A Comparative Pharmaceutico-Analytical study of Durvadi taila and Durvadi ghrita

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Abstract*—Sneha Kalpana is an important Ayurvedic pharmaceutical process in which the choice of lipid vehicle may influence the extraction, incorporation, stability, and physicochemical characteristics of herbal constituents. Durvadi Taila and Durvadi Ghrita contain the same herbal ingredients Durva, Daruharidra, and Kampillaka but are prepared using different lipid bases, Tila Taila and Go-Ghrita, respectively. Despite their similar herbal composition and therapeutic application in wound management, comparative pharmaceutico-analytical data on these formulations are limited. Therefore, the present study was undertaken to develop a standardized method of preparation and to comparatively evaluate the physicochemical of Durvadi Taila and Durvadi Ghrita, thereby assessing the influence of the lipid vehicle on the final formulation. Three batches each of Durvadi Taila and Durvadi Ghrita were prepared as per classical method until Sneha Siddhi Lakshanas were achieved. The formulations were evaluated for organoleptic and physicochemical parameters, including loss on drying, specific gravity, viscosity, refractive index, acid value, peroxide value, iodine value, and saponification value. HPTLC and GC-MS were performed for phytochemical profiling. Durvadi Taila was a deep green liquid, whereas Durvadi Ghrita was green and semi-solid. Both showed low moisture content (LOD <1%). Ghrita demonstrated higher viscosity (34.02 cP) and boiling point (230–232°C) than Taila (24.7 cP and 180–181°C, respectively). HPTLC showed consistent phytochemical profiles, while GC-MS identified oleic acid (95.04%) as predominant in Taila and squalene (5.01%) and ascorbyl palmitate (1.61%) among notable constituents in GhritaThe findings demonstrate that the lipid vehicle contributes to distinct pharmaceutico-analytical characteristics despite identical herbal ingredients, supporting the need to consider the vehicle when standardizing and selecting Sneha formulations.

***Index Terms*—Durvadi Ghrita, Durvadi Taila, Pharmaceutico-analytical study, Sneha Kalpana.**

I. INTRODUCTION

Sneha Kalpana refers to the pharmaceutical process of preparing therapeutic formulations using lipid media such as Ghrita, Taila, Vasa, and Majja, collectively known as Chatuh-Sneha.[1] Among these, Ghrita is considered superior due to its ability to assimilate and facilitate the delivery of the properties of drugs processed with it. Ghrita is primarily indicated for alleviating Vata and Pitta and promoting Rasa, Shukra, and Ojas[2], while Taila is regarded as an excellent Sneha owing to its capacity to incorporate the properties of added drugs. Go-Ghrita is considered superior among Ghrita[3], while Tila Taila is regarded as the best among Taila.[4]

Durva (Cynodon dactylon) is a widely used medicinal drug possessing properties such as Varnya, Pragnyasthapana, Vranaropaka, Mutrala, and Dahashamaka.[5] Durvadi Taila and Durvadi Ghrita are classical formulations mentioned under Chakradatta's Vranashotha Adhyaya,[6] containing the same ingredients and prepared by a similar method, but differ in their sneha media and therapeutic indications.

Despite the availability of classical references for both formulations, comparative pharmaceutico-analytical studies evaluating the influence of different sneha media on the final formulation are limited.

Therefore, the present study was undertaken to comparatively evaluate Durvadi Taila and Durvadi Ghrita with particular emphasis on their physicochemical characteristics. The study aims to understand how the choice of sneha media influences the properties of the formulation and thereby provides further insight into the principles of Sneha Kalpana, particularly the differences between Ghrita Paka and Taila Paka.

Objective

- Preparation of Durvadi Taila and Durvadi Ghrita as per classics and standardization of the same was carried out.
- To compare and analyse the change in physico-chemical parameters of durva in different sneha media.

II. MATERIALS AND METHODS

Ingredients and Proportions:

Table no. 01- Ingredients and proportions for preparation of Durvadi Taila.

	Durvadi Taila	Proportion	Total quantity
Drava Dravya	Durva swarasa	4	1200 ml
	Jala	4	1200 ml
Sneha Dravya	Taila	1	300 ml
Kalka dravya	Daruharidra	1\8th	18.75 gm
	Kampillaka		18.75 gm

Table no. 02- Ingredients and proportions for preparation of Durvadi Ghrita.

	Durvadi Ghrita	Proportion	Total quantity
Drava Dravya	Durva swarasa	4	1200 ml
	Jala	4	1200 ml
Sneha Dravya	Ghrita	1	300 ml
Kalka dravya	Daruharidra	1\8th	18.75 gm
	Kampillaka		18.75 gm

Procurement and Quality Evaluation of Ingredients

All raw materials Go ghrita, Tila taila, Daruharidra, Kampillaka, and Durva were procured, authenticated, and confirmed to comply with classical standards and pharmacopoeial specifications through prescribed purity testing.

Shodhana of Kampillaka[7]

A representative sample of commercial Kampillaka was subjected to purification (shodhana) by adding it to water in a beaker and allowing it to rest undisturbed. The genuine shuddha kampillaka floated on the surface and was separated from settling impurities.

Preparation of Durvadi Taila

Durvadi Taila was prepared in 3 batches yielding three distinct samples utilizing tila taila as lipid base DT 1, DT 2, and DT 3

Step 1: Preparation of Durva Swarasa:[8]

Fresh, cleaned, and chopped Durva grass was ground with a minimal volume of water using a mechanical grinder and expressed through a clean muslin cloth to yield dark green, herb-scented fresh juice.

Step 2: Preparation of Kalka: [9]

Equal proportions of finely pounded Daruharidra and Kampillaka powder were triturated with water to form kalka.

Step 3: Sneha Paka:

Tila taila was taken in a wide-mouthed, heavy-bottomed vessel and heated gently over mandagni. Durva swarasa along with required quantity of water was slowly added to the heated oil with continuous stirring. As the liquid mixture thickened, the prepared kalka paste was added. The boiling process was conducted in divided stages across three days until classical siddhi lakshanas were attained, marked by the rolling of kalka into a non-crackling varti on flame and the characteristic appearance of froth (phenodgama). The oil was filtered while warm through clean cloth and stored. This procedure was carried out to obtain samples DT 1, DT 2, and DT 3.

Preparation of Durvadi Ghrita

Durvadi Ghrita was prepared in 3 batches yielding three distinct samples DG 1, DG 2, and DG 3 utilizing Go ghrita as the lipid base.

Step 1: Preparation of Durva Swarasa:[8]
Clean Durva was ground into a fine paste with water added strictly to facilitate grinding, then squeezed through muslin cloth to obtain fresh swarasa.

Step 2: Preparation of Kalka:[9]
Fine powders of Daruharidra and purified Kampillaka were mixed together with an adequate quantity of water to form a smooth paste.

Step 3: Sneha Paka:
Go ghrita was melted and gently heated in a heavy-bottomed vessel. Durva swarasa and water were added with continuous agitation. Once heated, the kalka was incorporated, and the formulation was processed over mandagni across three days. Paka was concluded upon meeting the classical confirmatory signs, including positive varti formation, absence of crackling on exposure to fire, and complete subsidence of froth (phenashanti). The medicated ghrita was filtered warm through clean cloth to yield samples DG 1, DG 2, and DG 3.

Figure:01- List of raw drugs.

Figure:02- Samples of Durvadi Ghrita.

Figure:03- Samples of Durvadi Taila.

Table No. 03: Abbreviation of batches of Durvadi taila and Durvadi ghrita

Batches	Samples
1.Batch 1 (Durvadi taila)	DT 1
	DT 2
	DT 3
2.Batch 2 (Durvadi ghrita)	DG 1
	DG 2
	DG 3

III. ANALYTICAL STUDY OF DURVADI TAILA AND DURVADI GHRITA

Both durvadi taila and durvadi ghrita samples was comparatively analysed with suitable physicochemical parameters and advanced instrumental methods of analysis. During analytical study following parameters was considered:

- Moisture content
- Boiling point
- Specific gravity
- Viscosity
- Refractive index
- Acid value
- Tests for free fatty acids
- Iodine value
- Saponification value
- Unsaponifiable matter
- Peroxide value

- Tests for rancidity
- GC-MS
- HPTLC

Organoleptic characters:

Table no. 04- Organoleptic characters of Durvadi taila

Organoleptic characters	DT 1	DT 2	DT 3
Colour	Dark green	Dark green	Dark green
Odour	Distinct smell of tila taila and herby smell of grass	Distinct smell of tila taila and herby smell of grass	Distinct smell of tila taila and herby smell of grass
Taste	Katu	Katu	Katu
Consistency	oily	oily	oily

Table no. 05- Organoleptic characters of Durvadi Ghrita

Organoleptic characters	DG 1	DG 2	DG 3
Colour	Dark green	Dark green	Dark green
Odour	Aromatic odour of ghrita	Aromatic odour of ghrita	Aromatic odour of ghrita
Taste	Madhura	Madhura	Madhura
Consistency	Semisolid oily	Semisolid oily	Semisolid oily

Loss on drying/ moisture content:

Table no. 06- Loss on drying of the samples

Sample Name	1st Month
DT 1	0.14
DT 2	0.58
DT 3	0.62
DG 1	0.34
DG 2	0.33
DG 3	0.29

Viscosity:

Table no. 07 - Viscosity of all the samp

Sample No.	Viscosity (CP)	Temperature °C
DT 1	24.15	40
DT 2	25.01	40
DT 3	24.89	40
DG 1	34.15	40
DG 2	28.25	40
DG 3	39.66	40

Boiling point:

Table no. 08- Boiling point of all the sample

Sample	Boiling point
DT 1	180°C
DT 2	181°C
DT 3	180°C
DG 1	230°C
DG 2	230°C
DG 3	232°C

Specific Gravity:

Table no. 09- Specific gravity of the samples

Sample Name	Specific gravity
DT 1	0.92
DT 2	0.92
DT 3	0.92
DG 1	0.91
DG 2	0.91
DG 3	0.90

Rancidity:

Table no. 10 - Rancidity of the samples

Sample	rancidity
DT 1	Negative
DT 2	Negative
DT 3	Negative
DG 1	Negative
DG 2	Negative
DG 3	Negative

Refractive index:

Table no. 11 - Refractive index of the samples

Sample Name	Refractive index
DT 1	1.45
DT 2	1.475
DT 3	1.475
DG 1	1.46
DG 2	1.46
DG 3	1.46

Acid Value:

Table no. 12 - Acid value of the samples

Sample Name	Acid value	Average
DT 1	0.56	1.41
DT 2	0.56	
DT 3	1.24	
DG 1	0.94	1.21
DG 2	1.48	
DG 3	1.23	

Free fatty acid:

Table no. 13 - Free fatty acid of the samples

Sample Name	Free fatty acid	Average
DT 1	0.28	0.4
DT 2	0.28	
DT 3	0.64	
DG 1	0.472	0.60
DG 2	0.744	
DG 3	0.618	

Peroxide Value:

Table no. 14 - Peroxide value of the samples

Sample Name	Peroxide value	Average
DT 1	4.22	6.10
DT 2	4.24	
DT 3	7.2	
DG 1	7	7.23
DG 2	7.7	
DG 3	7	

Iodine value:

Table no. 15 - Iodine value of the samples

Sample Name	Iodine value	Average
DT 1	85.92	86.28
DT 2	84.67	
DT 3	88.25	
DG1	46.283	48.537
DG 2	50.683	
DG 3	48.647	

Saponification Value:

Table no. 16: Saponification value of the samples

Sample Name	Saponification value	Average
DT 1	175.29	176.09
DT 2	173.48	
DT 3	179.51	
DG 1	284.3	293.02
DG 2	304.8	
DG 3	289.98	

Unsaponification value:

Table no. 17 - Unsaponification value of the samples

Sample Name	Unsaponification value	Average
DT 1	0.99	1.06
DT 2	1	
DT 3	1.2	
DG 1	1.2	1.06
DG 2	0.99	
DG 3	0.99	

GCMS Durvadi Ghrita

Table no. 18 - Showing compounds of durvadi ghrita

Sl No	Rt	Molecules	Area %
1	22.18	2-Tridecanone	0.22%
2	22.63	Lauric acid, methyl ester	1.31%
3	25.59	2-Pentadecanone	1.09%
4	25.96	Myristic acid, methyl ester	1.94%
5	27.73	3,7,11,15-Tetramethyl-2-hexadecene	0.53%
6	29.15	Palmitic acid, methyl ester	6.45%
7	32.96	Linoleic acid, methyl ester	0.75%
8	33.17	Oleic acid, methyl ester	6.87%
9	33.72	Stearic acid, methyl ester	2.08%
10	37.75	2-Hydroxy-3-(tetradecanoyloxy)propyl myristate	4.01%
11	38.55	Terephthalic acid, di(2-ethylhexyl) ester	1.68%
12	38.79	Hexadecanoic acid, 1-(hydroxymethyl)-1,2-ethanediyl ester	4.05%
13	38.87	Squalene	5.01%
14	39.59	2,6,10,15,19,23-Hexamethyl-1,6,10,14,18,22-tetracosahexaen-3-ol	0.60%
15	39.7	Glycerol tricaprylate	1.79%
16	39.79	Fumaric acid, nonyl octyl ester	1.32%
17	39.96	Ascorbyl Palmitate	1.61%
18	41.14	Glycerol trilaurate	2.42%
19	41.2	Tetradecanoic acid, 2-hydroxy-1,3-propanediyl ester	3.27%
20	41.35	Eicosanoic acid, 2-[(1-oxohexadecyl) oxy]-1-[[(1-oxohexadecyl) oxy] methyl] ethyl ester	3.02%

21	43.21	Sec-butyl 6-methyl-2-oxo-4-[4-(trifluoromethyl) phenyl]-1,2,3,4-tetrahydro-5-pyrimidinecarboxylate	10.01%
22	43.32	Capric acid triglyceride	8.08%
23	46.28	Glycerol tricaprate	31.91%

GCMS- Durvadi Taila

Table no. 19 - Showing compounds of durvadi taila

SL NO	RT	MOLECULES	AREA %
1	19.16	2,4-Decadienal	0.06%
2	20.36	Tetradecane	0.01%
3	21.94	2,6,10,15-Tetramethylheptadecane	0.02%
4	22.7	2,4-Di-tert-butylphenol	0.07%
5	23.95	Hexadecane	0.01%
6	26.02	Myristic acid, methyl ester	0.03%
7	27.16	Octadecane	0.01%
8	29.2	Palmitic acid, methyl ester	0.04%
9	36.62	Oleic Acid	95.04%
10	38.94	trans-Squalene	0.51%
11	39.69	2-(Palmitoyloxy)-1-[(palmitoyloxy)methyl] ethyl icosanoate	1.29%
12	42.38	2,6-Bis(3,4-methylenedioxyphenyl)-3,7-dioxabicyclo (3.3.0) octane	2.91%

HPTLC Durvadi Ghrita

Table no. 20 - Showing Rf value of DG- track 1 in short wavelength (254nm)

Peak	Start Rf	Start Height	Max Rf	Max Height	Max%	End Rf	End Height	Area	Area %
1	-0.06	8.4	-0.02	283.8	24.65	0.03	67.0	6924.6	20.58
2	0.23	63.5	0.28	161.5	14.03	0.30	108.2	4640.8	13.79
3	0.30	108.3	0.31	112.8	9.79	0.38	51.3	3830.3	11.38
4	0.38	51.5	0.42	91.0	7.90	0.46	24.8	3094.4	9.19
5	0.52	23.5	0.61	196.7	17.09	0.65	43.5	7327.2	21.77
6	0.66	46.0	0.69	56.1	4.87	0.70	54.7	1160.5	3.45
7	0.70	55.4	0.73	140.5	12.21	0.78	10.7	3583.7	10.65
8	0.78	11.1	0.85	70.0	6.08	0.89	3.0	2370.1	7.04
9	0.96	1.6	1.00	38.9	3.38	1.03	0.7	721.8	2.14

Table no. 21 - Showing Rf value of DG- track 2 in short wavelength (254nm)

Peak	Start Rf	Start Height	Max Rf	Max Height	Max %	End Rf	End Height	Area	Area %
1	-0.07	0.5	-0.02	298.3	27.50	0.02	61.3	5360.5	16.90
2	0.21	52.6	0.27	155.1	14.30	0.29	103.5	5060.1	15.95
3	0.30	103.6	0.31	105.5	9.72	0.37	46.9	3455.8	10.89
4	0.38	45.8	0.41	90.8	8.37	0.46	22.5	2799.4	8.82
5	0.50	18.6	0.60	196.2	18.09	0.64	42.5	7198.5	22.69
6	0.65	42.6	0.73	137.8	12.71	0.77	11.0	4910.4	15.48
7	0.78	13.2	0.85	68.6	6.32	0.90	0.4	2247.0	7.08
8	0.95	0.5	1.00	32.4	2.99	1.03	0.3	692.2	2.18

Table no. 22 - Showing Rf value of DG- track 3 in short wavelength (254nm)

Peak	Stargt Rf	Start Height	Max Rf	Max Height	Max%	End Rf	End Height	Area	Area %
1	-0.06	2.6	-0.03	288.2	24.77	0.01	62.9	4350.9	13.52
2	0.21	59.2	0.26	158.4	13.62	0.29	104.4	4832.4	15.01
3	0.29	104.5	0.30	107.7	9.26	0.37	52.9	3663.8	11.38
4	0.38	52.7	0.41	97.8	8.41	0.47	27.6	3223.3	10.01

5	0.50	23.3	0.60	203.2	17.46	0.64	46.4	7720.5	23.98
6	0.65	46.7	0.68	58.8	5.05	0.69	58.2	1374.1	4.27
7	0.69	58.2	0.72	145.0	12.46	0.77	13.1	3799.3	11.80
8	0.77	13.2	0.84	71.0	6.10	0.90	2.3	2521.4	7.83
9	0.96	2.2	1.00	33.3	2.86	1.02	0.5	705.3	2.19

Table no. 23 - Showing Rf value of DG- track 1 in long wavelength (366nm)

Peak	Stargt Rf	Start Height	Max Rf	Max Height	Max%	End Rf	End Height	Area	Area %
1	-0.07	3.4	-0.03	531.5	27.58	-0.01	12.4	5324.2	11.63
2	0.06	20.5	0.13	51.4	2.67	0.14	47.7	1801.4	3.93
3	0.14	47.8	0.16	54.0	2.80	0.18	39.0	1234.8	2.70
4	0.21	41.9	0.25	84.9	4.41	0.28	29.7	2318.5	5.06
5	0.28	30.8	0.30	43.9	2.28	0.31	43.3	735.8	1.61
6	0.31	43.4	0.37	77.1	4.00	0.42	31.4	3864.3	8.44
7	0.42	32.0	0.48	108.7	5.64	0.50	108.5	4224.6	9.23
8	0.51	108.6	0.53	109.5	5.68	0.60	0.4	4286.2	9.36
9	0.61	0.9	0.65	123.9	6.43	0.73	81.4	6772.8	14.79
10	0.73	81.5	0.75	99.9	5.18	0.81	60.3	4494.6	9.82
11	0.82	60.5	0.86	84.5	4.39	0.90	70.0	3332.7	7.28
12	0.90	70.6	0.94	102.2	5.31	0.99	36.3	4196.8	9.17
13	0.99	31.9	1.00	414.9	21.53	1.01	33.9	2180.9	4.76
14	1.02	34.3	1.03	40.2	2.08	1.07	5.5	1022.7	2.23

Table no. 24 - Showing Rf value of DG- track 2 in long wavelength (366nm)

Peak	Stargt Rf	Start Height	Max Rf	Max Height	Max%	End Rf	End Height	Area	Area %
1	-0.05	6.8	-0.03	536.6	33.23	-0.01	17.4	4644.4	10.82
2	0.04	20.1	0.12	54.0	3.35	0.14	47.2	1956.6	4.56
3	0.14	47.8	0.15	55.0	3.41	0.18	38.5	1330.5	3.10
4	0.21	42.5	0.25	87.4	5.41	0.27	32.0	2286.7	5.33
5	0.28	32.3	0.29	46.5	2.88	0.30	44.8	711.9	1.66
6	0.31	46.2	0.34	84.2	5.21	0.35	67.3	1580.7	3.68
7	0.35	70.9	0.37	78.8	4.88	0.41	30.6	2396.8	5.59
8	0.46	105.8	0.51	110.8	6.86	0.52	110.0	4368.2	10.18
9	0.53	110.3	0.53	110.4	6.84	0.60	0.2	3044.2	7.09
10	0.61	0.4	0.65	124.8	7.73	0.72	81.6	6856.3	15.98
11	0.73	81.7	0.75	100.1	6.20	0.81	61.3	4390.0	10.23
12	0.81	61.7	0.86	84.9	5.26	0.89	70.4	3628.9	8.46
13	0.90	70.5	0.94	101.4	6.28	1.00	26.8	4460.7	10.40
14	1.00	27.0	1.03	39.6	2.45	1.08	0.6	1254.5	2.92

Table no. 25 - Showing Rf value of DG- track 3 in long wavelength (366nm)

Peak	Stargt Rf	Start Height	Max Rf	Max Height	Max%	End Rf	End Height	Area	Area %
1	-0.08	2.4	-0.03	510.6	36.51	-0.00	19.4	4192.3	9.50
2	0.05	22.5	0.12	54.4	3.89	0.13	46.7	1781.6	4.04
3	0.13	47.4	0.15	56.7	4.06	0.17	41.0	1196.4	2.71
4	0.20	42.9	0.25	89.4	6.39	0.27	30.5	2340.9	5.31
5	0.27	31.7	0.29	47.3	3.38	0.30	46.8	683.0	1.55
6	0.30	46.1	0.37	78.1	5.59	0.41	28.2	4143.2	9.39
7	0.41	28.5	0.52	111.4	7.96	0.60	0.5	9519.8	21.57
8	0.60	0.2	0.65	126.2	9.02	0.72	82.0	6990.8	15.84
9	0.73	82.6	0.75	100.0	7.15	0.81	61.7	4255.1	9.64
10	0.81	62.6	0.86	85.1	6.08	0.89	70.3	3457.7	7.84
11	0.90	72.1	0.94	100.5	7.18	1.00	26.3	4327.4	9.81
12	1.00	26.6	1.03	38.8	2.78	1.08	0.2	1236.7	2.80

HPTLC Durvadi Taila:

Table no. 26 - Showing Rf value of DT- track 1 in short wavelength (254nm)

Peak	Stargt Rf	Start Height	Max Rf	Max Height	Max%	End Rf	End Height	Area	Area %
1	-0.08	0.3	-0.02	639.4	37.93	0.05	114.1	14999.6	31.23
2	0.11	108.3	0.19	138.4	8.21	0.22	99.4	8039.2	16.74
3	0.22	99.4	0.28	404.7	24.00	0.36	46.3	11187.2	23.29
4	0.50	28.2	0.53	37.1	2.20	0.61	11.0	1622.3	3.38
5	0.72	9.8	0.75	22.3	1.32	0.77	3.8	506.9	1.06
6	0.80	1.0	0.85	106.4	6.31	0.89	0.1	1883.1	3.92
7	0.90	0.2	0.97	337.7	20.03	1.02	0.6	9789.9	20.38

Table no. 27 - Showing Rf value of DT- track 2 in short wavelength (254nm)

Peak	Stargt Rf	Start Height	Max Rf	Max Height	Max%	End Rf	End Height	Area	Area %
1	-0.06	1.7	-0.02	597.6	37.35	0.05	104.0	13339.0	29.63
2	0.11	102.7	0.19	129.6	8.10	0.22	93.4	7549.9	16.77
3	0.22	93.4	0.28	390.4	24.40	0.38	38.7	11161.8	24.80
4	0.51	27.8	0.54	38.3	2.39	0.61	12.2	1475.5	3.28
5	0.72	9.1	0.75	21.0	1.31	0.79	0.1	548.8	1.22
6	0.80	1.3	0.86	100.4	6.28	0.90	0.2	1804.6	4.01
7	0.90	0.2	0.97	322.7	20.17	1.02	0.4	9132.3	20.29

Table no. 28- Showing Rf value of DT- track 3 in short wavelength (254nm)

Peak	Stargt Rf	Start Height	Max Rf	Max Height	Max%	End Rf	End Height	Area	Area %
1	-0.05	2.7	-0.02	549.4	35.47	0.05	110.3	11334.7	25.64
2	0.10	106.7	0.18	138.2	8.92	0.21	99.1	8275.8	18.72
3	0.21	99.2	0.28	382.8	24.72	0.37	44.4	11398.9	25.79
4	0.51	30.0	0.54	39.5	2.55	0.61	13.1	1484.2	3.36
5	0.72	10.3	0.74	20.9	1.35	0.78	0.3	473.3	1.07
6	0.80	1.6	0.86	90.9	5.87	0.90	2.0	1788.7	4.05
7	0.91	3.2	0.97	327.2	21.13	1.02	1.0	9450.8	21.38

Table no. 29 - Showing Rf value of DT- track 1 in long wavelength (366nm)

Peak	Stargt Rf	Start Height	Max Rf	Max Height	Max%	End Rf	End Height	Area	Area %
1	-0.06	6.7	-0.03	502.4	36.29	0.00	32.0	6020.9	17.63
2	0.05	34.2	0.12	55.0	3.97	0.14	44.7	2422.3	7.09
3	0.18	41.3	0.25	126.0	9.10	0.28	1.6	4137.2	12.11
4	0.28	4.0	0.31	82.0	5.92	0.33	77.8	2046.2	5.99
5	0.46	74.3	0.48	84.4	6.10	0.53	58.4	2983.3	8.73
6	0.54	56.5	0.56	63.5	4.59	0.61	50.3	2447.8	7.17
7	0.61	49.7	0.64	53.7	3.88	0.68	45.5	2093.5	6.13
8	0.71	39.0	0.75	51.3	3.71	0.83	14.8	2719.0	7.96
9	0.85	17.1	0.88	41.4	2.99	0.89	38.4	1005.2	2.94
10	0.90	38.8	0.94	301.3	21.76	1.00	20.2	7707.1	22.56
11	1.00	19.8	1.01	23.3	1.68	1.06	3.2	577.9	1.69

Table no. 30 - Showing Rf value of DT- track 2 in long wavelength (366nm)

Peak	Stargt Rf	Start Height	Max Rf	Max Height	Max%	End Rf	End Height	Area	Area %
1	-0.08	0.1	-0.03	483.0	35.65	0.01	30.6	5607.2	17.60
2	0.07	36.8	0.12	55.4	4.09	0.14	44.8	2084.3	6.54
3	0.19	42.5	0.25	124.3	9.18	0.28	2.5	4100.4	12.87

4	0.28	2.9	0.31	81.6	6.02	0.35	71.8	2766.3	8.68
5	0.46	70.3	0.49	80.6	5.95	0.54	54.0	3127.7	9.82
6	0.55	55.1	0.57	57.8	4.27	0.61	45.6	1820.4	5.71
7	0.62	45.3	0.64	48.6	3.59	0.68	39.2	1681.5	5.28
8	0.71	34.8	0.75	46.5	3.43	0.79	32.0	1858.7	5.83
9	0.80	30.0	0.81	39.9	2.95	0.83	11.4	428.1	1.34
10	0.85	14.0	0.88	35.3	2.61	0.90	33.4	834.8	2.62
11	0.90	34.3	0.94	282.2	20.83	1.00	17.9	7045.0	22.11
12	1.00	18.1	1.02	19.6	1.45	1.06	0.5	510.2	1.60

Table no. 31 - Showing Rf value of DT- track 3 in long wavelength (366nm)

Peak	Stargt Rf	Start Height	Max Rf	Max Height	Max%	End Rf	End Height	Area	Area %
1	-0.06	2.2	-0.03	467.1	34.80	0.01	29.5	4639.4	15.14
2	0.06	35.0	0.12	54.9	4.09	0.14	42.6	2083.1	6.80
3	0.18	38.8	0.25	121.3	9.04	0.28	0.9	4034.8	13.16
4	0.28	4.8	0.31	80.5	6.00	0.34	72.0	2530.4	8.26
5	0.46	71.3	0.48	81.6	6.08	0.51	57.3	2459.4	8.02
6	0.55	54.2	0.56	87.8	6.54	0.59	48.4	1593.5	5.20
7	0.62	44.5	0.64	48.8	3.63	0.70	34.5	1910.8	6.23
8	0.71	34.0	0.74	47.7	3.55	0.83	10.1	2443.9	7.97
9	0.83	10.3	0.88	37.1	2.76	0.89	36.0	919.7	3.00
10	0.90	36.5	0.94	295.6	22.02	0.99	17.7	7505.5	24.49
11	1.00	18.2	1.01	20.2	1.50	1.05	3.1	527.6	1.72

IV. DISCUSSION

Sneha Kalpana is an important pharmaceutical process in Ayurveda in which medicinal principles are processed in lipid media. The present study focused on the comparative pharmaceutico-analytical evaluation of Durvadi Taila and Durvadi Ghrita, prepared using the same herbal ingredients but different Sneha media. Durva, possessing properties such as Varnya, Vranaropaka, Mutrala and Dahashamaka, was selected as the principal drug. The study was undertaken to understand the influence of Sneha media on the physicochemical and phytochemical characteristics of the formulations.

Pharmaceutical study:

Raw materials were authenticated and subjected to purity testing, followed by classical Shodhana of Kampillaka. Durvadi Taila and Durvadi Ghrita were prepared in three samples each using the prescribed ingredients and Sneha–Drava proportions. The preparations were completed under mandagni after attaining appropriate Siddhi Lakshanas.

V. ANALYTICAL DISCUSSION

All three samples of both formulations exhibited dark green colour, attributable to the incorporation of Durva constituents. Durvadi Taila showed a characteristic odour of Tila Taila with a grass-like note and a Katu taste, whereas Durvadi Ghrita was aromatic with a madhura taste. Taila remained liquid and oily, while Ghrita was semi-solid and unctuous. The moisture/volatile content was below 1% in all samples, indicating adequate removal of moisture during preparation. The boiling point was 180–181°C for Durvadi Taila and 230–232°C for Durvadi Ghrita, reflecting the inherent difference between the two sneha media. The mean specific gravity was 0.92 g/cm³ for Durvadi Taila and 0.91 g/cm³ for Durvadi Ghrita. Viscosity at 40°C was 24.7 cP and 34.02 cP, respectively. Both were lower than the reported values for the corresponding raw Sneha media, which may be attributed to thermal processing. The mean acid value was 1.41 mg KOH/g in Durvadi Taila and 1.21 mg KOH/g in Durvadi Ghrita, indicating comparatively low free fatty acid formation. The corresponding free fatty acid values were 0.4% and 0.6%, respectively.

Peroxide values were 6.10 and 7.23, indicating that both formulations remained within acceptable limits with no evidence of significant oxidative deterioration.

The iodine value was 86.28 for Durvadi Taila and 48.537 for Durvadi Ghrita. Since iodine value reflects the degree of unsaturation, the lower values indicate comparatively lower unsaturation following pharmaceutical processing. The saponification values were 176.29 mg KOH/g for Taila and 293.02 mg KOH/g for Ghrita. The higher value in Durvadi Ghrita suggests a greater proportion of relatively lower molecular-weight fatty acids, whereas the lower value in Taila may reflect changes in fatty-acid composition during repeated heating. Unsaponifiable matter was 1.06% in both formulations. GC–MS demonstrated distinct chemical profiles between the formulations. Durvadi Ghrita showed 23 compounds, with glycerol tricaprate as the major component (31.91% area), along with palmitic acid methyl ester, oleic acid methyl ester and squalene. Durvadi Taila showed 12 peaks, of which oleic acid constituted 95.04% area, demonstrating a marked difference in the fatty-acid profile of the two Sneha media. These findings indicate that the choice of Sneha substantially influences the chemical composition of the finished formulation.

HPTLC fingerprinting further demonstrated distinct chromatographic profiles. Durvadi Ghrita exhibited 9 peaks in Tracks 1 and 3 and 8 peaks in Track 2 at 264 nm, while Durvadi Taila showed 7 peaks in each track. At 366 nm, Ghrita exhibited 14, 14 and 12 peaks, whereas Taila showed 11, 12 and 11 peaks across the respective tracks. Characteristic spots corresponding to reported Durva profiles were also observed. These findings support the utility of HPTLC for quality control and batch-to-batch consistency. However, marker-based studies comparing the raw drugs with both formulations are required to more precisely establish differences in phytoconstituent extraction by Ghrita and Taila.

Overall, the comparative findings demonstrate that although Durvadi Taila and Durvadi Ghrita contain identical herbal ingredients and follow essentially the same pharmaceutical process, the Sneha medium produces distinct physicochemical and chromatographic profiles. This supports the classical concept that the nature of the Sneha influences the characteristics of the final formulation and highlights the importance of Sneha selection in Sneha Kalpana.

VI. CONCLUSION

The present comparative study demonstrated that Durvadi Taila and Durvadi Ghrita, despite containing identical ingredients, exhibited distinct physicochemical and advanced analytical profiles owing to their different Sneha media. Durvadi Ghrita showed greater phytochemical diversity, with 23 compounds identified by GC–MS and up to 14 HPTLC bands, whereas Durvadi Taila showed 12 compounds with a predominantly oleic acid profile (95.04%) and a comparatively compressed chromatographic profile. Differences in iodine, saponification, viscosity, acid, free fatty acid and peroxide values further demonstrated the influence of the lipid base and pharmaceutical processing. Thus, the two formulations are chemically distinct and not interchangeable, highlighting the influence of Sneha media on the final characteristics of Sneha Kalpana.

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