CHROMATOGRAPHICAL ANALYSIS OF PANCHATIKTA GHRITA PREPARED WITH AMURCHITA AND MURCHITA GHRITA

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ABSTRACT

There is a description of different dosage forms in Ayurveda 5000 years ago.
Swarasa, kalka, kwatha, hima and phanta are the five fundamental preparations mentioned in ayurvedic pharmaceutics. Taila paka, ghrita paka, kshira paka, avaleha and arishta are considered as the upakalpana. Sneha kalpana is one of most commonly used form of medicines in ayurveda. Among them ghrita kalpana is having major part which is used both internally and externally.Different types of fat or lipid media are used in ayurvedic treatment. *Ghrita* (ghee), *taila* (oil), *vasa* (fat) and *majja* (marrow) are mainly four *sneha dravya* (fat media) mentioned in ayurvedic classics.
Panchatiktha ghrita is used as shamana (alleviating treatment) aushadhi (medicine) and in purvakarma (preceding procedure) of virechana (purgation therapy) or vamana (emesis therapy). Murchana samskara (processing of ghee) is mentioned in bhaishajya ratnavali for both taila (oil) and ghrita kalpana (ghee formulations) to reduce amadosa, durgandhata (bad odour) etc. Dosha (impurities) and to enhance the viryata (potency) of sneha (lipid).To evaluate the changes after murchana with advanced method like gc-ms study. From GCMS analysis of ghrita samples it is revealed that increased in dodecanoic acid, heptadecanoic acid and decreased in palmitic acid. Increased unsaturated fatty acids in panchatikta ghrita after preparing with murchita ghrita proved that murchana samskara is beneficial to human health by increasing the HDL.

Key words- Ghrita (ghee), murchita ghrita (processed ghee), chromatographic analysis, panchatikta ghrita.

INTRODUCTION

In Ayurveda, there is a description of different dosage forms for the purpose of making it compatible without losing the potency or efficiency of the drugs.

Swarasa, kalka, kwatha, hima and phanta are the five fundamental preparations mentioned in ayurvedic pharmaceutics[1]. Taila paka, ghrita paka, kshira paka, avaleha and arishta are considered as the upakalpana.

Different types of fat or lipid media are used in ayurvedic treatment. *Ghrita* (ghee), *taila* (oil), *vasa* (fat) and *majja* (marrow) are mainly four *sneha dravya* (fat media) mentioned in ayurvedic classics. *Goghrita* (cow's ghee) and *tila taila* (oil) are said be best among all *jangama* (animal origin) and *sthavara* (plant origin) *sneha* (fat) *dravya* respectively[2].

Panchatikta ghrita is commonly used for treatment of drusta vruna (non-healing ulcer), kustha (diseases of skin), vata vyadhi (disease due to vata dosa), pitta vyadhi (disease of pitta dosa), kapha vikara (disorders due to vitiation of kapha dosa), krimi (helminthiasis/worm infestation), arsha (haemorrhoids),kasa (cough)[3].

Before the preparation of any *oushadhi siddha* (medicated) *taila* (oil) and *ghrita* (ghee), *murchana* (processing of ghee) a kind of *samskara* (procedure) has to be adopted as mentioned in classics. Previous research works carried out on physico chemical, chromatographical analysis and experimental studies done on *ghrita kalpana* (ghee preparations) using *murchita ghrita* (processed ghee) has also shown promising results.

So, an effort was made to know the changes in the components of panchatikta ghrita prepared with murchita ghrita (processed ghee) sample by advanced techniques like chromatography.

Gas chromatography (GC) is a widely applied technique in many branches of science and technology. For over half a century, GC has played a fundamental role in the determination of components (in number & proportion) exist in a mixture. However, the ability to establish the nature and chemical structure of these separated and quantified compounds is ambiguous and reduced, and requires a spectroscopic detection system. The most used, is the mass spectrometric detector (MSD), which allows obtaining the "fingerprint" of the molecule, i.e., its mass spectrum. Mass spectra provide information on the molecular weight, elemental composition. If a high-resolution mass spectrometer is used, functional groups present, in some cases, the geometry and spatial isomerism of the molecule.

Generally used for a) identification and quantitation of volatile and semi volatile organic compounds in complex mixtures. B) determination of molecular weights and elemental compositions of unknown organic compounds in complex mixtures. C) structural determination of unknown organic compounds in complex mixtures both by matching their spectra with reference spectra and by a prior spectral interpretation.

MATERIALS AND METHODS:

Raw drugs were collected from S.D.M Ayurveda Teaching Pharmacy, Hassan and preparation of panchatikta ghrita is carried out. Panchatikta ghrita was prepared as per the reference of Bhaishajya Ratnavali. Chromatographical study was conducted at Bureau Veritas, Chennai.

OBSERVATIONS AND RESULTS

Table 1. Details of compounds detected from Panchatiktha ghrita prepared with murchita ghrita

SN	RT (min)	Hit Name	Area %	Quality
1	8.169	Octanoic acid, methyl ester	0.15	90
2	11.349	Unidentified	0.05	--
3	11.465	Decanoic acid, methyl ester	0.92	98
4	14.312	Dodecanoic acid, methyl ester	1.91	98
5	15.227	Unidentified	0.06	--
6	15.604	Tridecanoic acid, methyl ester	0.07	97
7	16.389	Tridecanoic acid, 12-methyl-, methyl ester	0.27	98
8	16.679	Methyl myristoleate	0.94	99
9	16.839	Methyl tetradecanoate	10.98	99

10	17.565	Methyl 13-methyltetradecanoate	0.54	99
11	17.652	Methyl 13-methyltetradecanoate	1.02	91
12	17.797	Unidentified	0.05	--
13	17.986	Pentadecanoic acid, methyl ester	1.82	99
14	18.683	Hexadecanoic acid, methyl ester	0.49	95
15	18.872	Methyl hexadec-9-enoate	2.82	99
16	19.134	Hexadecanoic acid, methyl ester	28.72	99
17	19.758	Hexadecanoic acid, 15-methyl-, methyl ester	0.54	98
18	19.845	Hexadecanoic acid, 14-methyl-, methyl ester	0.72	96
19	19.903	cis-10-Heptadecenoic acid, methyl ester	0.53	99
20	20.136	Heptadecanoic acid, methyl ester	1.15	98
21	20.673	5,8,11,14-Eicosatetraenoic acid, methyl ester, (all-Z)-	0.04	--
22	20.833	9,12-Octadecadienoic acid (Z,Z)-, methyl ester	2.56	99
23	20.934	9-Octadecenoic acid, methyl ester, (E)-	21.44	99
24	21.007	9-Octadecenoic acid, methyl ester, (E)-	5.56	99
25	21.167	Methyl stearate	12.77	99
26	21.341	Methyl 9-cis,11-trans-octadecadienoate	1.30	99
27	21.457	Methyl 10-trans,12-cis-octadecadienoate	0.11	99
28	21.748	Methyl 9-cis,11-trans-octadecadienoate	0.15	93

29	21.849	cis-10-Nonadecenoic acid, methyl ester	0.26	99
30	22.096	Nonadecanoic acid, methyl ester	0.35	99
31	22.416	1,3-Cyclododecadiene, (E,Z)-	0.14	97
32	22.474	cis-5,8,11,14,17-Eicosapentaenoic acid	0.06	91
33	22.576	8,11,14-Eicosatrienoic acid, methyl ester	0.09	99
34	22.648	Cyclooctene, 3-ethenyl-	0.07	90
35	22.779	cis-11-Eicosenoic acid, methyl ester	0.38	99
36	23.011	Methyl 18-methylnonadecanoate	0.35	99
37	23.897	Methyl 18-methylicosanoate	0.05	99
38	24.246	Methyl 7,10,13,16,19-docosapentaenoate	0.12	93
39	24.754	Methyl 20-methyl-heneicosanoate	0.10	99
40	25.567	Tricosanoic acid, methyl ester	0.05	94
41	26.366	Tetracosanoic acid, methyl ester	0.29	91

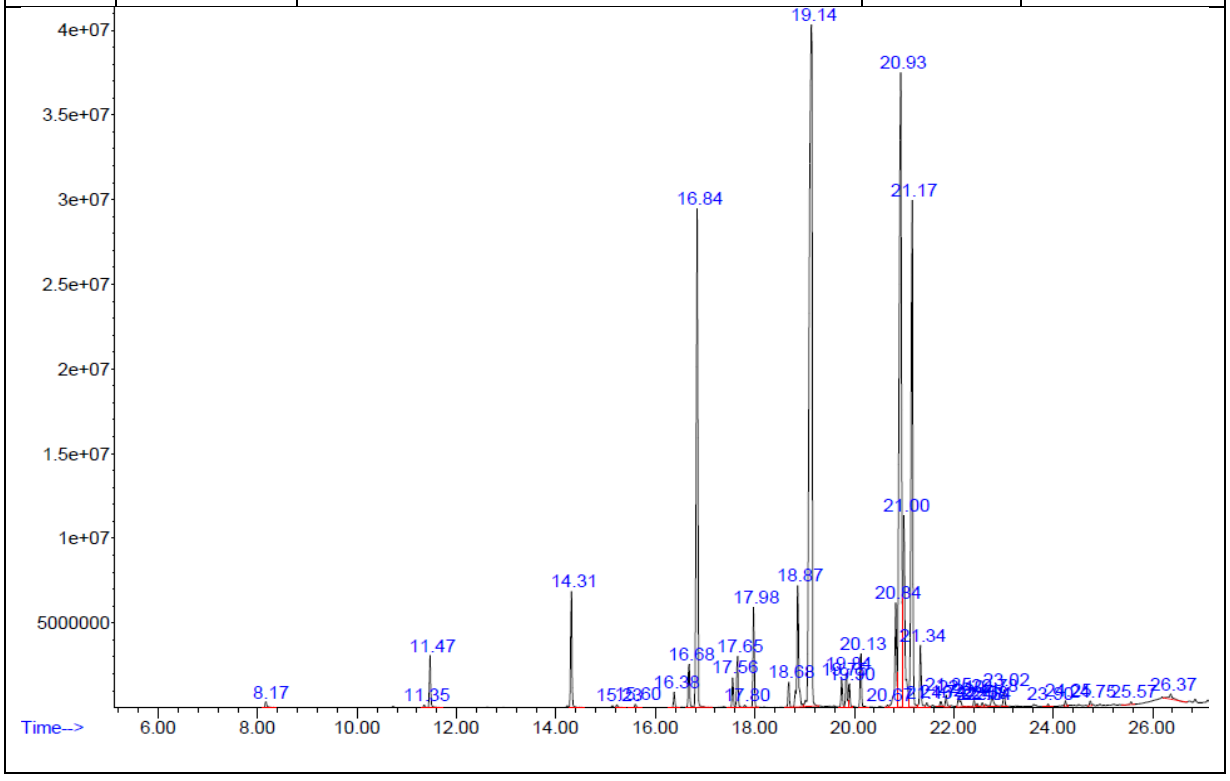

Table 2. Details of compounds detected from Panchatiktha ghrita prepared with Amurchita ghrita

SN	RT (min)	Hit Name	Area %	Quality
1	11.465	Decanoic acid, methyl ester	0.58	98
2	14.312	Dodecanoic acid, methyl ester	1.76	97
3	16.389	Tridecanoic acid, 12-methyl-, methyl ester	0.20	98
4	16.679	Methyl myristoleate	0.85	99
5	16.839	Methyl tetradecanoate	10.38	99
6	17.565	Methyl 13-methyltetradecanoate	0.45	99
7	17.652	Pentadecanoic acid, methyl ester	0.80	91
8	17.986	Pentadecanoic acid, methyl ester	1.63	99
9	18.683	Pentadecanoic acid, 14-methyl-, methyl ester	0.45	97
10	18.872	Methyl hexadec-9-enoate	2.59	99
11	19.119	Hexadecanoic acid, methyl ester	31.44	98
12	19.743	Hexadecanoic acid, 15-methyl-, methyl ester	0.48	99
13	19.845	Hexadecanoic acid, 14-methyl-, methyl ester	0.61	98
14	19.903	cis-10-Heptadecenoic acid, methyl ester	0.44	99
15	20.136	Heptadecanoic acid, methyl ester	0.99	99
16	20.833	9,12-Octadecadienoic acid (Z,Z)-, methyl ester	1.98	99

17	20.920	9-Octadecenoic acid, methyl ester, (E)-	22.10	99
18	20.992	9-Octadecenoic acid (Z)-, methyl ester	5.57	99
19	21.152	Methyl stearate	13.51	99
20	21.326	Methyl 9-cis,11-trans-octadecadienoate	1.36	99
21	21.849	cis-10-Nonadecenoic acid, methyl ester	0.23	99
22	22.096	Nonadecanoic acid, methyl ester	0.29	99
23	22.416	5,8,11,14-Eicosatetraenoic acid, methyl ester, (all-Z)-	0.11	93
24	22.575	Sulfuric acid, 5,8,11-heptadecatrienyl methyl ester	0.08	80
25	22.779	Methyl 13-eicosenoate	0.50	87
26	23.011	Methyl 18-methylnonadecanoate	0.42	99
27	24.246	i-Propyl 7,10,13,16,19-docosapentaenoate	0.08	76
28	24.754	Methyl 20-methyl-heneicosanoate	0.09	96

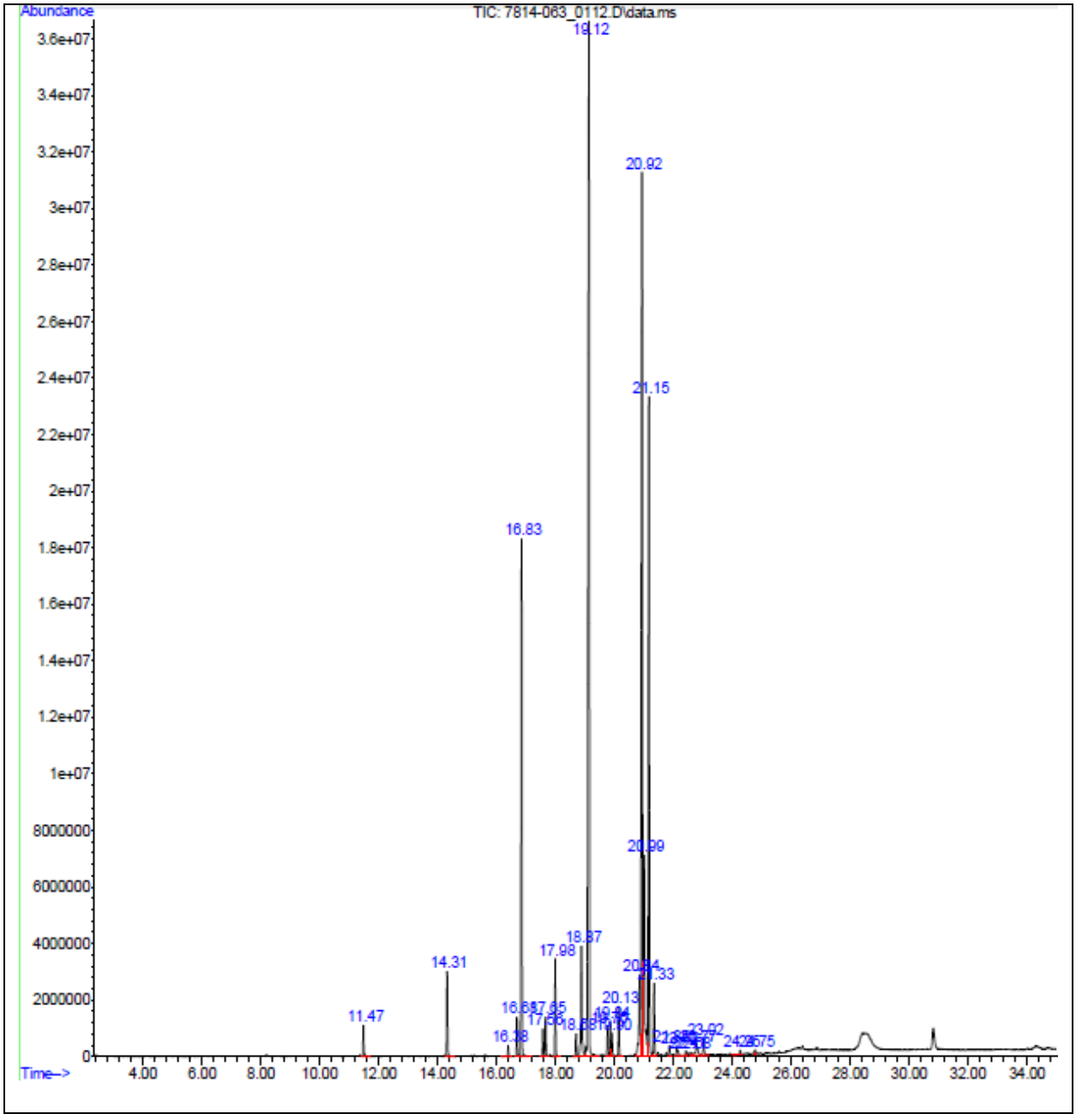
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Table-3 showing the components of GCMS report of Ghrita samples

Sl no	Components	Functional group	Sample 1	Sample 2
1.	Decanal dimethyl acetal	aldehyde	0	1
		Total aldehyde	**0**	**1**
2.	Methyl tetradecanoate	ester	4	3
3.	Methyl 9-tetradecenoate	ester	1	1
4.	Methyl Z-11-tetradecenoate	ester	0	1
5.	Methyl 13-methyltetradecanoate	ester	2	2
6.	Methyl 9-methyltetradecanoate	ester	1	0
7.	Methyl hexadec-9-enoate	ester	1	1
8.	Methyl 9-heptadecenoate or 9-17:1	ester	1	0
9.	Methyl 18-methylnonadecanoate	ester	1	1
10.	Methyl 6- methyloctanoate	ester	0	1
11.	Chloromethyl 10-chlorododecanoate	ester	0	1
12.	i-Propyl 7,10,13,16,19-docosapentaenoate	ester	1	2
13.	Methyl eicosa-5,8,11,14,17-pentaenoate	ester	0	1
14.	Methyl 18-methylicosanoate	ester	0	1
15.	Ethyl 6,9,12,15,18-heneicosapentaenoate	ester	0	1
16.	Methyl 20-methyl-heneicosanoate	ester	1	1
17.	Heneicosanoic acid, methyl ester	ester	0	2
18.	Sulfuric acid,5,8,11-heptadecatrienyl methyl ester	ester	1	0

19.	Methyl 8,11,14,17-eicosatetraenoat	ester	1	0
		Total ester	**15**	**19**
20.	Oxacyclohexadecan-2-one	ketone	1	0
		Total ketone	**1**	**0**
21.	Octanoic acid , methyl ester	saturated	0	2
22.	Decanoic acid, methyl ester	saturated	3	3
23.	Dodecanoic acid, methyl ester	saturated	2	3
24.	Undecanoic acid, 10-methyl –methyl ester	saturated	1	0
25.	Tridecanoic acid, 12 –methyl-methyl ester	saturated	2	3
26.	Pentadecanoic acid, methyl ester	saturated	5	6
27.	Pentadecanoic acid, 14-methyl-,methyl ester	saturated	2	2
28.	Hexadecanoic acid, methyl ester	saturated	4	4
29.	13-Tetradecynoic acid, methyl ester	saturated	0	1
30.	Hexadecanoic acid, 15-methyl-, methyl ester	saturated	2	2
31.	Hexadecanoic acid, 14-methyl-, methyl ester	saturated	4	2
32.	Heptadecanoic acid, methyl ester	saturated	3	7
33.	Cyclopropaneoctanoic acid, 2-octyl-, methyl ester	saturated	1	1
34.	Eicosanoic acid, methyl ester	saturated	2	2
35.	Cyclopropaneoctanoic acid, 2-hexyl-, methyl ester	saturated	0	1
36.	Nonadecanoic acid,methyl ester	saturated	3	3
37.	Dodecane, 1,1-dimethoxy-	saturated	0	2
38.	Tridecanoic acid, methyl ester	saturated	0	3
39.	Tetradecanoic acid, 12-methyl-,methyl ester	saturated	1	1
40.	Docosanoic acid, methyl ester	saturated	2	2

41.	Tricosanoic acid , methyl ester	saturated	0	2
42.	Methyl 20-methyl-docosanoate	saturated	0	1
43.	Tetracosanoic acid, methyl ester	saturated	0	1
44.	Methyl 13-methyl-eicosanoate	saturated	1	1
45.	Methyl 14-methyl-eicosanoate	saturated	0	1
46.	Methyl myristoleate	saturated	1	1
47.	11-Hexadecenoic acid, 15-methyl-,methyl ester	saturated	0	1
48.	Methyl stearate	saturated	3	3
49.	10-Nonadecenoic acid, methyl ester	saturated	1	1
		Total saturated	**43**	**62**
50.	Methyl 9-cis, 11-trans- octadecadienoate	unsaturated	1	2
51.	Methyl 10-trans, 12-cis - octadecadienoate	unsaturated	1	3
52.	Cis-10-Nonadecenoic acid,methyl ester	unsaturated	1	1
53.	(7R,8S)-cis-anti-cis-7,8-Epoxytricycio{7,3,0,0(2,6)}dodecane	unsaturated	0	1
54.	9-Hexadecenoic acid, methyl ester	unsaturated	2	2
55.	9,12-Octadecadienoic acid (Z,Z) methyl ester	unsaturated	1	3
56.	9,12-Octadecadienoic acid ,methyl ester, (E,E)	unsaturated	0	2
57.	10,13-Octadecadienoic acid ,methyl ester	unsaturated	1	0
58.	9-Octadecenoic acid, methyl ester, (E)-	unsaturated	3	3
59.	9-Octadecenoic acid (Z)-, methyl ester	unsaturated	3	1
60.	cis-13-Octadecenoic acid, methyl ester	unsaturated	1	0
61.	11- Octadecenoic acid , methyl ester, (Z)-	unsaturated	0	1

62.	Cis-11-Eicosenoic acid, methyl ester	unsaturated	0	2
63.	11-Eicosenoic acid, methyl ester	unsaturated	0	1
64.	9-Dodecenoic acid, methyl ester, E)-	unsaturated	0	1
65.	11,14-Octadecadienoic acid, methyl ester	unsaturated	1	0
66.	8-Octadecenoic acid, methyl ester	unsaturated	0	1
67.	5,8,11,14-Eicosatetraenoic acid, methyl ester, (all-Z)-	unsaturated	1	2
68.	5,8,11,14-Eicosatetraenoic acid, ethyl ester, (all-Z)-	unsaturated	1	1
69.	Cis-5-Dodecenoic acid, methyl ester	unsaturated	0	1
70.	9,12-Tetradecadien-1-ol, acetate, (Z,E)-	unsaturated	0	1
71.	9,11-Octadecadienoic acid, methyl ester, (E,E)-	unsaturated	0	1
72.	cis-5,8,11,14,17-Eicosapentaenoic acid	unsaturated	0	1
73.	8,11,14-Eicosatrienoic acid, methyl ester	unsaturated	0	1
74.	7,10,13-Eicosatrienoic acid, methyl ester	unsaturated	0	1
75.	8,11,14-Eicosatrienoic acid, (Z,Z,Z)-	unsaturated	0	1
76.	Cyclooctene, 3-ethenyl-	unsaturated	0	1
77.	Ethyl 6,9,12-hexadecatrienoate	unsaturated	0	1
78.	Methyl 7,10,13,16,19-docosapentaenoate	unsaturated	0	1
79.	Ethyl 9-hexadecenoate	unsaturated	1	0
80.	7,10-Octadecadienoic acid, methyl ester	unsaturated	1	0
81.	cis-Bicyclo{4,3,0}-3-nonene	unsaturated	1	0
82.	Cis-5,8,11-Eicosatrienoic acid, methyl ester	unsaturated	1	0
83.	Methyl 7,10,13,16,19-docosapentaenoate	unsaturated	1	0

84.	Cis-10-Heptadecenoic acid, methyl ester	unsaturated	2	1
85.	Cis,cis,cis-7,10,13-Hexadecatriena	unsaturated	0	1
86.	1,3-Cyclododecadiene,(E,Z)-	unsaturated	1	1
		Total unsaturated	**25**	**40**

Table 4. : Summary of components in ghrita samples

Components	**Sample 1**	**Sample 2**
Aldehyde	**0**	**1**
Ester	**15**	**19**
Ketone	**1**	**0**
Saturated fatty acids	**43**	**62**
Unsaturated fatty acids	**25**	**40**
Total	**84**	**122**

Table. 5- Area % of major components of ghrita samples detected in GCMS report

Sl no	COMPONENTS		Type of fatty acid	Sample 1	Sample 2
	Systematic name	**Common name**		**Area%**	**Area%**
1.	**Decanoic acid, methyl ester**	Capric	saturated	0.58	0.92
2.	**Dodecanoic acid, methyl ester**	Lauric	saturated	1.76	1.91
3.	**Hexadecanoic acid, methyl ester**	Palmitic	saturated	31.44	28.72
4.	**Heptadecanoic acid, methyl ester**	margaric	saturated	0.99	---
5.	**Methyl stearate**		saturated	13.51	12.77
6.	**Cis-11-Eicosenoic acid, methyl ester**	gondoic	unsaturated	---	0.38
7.	**9,12-Octadecadienoic acid (Z,Z) methyl ester**	linoleic	unsaturated	1.98	2.56
8.	**9-Octadecenoic acid, methyl ester, (E)-**	oleic	unsaturated	22.1	21.44
9.	**9-Octadecenoic acid (Z)-, methyl ester**	oleic	unsaturated	5.57	---

Table 6. Numbers of major components detected in Ghrita samples by GCMS report

Sl no	systematic name of components	Common name	Type of fatty acid	Sample 1	Sample 2
1.	**Decanoic acid, methyl ester**	Capric	saturated	3	3
2.	**Dodecanoic acid, methyl ester**	Lauric	saturated	2	3
3.	**Hexadecanoic acid, methyl ester**	Palmitic	saturated	4	4
4.	**Heptadecanoic acid, methyl ester**	margaric	saturated	3	7
5.	**Eicosanoic acid, methyl ester**	arachidic	saturated	2	2
6.	**Cis-11-Eicosenoic acid, methyl ester**	gondoic	unsaturated	0	2
7.	**9,12-Octadecadienoic acid (Z,Z) methyl ester**	linoleic	unsaturated	1	3
8.	**9-Octadecenoic acid, methyl ester, (E)-**	oleic	unsaturated	3	3
9.	**9-Octadecenoic acid (Z)-, methyl ester**	oleic	unsaturated	3	1
10.	**8-Octadecenoic acid, methyl ester**		unsaturated	0	1

Sample 1= Panchatikta ghrita prepared with amurchita ghrita

Sample 2= Panchatikta ghrita prepared with murchita ghrita

On GCMS analysis of both samples it was observed that

Components of aldehyde increases when prepared with murchita ghrita in case of panchatikta ghrita. Aldehydes are wide spread in animal and plants kingdom. They play an important role in biochemical

processes of life like fat metabolism. So fat metabolism increases after murchana samskara. There is increase of ester components in panchatikta ghrita when prepared with murchita ghrita. There is absence of ketone group in case of panchatikta ghrita when prepared with murchita ghrita. Saturated fatty acids are increased in case of panchatikta ghrita when prepared with murchita ghrita.

Saturated fats increase low density lipoproteins (LDL or bad cholesterol) & very low density lipoproteins (VLDL's). So murchana samskara is proved therapeutically beneficial.

•Decanoic acid remains same in number in panchatikta ghrita prepared with amurchita and murchita ghrita and increased in area% in panchatikta ghrita prepared with Murchita ghrita.

Decanoic acid, also known as “capric acid,” occurs naturally in coconut oil and palm kernel oil, as well as in the milk and animal fats of some mammals[4]. According to study results published in 1998 in the "american journal of clinical nutrition." capric acid — together with lauric acid and caprylic acid, other medium-chain fatty acids — helps to increase levels of high-density lipoproteins — HDL, the "good" cholesterol — relative to low-density lipoproteins — LDL, the "bad" cholesterol.

•Dodecanoic acid, methyl ester which is known as lauric acid[5] is increased in area% in panchatikta ghrita prepared with murchita ghrita. Its number increased in panchatikta when prepared with murchita ghrita.

•Lauric acid, as a component of triglycerides, comprises about half of the fatty acid content in coconut oil, human breast milk (6.2% of total fat), cow's milk (2.9%) and goat's milk (3.1%).

•Lauric acid increases total serum cholesterol more than many other fatty acids. But most of the increase is attributable to an increase in high-density lipoprotein (HDL). As a result, lauric acid has been characterized as having "a more favorable effect on total HDL cholesterol than any other fatty acid.

•Study has shown that palmitic acid i.e., hexadecanoic acid, methyl ester is decreased area% wise in the panchatikta ghrita when prepared with murchita ghrita and remain same in number in both the ghrita samples. According to the World Health Organization, evidence is "convincing" that consumption of palmitic acid increases risk of developing cardiovascular diseases[6].

•Heptadecanoic acid was increased in number in panchatikta ghrita when prepared with murchita ghrita. In area% it is not detected in panchatikta ghrita when prepared with murchita ghrita.

•Heptadecanoic acid, also called margaric acid is found in dairy fat and some fish and could help reverse the early stages of diabetes in humans.

Researchers studied the fatty acid blood levels in 49 dolphins as well as their dietary fish shows that, of the 55 fatty acids studied, the saturated fat heptadecanoic acid appeared to have had the most beneficial impact on metabolism[7].

•Cis-11-Eicose noic acid, methyl ester which known as gondoic acid was detected in panchatikta ghrita prepared with murchita ghrita which is absent in panchatikta ghrita prepared with amurchita ghrita.

•Gondoic acid is a monounsaturated omega-9 fatty acid found in a variety of plant oils and nuts. Omega 9 fatty acids are included in animal fat and vegetable oil and they are one of the most important sources of omega 9. Lack of these leads to irregular heartbeat, male infertility, growth retardation, etc.

•9-octadecenoic acid, methyl esters are also called as oleic acid are increased in number in panchatikta ghrita.

Oleic acid is a fatty acid that occurs naturally in various animal and vegetable fats. In chemical terms it is classified as a monounsaturated omega-9 fatty-acid[8].

Monounsaturated fat consumption has been associated with decreased low-density lipoprotein (LDL) cholesterol and possibly increased high-density lipoprotein (HDL) cholesterol[9].

Unsaturated fatty acids are increased in panchatikta ghrita when prepared murchita ghrita. Unsaturated fats increase high-density lipoprotein (HDL) and decrease low density lipoproteins (LDL)[10].

It shows that murchana samskara proved beneficial in panchatikta ghrita when prepared with murchita ghrita.

Total 84 components in panchatikta ghrita prepared with amurchita ghrita, 122 components in panchatikta ghrita prepared with murchita ghrita. Numbers of components were increased in case of panchatikta ghrita prepared with murchita ghrita.

CONCLUSION

From GCMS analysis of ghrita samples it is observed that, increased Dodecanoic acid, methyl ester which is known as Lauric acid by area% in ghrita and panchatikta ghrita when prepared with murchita ghrita proved beneficial in increasing HDL cholesterol.

Decreased Palmitic acid which is known as Hexadecanoic acid, methyl ester in panchatikta ghrita when prepared with murchita ghrita proved beneficial in decreasing risk of developing cardiovascular diseases.

Increased Heptadecanoic acid, also called as margaric acid in case of Panchatikta when prepared with murchita ghrita proved that murchana samskara is advantageous in beneficial impact on metabolism.

Increased unsaturated fatty acids in panchatikta ghrita after preparing with murchita ghrita proved that murchana samskara is beneficial to human health by increasing the HDL.

Increased number of fatty acids in panchatikta ghrita after preparing with murchita ghrita indicates the addition of new components.

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