiccup, pain, nausea, indigestion, and vomiting. Valiyakarpuradichurnam was procured from standard Ayurvedic vendor at Chennai and was processed suitably before subjecting it to GC MS analysis. The GC MS profile indicated the presence of medicinally important molecules such as isoborneol, thymol, eugenol, Alfa-copaene, caryophyllene, tridecanoic acid, 12-methyl-, methyl ester, ethyl p-methoxycinnamate, piperine, gamma-sitosterol etc. which do indicate their supportive role towards the cure by Valiyakarpuradichurnam. It is concluded that the Valiyakarpuradichurnam does contain some important biomolecules which support its activity as an effective medicine.

Key words: ValiyaKarpuradichurnam, GC MS, Ayurvedic, Isoborneol, Thymol, Eugenol, Alfa-copaene, Caryophyllene

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INTRODUCTION

The present study in another step by the present workers towards Aurvedic and Sidhha medicine standardization by applying latest analytical methods [1-29]. It consist of the GC MS analysis of one Ayurvedic medicine prescribed for cough, cold, anorexia, hiccup, pain, nausea, indigestion and vomiting. The following dry ingredients of the medicine are powdered and mixed in equal ratio to obtain this medicine. Karpura (*Cinnamomum camphora*), Jatipatra (*Myristica fragrans*), Devadaru (*Cedrus deodara*), Madhuka (*Madhuca indica*), Jatiphala (Fruit of *Myristica fragrans*), Anjana (Collyrium), Sunthi (*Zingiber officinale*), Ajaji (*Carum carvi*), Jeeraka (Cuminumcyminum), Ela (*Elettaria cardamomum*), Kasturi (Musk), Kachora (*Curcuma zadoria*), Pippali (*Piper longum*), Guduchi (*Tinospora cordifolia*), Lodhra flower (*Symplocos racemosa*), Maricha (*Piper nigrum*), Dalchini (*Cinnamomumzeylanicum*), Balaka (*Coleusvettiveroides*), Agragrahi (*Anacyclus pyrethrum*), Bhringaraj (*Eclipta alba*), Lavanga (*Syzigiumaromaticum*), Musta (*Cyperus rotundus*), Usheera (*Vetiveria zizanioides*), Patha (*Cissampelos pareira*), Kusta ((*Saussurealappa*), Krishnagaru (*Aquilariaagallocha*)) and Rasna (*Pluchealanceolata*). The dosage of this medicine is one to three g of the powder with honey three times a day or as advised by the physician. It is manufactured by Arya Vaidya Nilayam, Arya Vaidyasala Kottakkal among others.

MATERIALS AND METHODS

Valiyakarpuradichurnam was obtained from standard Ayurvedic vendor at Chennai and was subjected to GC MS analysis by standard procedure.

Instrument: Gas chromatography (Agilent: GC: (G3440A) 7890A. MS MS:7000 triple quad GCMS,) was equipped with mass spectrometry detector.

Sample preparation: 100 micro lit sample dissolved in 1 ml of suitable solvents. The solution stirred vigorously using vortex stirrer for 10 seconds. The clear extract was determined using gas chromatography for analysis.

GC MS protocol: The GC MS column consisted of DB5 MS (30 mm × 0.25 mm ID × 0.25 µm, composed of 5% phenyl 95% methyl poly siloxane), 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; auxilary 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 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).

RESULTS AND DISCUSSION

The GC MS profile of Valiyakarpouradichurnam is represented in Figure 1.

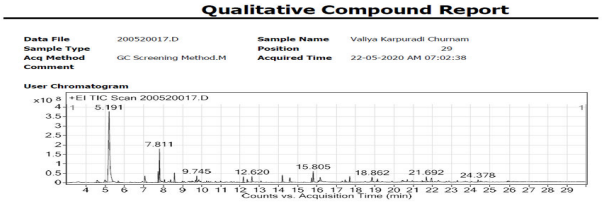

Figure 1: Depicts the GC MS profile of Valiya karpuradi churnam.

Table 1 indicates the retentions values, types of possible compound, their molecular formulae, molecular mass, peak area and their medicinal roles of each compound as shown in the GC MS profile of Valiyakarpuradichurnam. 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 ethno botanical data base (national agriculture library, USA) and others as shown in Table 1 [30].

Table 1 indicates the presence of some molecules such as isoborneol, thymol, eugenol, alfa-copaene, caryophyllene, tridecanoic acid, 12-methyl-, methyl ester, ethyl p-methoxycinnamate, piperine, gamma-sitosterol etc. which have medicinal properties relating to those of valiyakarpuradichurnam in alleviating the ailment. Further work is warranted to understand the exact mechanism of action of these molecules as well as that of valiyakarpuradichurnam (Table 1) [31-35].

Table 1: Indicates the retentions time, types of possible compound, their molecular formulae, molecular mass, percentage peak area and their medicinal roles of each compound as shown in the GC MS profile of Valiyakarpuradichurnam.

Sl.NO	Retention time	Compound name	Mol. formula	Mol. weight	% Peak area	Possible medical role
1	4.57	Bicyclo[2.2.1]heptan-2-ol, 1,5,5-trimethyl-	$C_{10}H_{18}O$	154.1	1.55	Not known
2	4.97	Bicyclo[2.2.1]heptan-2-one, 1,7,7-trimethyl-, (1S)-	$C_{10}H_{16}O$	152.1	1.38	Not known
3	5.19	Isoborneol	$C_{10}H_{18}O$	154.1	50.67	Isoborneol, a derivative of borneol is reported to have antiviral properties on herpes simplex virus 1 (HSV-1)
4	7.05	Thymol	$C_{10}H_{14}O$	150.1	2.2	Thymol is reported to have hair growth potential. Thymol derivatives have antioxidant, antibacterial and anti-inflammatory activities
5	7.74	Cyclohexene, 3-methyl-6-(1-methylethylidene)-	$C_{10}H_{16}$	136.1	3.45	Not known

6	7.81	Eugenol	$C_{10}H_{12}O_2$	164.1	9.23	Eugenol or phenol, 2-methoxy-3-(2-propenyl): synthetic eugenol has been reported to have many important medicinal properties as is described by many reporters. It has medicinal roles such as antifungal, antioxidant, anticonvulsant and local anaesthetic, anti-stress, bacteriostatic, bactericidal, anti-carcinogenic, depresses activity of central nervous system, anti-radiation, antiviral, induces apoptosis in melanoma cells and HL-60 leukemia cells
7	8.08	Alfa-Copaene	$C_{15}H_{24}$	204.2	0.8	Analgesic, anti-inflammatory
8	8.39	Longifolene	$C_{15}H_{24}$	204.2	0.81	Not known
9	8.59	Caryophyllene	$C_{15}H_{24}$	204.2	2.63	Has role as non-steroidal anti-inflammatory drug
10	9.75	cubedol	$C_{15}H_{26}O$	222.2	1.8	Not known
11	12.17	Tridecanoic acid, 12-methyl-, methyl ester	$C_{15}H_{30}O_2$	242.2	1.34	Catechol-O-methyl-transferase-inhibitor, methyltransferase-inhibitor, methyl-donor, methyl-guanidine-inhibitor, arachidonic-acid-inhibitor, increases aromatic amino acid decarboxylase activity
12	12.37	Ethyl p-methoxycinnamate	$C_{12}H_{14}O_3$	206.1	0.96	Anti-CAMP-phosphodiesterase, anticancer, antidote, anti-mitral valve prolapse, adrenal Press or
13	12.62	Tetradecanoic acid	$C_{14}H_{28}O_2$	228.2	1.68	Acidifier, arachidonic acid inhibitor, increases aromatic amino acid decarboxylase activity
14	14.2	Hexadecanoic acid, methyl ester	$C_{17}H_{34}O_2$	270.3	2.19	Catechol-O-methyl-transferase inhibitor, methyl donar, methyl guanidine inhibitor, acidifier, arachidonic acid inhibitor, Increases aromatic amino acid decarboxylase activity
15	14.59	Azuleno [4,5-b]furan-2(3H)-one, 3a, 4,6a,7,8,9,9a,9b-octahydro-6-methyl-3,9-bis(methylene)-, [3aS-(3a alpha, 6a alpha, 9a alpha, 9b beta)]-	$C_{15}H_{18}O_2$	230.1	2.06	Not known
16	15.73	12,15-Octadecadienoic acid, methyl ester	$C_{19}H_{34}O_2$	294.3	1.19	Acidifier, acidulant, arachidonic acid inhibitor, Increases aromatic amino acid decarboxylase activity, inhibits production of

						uric acid, catechol-o-methyl-transferase Inhibitor, methyl donar, methyl guanidine inhibitor
17	15.81	9-Octadecenoic acid, methyl ester, (E)-	$C_{19}H_{36}O_2$	296.3	3.14	Acidifier, acidulant, arachidonic acid inhibitor, increases aromatic amino acid decarboxylase activity, inhibits production of uric acid,
18	16.17	9-Octadecenoic acid, (E)-	$C_{18}H_{34}O_2$	282.3	1.37	Acidifier, acidulant, arachidonic acid inhibitor, increases aromatic amino acid decarboxylase activity, inhibits production of uric acid, anticancer, cytochrome P450 2E1 inhibitor
19	17.47	1,15-Pentadecanedioic acid	$C_{15}H_{28}O_4$	272.2	0.85	Acidifier, arachidonic acid inhibitor, increases aromatic amino acid decarboxylase activity
20	17.7	4-Butylbenzoic acid, 1-adamantylmethyl ester	$C_{22}H_{30}O_2$	326.2	1.55	Increase Zinc bioavailability, oligosaccharide provider, decreases endothelial leukocyte adhesion, decreases endothelial platelet adhesion, energizer
21	18.86	Z-(13,14-Epoxy)tetradec-11-en-1-ol acetate	$C_{16}H_{28}O_3$	268.2	1.94	Increases Zinc bioavailability, oligosaccharide provider, decreases endothelial leukocyte adhesion, decreases endothelial platelet adhesion, energizer
22	19.15	Isobornyl propionate	$C_{13}H_{22}O_2$	210.2	1.17	Not known
23	20.44	2,3-Dihydroxypropyl elaidate	$C_{21}H_{40}O_4$	356.3	0.81	Not known
24	21.69	Piperine	$C_{17}H_{19}NO_3$	285.1	1.68	Radio protective, immuno modulatory, antitumor, anti-depressant, anticonvulsant, anti-nociceptive, anti-arthritic, helps in the absorption of selenium, vitamin B, beta carotene and other nutrients[35]
25	21.96	2-Pentenoic acid, 3-methyl-5-(2,6,6-trimethyl-1-cyclohexenyl)	$C_{15}H_{24}O_2$	236.2	2.06	Acidifier, acidulant, arachidonic acid inhibitor, increases aromatic amino acid decarboxylase activity, inhibits production of uric acid, catechol-o-methyl-transferase Inhibitor, methyl donor, methyl guanidine inhibitor
26	24.38	gamma-sitosterol	$C_{29}H_{50}O$	414.4	0.77	PPARgamma antagonist
27	25.96	Ethyl iso-allocholate	$C_{26}H_{44}O_5$	436.3	0.72	Isoptericide

CONCLUSION

From the above results and discussion it is indicative that the molecules present in Valiyakarpuradichurnam could support the medicinal role of this medicine. It will be of interest to understand the roles of molecules whose medicinal roles are not known.

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