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GAS CHROMATOGRAPHY AND MASS SPECTROSCOPY OF CHANDANA AND SARSHAPA CHURNA

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ABSTRACT

Ayurveda pharmaceutics deals with preparation of various dosage forms. Churna is a dosage form that is said to be the upakalpa of kalka- a primary preparation in Ayurveda pharmaceutics that is popular in clinical practice. Innumerable combinations of different herbs in the form of powder are used for various diseases. Sarshapa and chandana churna- a combination of two herbs is explained to be used as a krimighna (anti- microbial) in treatise of Ayurveda. An analytical study of the combination was subjected to Gas Chromatography and Mass Spectroscopy (GCMS) to evaluate the components of the powder. GCMS are tests applied to identify different components in a given sample. The GCMS report shows that Sarshapa and chandana powder sample consists of many active compounds among which 13-Docosenoic acid, methyl ester, (Z)-, 2-Buten-1-ol,, 2- ethyl-4-(2,2,3-trimethyl-3-cyclopenten-1-yl)- and 9-Octadecenoic acid, methyl ester, (E)- are the compounds which are found in highest concentration.

Keywords: Ayurveda, Chandana, Churna, GCMS, Sarshapa

INTRODUCTION

Churna (a powder dosage form) is the simplest form of Ayurvedic medicine that can be easily prepared, administrated having more shelf life, with higher therapeutic value and palatability, and accepted by all age groups. Churna is a well-known dosage form in Ayurvedic pharmaceutics that is used abundantly internally and externally **[1]**. A combination of Chandana (*Santalum album*) and Sarshapa (*Brassica campestris*) churna are said as krimighna (anti- microbial) **[2]**.

Gas Chromatography–Mass Spectrometry (GC-MS) is a hyphenated analytical technique that combines the separation properties of gas-liquid chromatography with the detection feature of mass spectrometry to identify different substances within a test sample. GC is used to separate the volatile and thermally stable substitutes in a sample whereas GC-MS fragments the analyte to be identified on the basis of its mass. The further addition of mass spectrometer in it leads to GC-MS/MS **[3]**.

MATERIALS AND METHODS:

The Gas Chromatography and Mass Spectroscopy is a test applied to identify different components in a given sample. Complex substances are separated, identified and quantified at the molecular level with the help of GCMS. The working principle of Gas chromatography is based on the boiling point of the compounds and the compounds will be separated at different temperature on heating. This is then transferred into the Mass spectroscopy, where the compounds are analyzed based on the mass to charge ratio and further compared with the data library of known spectra and the report is generated **[4]**.

OBSERVATIONS AND RESULTS

Table 1: Observations and results of Gas Chromatography

Peak number	RT	Compound Name	CAS#	Formula	Match Factor	Component Area	Area %
1	6.0898	Tricyclo[4.2.1.1(2,5)]dec-3-en-9-ol, acetate, stereoisomer	119405-11-7	$C_{12}H_{16}O_2$	56.6	18694794.30	2.732
2	6.3890	2-Buten-1-ol,, 2- ethyl-4-(2,2,3-trimethyl-3-cyclopenten-1-yl)-	28219-61-6	$C_{14}H_{24}O$	60.4	12855218.41	1.878
3	6.5131	2-Buten-1-ol,, 2- ethyl-4-(2,2,3-trimethyl-3-cyclopenten-1-yl)-	28219-61-6	$C_{14}H_{24}O$	69.9	52403423.24	7.657
4	7.2160	Phenol, 4-ethenyl-2,6- dimethoxy-	28343-22-8	$C_{10}H_{12}O_3$	68.7	32682568.00	4.776
5	7.5663	1,4- Mehano-1H-indene, octahydro-4-methyl-8-methylene-7-(1-methylethyl)-, [1S-(1.alpha.,3a.beta.,4.alpha.,7.alpha.,7a.beta.)]-	3650-28-0	$C_{15}H_{24}$	52.6	10319152.51	1.508
6	7.8022	E-11-Methyl-12-tetradecen-1-ol-acetate	1000130-80-7	$C_{17}H_{32}O_2$	62.7	14253412.10	2.083

7	**9.9838**	**1H-2,8a-Methanocyclopenta[a]cyclopropa[e]cyclodec 11-one, 1a,2,5,5a,6,9,10,10a-octahydro-5,5a,6-trihydroxy-1,4-bis(hydroxymethyl)-1,7,9-trimethyl-, [1S- (1.alpha., 1a.alpha.,2.alpha.,5.beta.,5a.beta.,6.beta.,8alpha.,9.alpha., 10a.alpha.)]-**	**52557-29-6**	**$C_{20}H_{28}O_6$**	**54.0**	**7870782.44**	**1.15**
8	**10.6696**	**Hexadecanoic acid, methyl ester**	**112-39-0**	**$C_{17}H_{34}O_2$**	**53.5**	**7864409.22**	**1.149**
9	**13.0966**	**9,12-Octadecadienoic acid (Z,Z)-, methyl ester**	**112-63-0**	**$C_{19}H_{34}O_2$**	**67.4**	**12725270.55**	**1.859**
10	**13.1866**	**9-Octadecenoic acid, methyl ester, (E)-**	**1937-62-8**	**$C_{19}H_{36}O_2$**	**70.9**	**28707101.57**	**4.195**
11	**16.7368**	**Oleyl oleate**	**3687-45-4**	**$C_{36}H_{68}O_2$**	**56.1**	**10434604.25**	**1.525**
12	**20.2066**	**2,4,6- Decatrienoic acid, 1a,2,5,5a,6,9,10,10a-octahydro-5,5a-dihydroxy-4-(hydroxymethyl)-1,1,7,9-tetramethyl-11-oxo-1H-2,8a-methanocyclopenta[a]cyclopropa[e]cyclodec en-6-ylester, [1aR-(1a.alpha.,2.alpha.,5.beta.,5a.beta.,6.beta.,8a.alpha.,9.alpha.,10a.al**	**52557-28-5**	**$C_{30}H_{40}O_6$**	**53.1**	**5917944.00**	**0.8648**
13	**20.7443**	**13-Docosenoic acid, methyl ester, (Z)-**	**1120-34-9**	**$C_{23}H_{44}O_2$**	**77.8**	**91457339.46**	**13.36**
14	**21.3357**	**Bis (2-ethylhexyl) phthalate**	**117-81-7**	**$C_{24}H_{38}O_4$**	**51.1**	**23567657.99**	**3.444**

13-Docosenoic acid, methyl ester, (Z)- is the highest peak observed

DISCUSSION

Gas chromatography is modified technique to analyze and separate the volatile compounds of an organic or inorganic substance, without decomposition of the compound. The report of GCMS conveyed that there are multiple volatile compounds in the powder out of which 13-Docosenoic acid, methyl ester, (Z)- is the highest peak is the compound which covered maximum area of the graph depicting the highest concentration in the sample.

Fourteen compounds were identified showing that the churna is rich in volatile matters in its essential oil. The report also shows the presence of active compound which are proven antimicrobials in the Sarshapa and chandana powder prepared for the study. 13-Docosenoic acid, methyl ester, (Z)- , 2-Buten-1-ol, 2- ethyl-4-(2, 2, 3-trimethyl-3-cyclopenten-1-yl) - and 9-Octadecenoic acid, methyl ester, (E)- are the compounds which are found in maximum quality. These compounds present in these drugs imparts flavor to the drugs.

CONCLUSION

The GCMS report shows that Sarshapa and Chandana powder sample consists of many active compounds among which 13-Docosenoic acid, methyl ester, (Z)- , 2-Buten-1-ol,, 2- ethyl-4-(2,2,3-trimethyl-3-cyclopenten-1-yl)- and 9-Octadecenoic acid, methyl ester, (E)- are the compounds which are found in highest concentration.

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