

ORIGINAL RESEARCH ARTICLE

A Comparative Analytical Study of *Ashtanga Ghrita* and *Ashtamanagala Ghrita*

Author: Ashigha S¹

Co Authors: Kavya²

^{1,2}Dept of PG studies in Kaumarabhritya, SDMCAH&R, Udupi, KA, India

ABSTRACT

Ashtanga Ghrita and *Ashtamangala Ghrita* are two *Ayurvedic* formulations which are said to have *Medha*, *Smriti*, *Buddhi* enhancement properties according to Acharya Vagbhata and Acharya Chakradutta respectively. The current study was aimed to standardize both the *Ghrita* and to compare their analytical parameters such as Moisture content (Loss on Drying), Refractive index, Specific Gravity, Acid value, Saponification value, Ester value, Iodine value, Peroxide value, Viscosity, HPTLC. This study will help in understanding the best quality drug and can as well assure the safety, also aid in reproducing the formulations within the standardized parameters.

Key Words *Analytical parameters, Ashtanga Ghrita, Ashtamangala Ghrita*

Received 2024 Accepted 11th 2024 Published 10th November 2024

INTRODUCTION

Ayurveda is the science which offers various modalities of treatments and have a broad spectrum of formulations. *Ghrita* preparations are one among them, which have excellent nootropic effect when used in the right condition. *Ashtanga Ghrita* (AG) and *Ashtamangala Ghrita* (AMG) are two of the numerous preparations explained in classics. As the drug formulations are having properties which are *Medhykara*, *Smritivardhaka*, *Buddhivardhaka* and when it is administered as *Nasya*, it may provide systemic effects upon reaching the *Mastishka* (brain) by acting on important centers which controls neurological, endocrine and circulatory functions.

AIMS AND OBJECTIVES :

1. To standardize *Ashtanga Ghrita*
2. To standardize *Ashtamangala Ghrita*
3. To compare the analytical parameters of *Ashtanga Ghrita* and *Ashtamangala Ghrita*

MATERIALS AND METHODS :

Literary source :

The research drug AG and AMG were reviewed from *Ashtanga Hridaya*, *Uttarasthan* 1st chapter¹ and *Chakradatta*, *Balaroga Chikitsadhyaya*, 64th chapter respectively².

Pharmaceutical source :

ORIGINAL RESEARCH ARTICLE

The essential raw drugs were collected and prepared from GMP certified SDM Pharmacy, Udupi.

Analytical Study was carried out from Sri Dharmasthala Manjunatheshwara Centre for Research in Ayurveda and Allied Sciences.

The Samples of prepared medicines AG and AMG were analyzed using following parameters as per the references available in protocol for testing published by Central Council for Research in Ayurvedic Sciences (CCRAS). The parameters were: Moisture content (Loss on Drying), Refractive index, Specific Gravity, Acid value, Saponification value, Ester value, Iodine value, Peroxide value, Viscosity, HPTLC³.

RESULTS

The given sample of AG and AMG was standardized, the results of standardization

parameters are given in Table 1 and HPTLC photo documentation, Fingerprint, R_f values and densitometric scan of AG and AMG are given in Table 2 and respective figures 1-5.

Table 1 Standardization parameters of AG and AMG

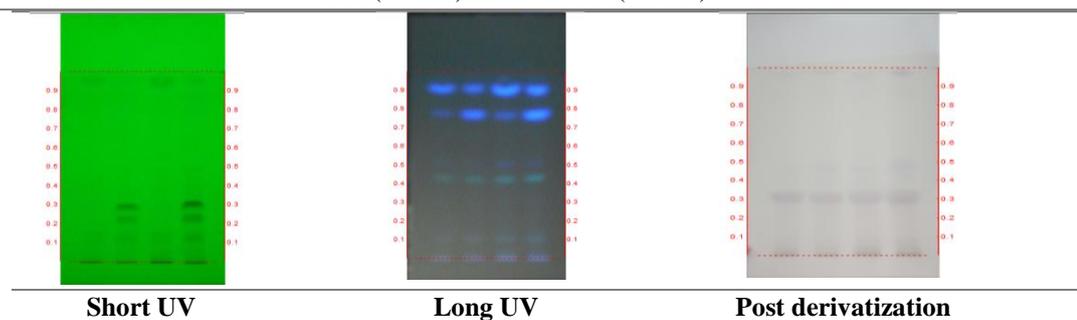
Parameter	Results n = 3 %w/w		
	AG	AMG	AG
Moisture	0.0	0.0	0.0
Refractive index	1.45894	1.45894	1.45894
Specific gravity	0.8940	0.9110	0.8940
Acid value	5.6	6.04	5.6
Saponification value	250.35	248.23	250.35
Ester value	244.75	242.19	244.75

DISCUSSION

The **Moisture content** of both the drugs AG and AMG came '0', which means the chances of these drugs undergoing decomposition, any chemical change or microbial contamination until exposed is zero⁴.

Table 2 R_f values of sample of AG and AG (*F- fluorescent)

Short UV		Long UV		Post derivatization	
AG	AMG	AG	AMG	AG	AMG
0.11 (Green)	-	0.11 (F. blue)	0.11 (F. blue)	-	-
0.13 (Green)	0.13 (Green)	-	-	-	-
-	0.24 (Green)	-	-	-	-
-	0.31 (Green)	-	-	0.30 (Purple)	0.31 (Purple)
-	-	0.42 (F. blue)	0.42 (F. blue)	-	-
-	-	-	-	0.46 (Purple)	0.46 (Purple)
-	0.50 (Green)	0.50 (F. blue)	0.50 (F. blue)	-	0.51 (Purple)
-	-	0.77 (F. blue)	0.77 (F. blue)	-	-
-	-	0.90 (F. blue)	0.90 (F. blue)	-	-

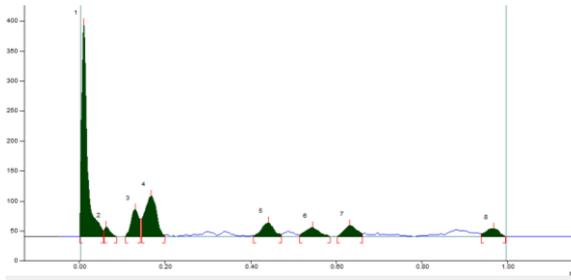


Solvent system - T: EA (9.0: 1.0)

Track 1 – AG – 4µl, Track 2 – AMG - 4µl, Track 3 – AG – 8µl, Track 4 – AMG– 8µl

Figure 1. HPTLC photo documentation of Chloroform fraction of AG and AMG

ORIGINAL RESEARCH ARTICLE



Track 3, ID: Ashtanga ghritha

Peak	Start Position	Start Height	Max Position	Max Height	Max %	End Position	End Height	Area	Area %
1	0.00 Rf	0.0 AU	0.01 Rf	354.5 AU	63.77 %	0.06 Rf	10.1 AU	3344.0 AU	47.47 %
2	0.06 Rf	11.2 AU	0.06 Rf	16.1 AU	2.89 %	0.09 Rf	0.2 AU	158.6 AU	2.25 %
3	0.11 Rf	0.5 AU	0.13 Rf	45.8 AU	8.25 %	0.14 Rf	29.4 AU	618.7 AU	8.78 %
4	0.15 Rf	29.6 AU	0.17 Rf	68.3 AU	12.29 %	0.20 Rf	2.7 AU	1350.5 AU	19.17 %
5	0.41 Rf	1.8 AU	0.44 Rf	23.4 AU	4.21 %	0.47 Rf	4.0 AU	484.6 AU	6.88 %
6	0.51 Rf	2.8 AU	0.55 Rf	15.3 AU	2.76 %	0.59 Rf	0.1 AU	366.8 AU	5.21 %
7	0.60 Rf	0.1 AU	0.63 Rf	18.6 AU	3.35 %	0.66 Rf	4.9 AU	408.9 AU	5.80 %
8	0.94 Rf	5.1 AU	0.97 Rf	13.8 AU	2.49 %	1.00 Rf	0.4 AU	312.9 AU	4.44 %

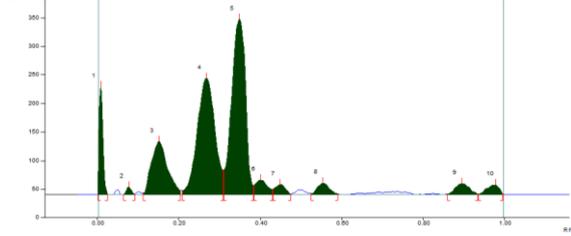


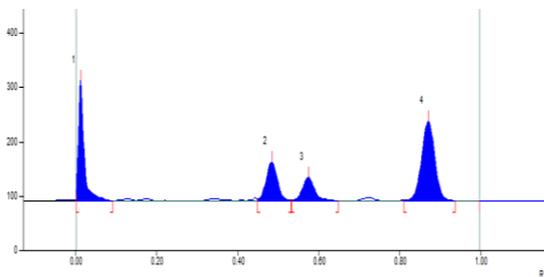
Fig 2a AG

Track 4, ID: Ashtamangala ghritha

Peak	Start Position	Start Height	Max Position	Max Height	Max %	End Position	End Height	Area	Area %
1	0.00 Rf	0.0 AU	0.01 Rf	189.5 AU	20.91 %	0.02 Rf	1.0 AU	1240.5 AU	6.20 %
2	0.06 Rf	0.3 AU	0.08 Rf	13.3 AU	1.46 %	0.09 Rf	1.4 AU	118.4 AU	0.59 %
3	0.11 Rf	3.0 AU	0.15 Rf	93.1 AU	10.27 %	0.20 Rf	7.0 AU	2633.8 AU	13.17 %
4	0.21 Rf	7.1 AU	0.27 Rf	203.5 AU	22.46 %	0.31 Rf	42.6 AU	6370.6 AU	31.86 %
5	0.31 Rf	43.1 AU	0.35 Rf	307.2 AU	33.90 %	0.38 Rf	15.9 AU	7489.7 AU	37.45 %
6	0.39 Rf	16.6 AU	0.40 Rf	25.4 AU	2.80 %	0.43 Rf	9.5 AU	535.3 AU	2.68 %
7	0.43 Rf	9.6 AU	0.45 Rf	17.9 AU	1.97 %	0.48 Rf	0.9 AU	319.7 AU	1.60 %
8	0.53 Rf	2.0 AU	0.55 Rf	20.3 AU	2.24 %	0.59 Rf	1.5 AU	427.3 AU	2.14 %
9	0.86 Rf	0.8 AU	0.90 Rf	19.1 AU	2.11 %	0.94 Rf	0.9 AU	486.5 AU	2.43 %
10	0.94 Rf	1.0 AU	0.98 Rf	17.1 AU	1.88 %	1.00 Rf	1.5 AU	375.8 AU	1.88 %

Fig 2b. AMG, R_f 0.24 ± 0.03 (β-asarone)

Figure 2 Densitometric scan at 254nm



Track 3, ID: Ashtanga ghritha

Peak	Start Position	Start Height	Max Position	Max Height	Max %	End Position	End Height	Area	Area %
1	0.00 Rf	10.6 AU	0.01 Rf	220.7 AU	45.87 %	0.09 Rf	0.2 AU	2274.7 AU	27.74 %
2	0.45 Rf	3.1 AU	0.49 Rf	71.4 AU	14.84 %	0.53 Rf	1.5 AU	1459.6 AU	17.80 %
3	0.53 Rf	1.5 AU	0.58 Rf	42.7 AU	8.89 %	0.65 Rf	0.1 AU	960.7 AU	11.72 %
4	0.81 Rf	1.2 AU	0.87 Rf	146.3 AU	30.40 %	0.94 Rf	0.2 AU	3505.2 AU	42.75 %

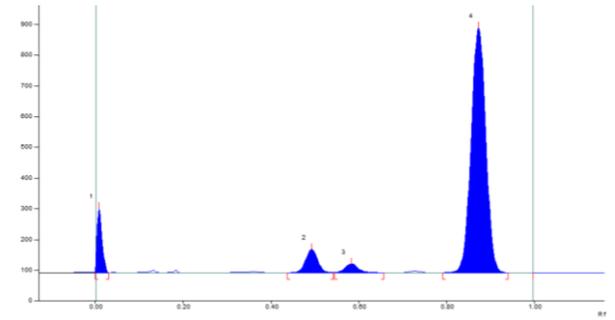


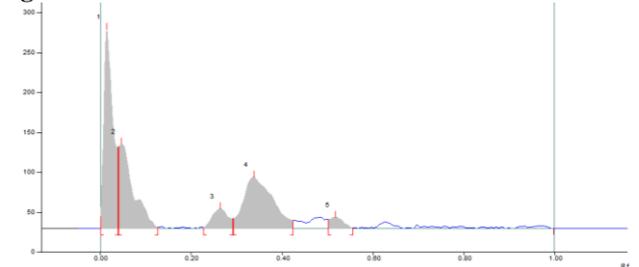
Fig 3a. AG

Track 4, ID: Ashtamangala ghritha

Peak	Start Position	Start Height	Max Position	Max Height	Max %	End Position	End Height	Area	Area %
1	0.00 Rf	0.0 AU	0.01 Rf	209.9 AU	18.83 %	0.03 Rf	0.3 AU	1666.2 AU	7.23 %
2	0.44 Rf	0.6 AU	0.49 Rf	76.6 AU	6.87 %	0.54 Rf	1.5 AU	1556.6 AU	6.76 %
3	0.55 Rf	1.6 AU	0.58 Rf	29.7 AU	2.66 %	0.66 Rf	0.1 AU	683.3 AU	2.97 %
4	0.79 Rf	0.8 AU	0.87 Rf	798.4 AU	71.63 %	0.94 Rf	0.3 AU	19128.0 AU	83.04 %

Fig 3b AMG

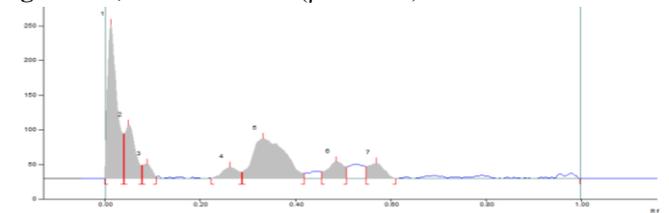
Figure 3 Densitometric scan at 366nm



Track 3, ID: Ashtanga ghritha

Peak	Start Position	Start Height	Max Position	Max Height	Max %	End Position	End Height	Area	Area %
1	0.00 Rf	15.2 AU	0.01 Rf	249.6 AU	54.38 %	0.04 Rf	01.4 AU	3555.8 AU	35.96 %
2	0.04 Rf	102.2 AU	0.05 Rf	105.6 AU	23.00 %	0.13 Rf	1.5 AU	2453.8 AU	24.81 %
3	0.23 Rf	1.2 AU	0.26 Rf	24.9 AU	5.43 %	0.29 Rf	12.0 AU	620.9 AU	6.28 %
4	0.29 Rf	12.3 AU	0.34 Rf	64.4 AU	14.04 %	0.42 Rf	10.2 AU	2944.7 AU	29.78 %
5	0.50 Rf	11.3 AU	0.52 Rf	14.4 AU	3.14 %	0.56 Rf	0.7 AU	314.1 AU	3.18 %

Fig 4a AG, R_f 0.24 ± 0.03 (β-asarone)



Track 4, ID: Ashtamangala ghritha

Peak	Start Position	Start Height	Max Position	Max Height	Max %	End Position	End Height	Area	Area %
1	0.00 Rf	0.0 AU	0.01 Rf	222.2 AU	50.47 %	0.04 Rf	64.5 AU	3119.3 AU	34.67 %
2	0.04 Rf	64.8 AU	0.05 Rf	77.2 AU	17.53 %	0.08 Rf	18.6 AU	1233.4 AU	13.71 %
3	0.08 Rf	18.9 AU	0.09 Rf	20.7 AU	4.70 %	0.11 Rf	2.6 AU	282.4 AU	3.14 %
4	0.22 Rf	0.4 AU	0.26 Rf	16.4 AU	3.72 %	0.29 Rf	9.3 AU	390.5 AU	4.34 %
5	0.29 Rf	9.5 AU	0.33 Rf	57.5 AU	13.07 %	0.42 Rf	7.7 AU	2822.9 AU	31.38 %
6	0.45 Rf	9.6 AU	0.49 Rf	24.3 AU	5.53 %	0.51 Rf	16.7 AU	605.2 AU	6.73 %
7	0.55 Rf	17.3 AU	0.57 Rf	21.9 AU	4.98 %	0.61 Rf	0.1 AU	542.8 AU	6.03 %

Fig 4b. AMG, R_f 0.24 ± 0.03 (β-asarone)

Figure 4 Densitometric scan at 620nm

ORIGINAL RESEARCH ARTICLE

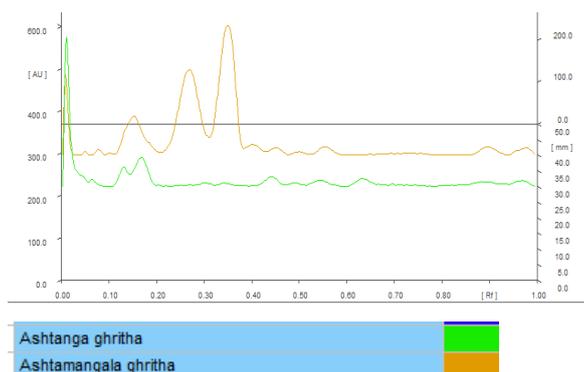


Fig 5a At 254nm

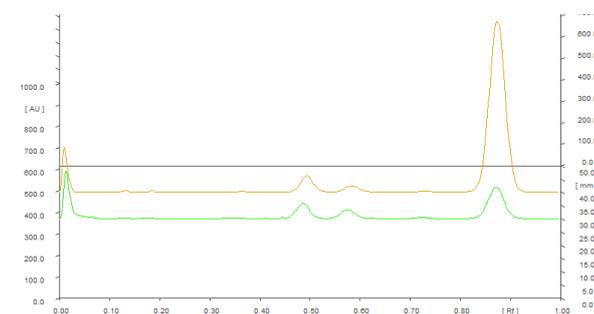


Fig 5b At 366nm

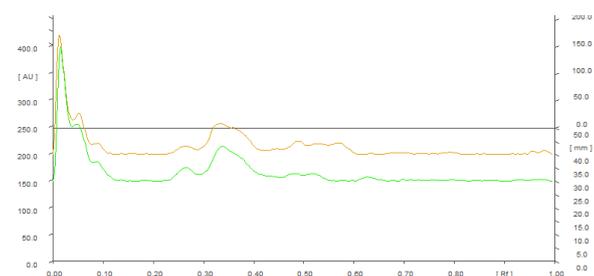


Fig 5c At 620nm

Figure 5 Chromatogram

The **Refractive Index** is the ratio of the velocity of light in the substance. This confirms the purity, helps in identifying a particular substance and or measure its concentration. The more the RI, more the concentration of light, facilitating the rancidification of *Ghritha*⁵. The RI of pure ghee is 1.45⁶. Here the RI of *AG* and *AMG* are the same (1.459), which is almost same as that of pure ghee. The **Specific Gravity** of a sample can be correlated to density of arranged molecules, total solid content in a sample or increased ratio of mass/volume⁷. The SG of *AG* and *AMG* are

0.8940 and 0.9110 respectively, indicating *AMG* has more active constituents than *AG*. The **Saponification** value is a measure of all the fatty acids present in the sample in form of triglycerides⁸. Medicated *Ghritha* with high saponification value is expected to have better absorption rate. In these test samples, the the presence free fatty acids are more in *AG* when compared to *AMG*, which indicates its easy absorption when administered in comparison to *AMG*. The **Acid values** indicate its amount of free fatty acids present in the *Ghritha*, ie, it determines the age and neutralized deterioration of the *Ghritha*. Here both are acidic with *AMG* slightly more acidic than *AG*⁹. **Iodine value** gives an idea about the unsaturated fat in the samples. Higher the iodine value, higher quantity of unsaturated fats are present. Unsaturated fatty acids are important nutrients involved in many body functions, including neuro-protective, antioxidant, anti-inflammatory effects and cardiovascular health¹⁰. Here in both the samples, most of the fats are unsaturated, and is slightly higher in *AMG*. **Ester value (EV)** is the measure of hydroxy acids in the lipid molecule. It is the difference between saponification and acid values¹¹. In the current analytical study, the EV of *AG* is slightly higher than that of *AMG*. **Unsaponifiable matters** in oils and fats, which consists mainly of hydrocarbons, sterols and aliphatic alcohols of high molecular mass, serves for the identification of oils and fats for the detection of incidental and intentional impurities.

Among the samples, both *AG* and *AMG* have

ORIGINAL RESEARCH ARTICLE

almost similar values¹². The **Peroxide value** is a measurement of several milliequivalents of active oxygen that expresses the amount of peroxide contained in 1000 g of substance. It signifies the percentage of oxidation of *Ghrita*¹³, ie, it helps in finding the stability of the sample. The peroxide value of *Ghrita* is below 4, which is within the permissible limit of unrandification. The more peroxide value signifies its higher tendency for rancidification¹⁴. In the current study, for both *AG* and *AMG*, oxidation is 0. Hence both the sample can be said to be stable. The **Viscosity** of *Ghrita* is inversely proportional to the rate of absorption⁹. Though there is no much difference among both the samples, *AG* is less viscous, ie, rate of absorption is rapid and can get absorbed faster in comparison to *AMG*. **Rancidity** is a process which is accompanied by the formation of the unpleasant odor, taste and as a result of action of moisture, oxygen of air and enzymes¹⁵. It determines the level of oxidation, which in turn helps to determine the shelf life of *Ghrita*¹⁶. In the current study, both the samples are not oxidized and hence the shelf life of both is unaffected. **HPTLC** of both the samples, *AG* and *AMG*, were conducted in conjunction with the various marker compounds that corresponded to the active components in order to guarantee that the active substances were present in every formulation.

CONCLUSION

Even with the introduction of contemporary technologies, there are still many formulations

which are not included in API, which is yet to be recognized and documented. In the present analytical investigation, physiochemical characteristics of both the samples were within the reference range. With this study, it can be concluded that by standardizing *AG* and *AMG Ghrita*, it will help in understanding the best quality drug and can as well assure the safety. This study may help in choosing the route of administration, as in here, *Nasya* will be the most suited mode of administration of these drugs owing to the properties they exhibited during the analysis. It will also help to make the formulations reproducible within the standardized parameters.

ORIGINAL RESEARCH ARTICLE

REFERENCES

1. Murthy K. R (2013). English translation of Ashtanga Hrdayam of Vagbhata, Uttarasthana : 1/43-4 (9th ed., p. 11). Chaukhambha Vishvabharathi; Varanasi.
2. Rao P. Sanskrit Text with English translation on Chikitsa Sangraha of Chakrapanidutta, Balaroga Chikitsa :64/78-80 (p.636). Chaukamba Orientalia; New Delhi.
3. The Ayurvedic Pharmacopoeia of India, Part – I, Vol. VI (1st ed., p. 277-301) Ministry of Health and Welfare, Department of AYUSH Government of India, New Delhi.
4. Kumar, Anil & Naik, Satya. (2018). Ghee : Its Properties, Importance and Health Benefits. https://www.researchgate.net/publication/339499398_Ghee_Its_Properties_Importance_and_Health_Benefits .
5. Gurav, N. S., Gurav, S. S., & Sakharwade, S. N. (2020). Studies on Ashwagandha Ghrita with reference to murchana process and storage conditions. *Journal of Ayurveda and integrative medicine*, 11(3), 243–249. <https://doi.org/10.1016/j.jaim.2019.10.004>
6. **Rathi, Bharat; Rajput, Dhirajsingh; Wanjari, Anita; Khan, Mujahid; Rathi, Renu. Physico - Chemical Analysis of Purana Ghrita (Old Clarified Butter) with special reference to Fatty Acid Profile. *Journal of Indian System of Medicine*, 6(1), 4-9. https://journals.lww.com/jism/fulltext/2018/06010/physico__chemical_analysis_of_purana_ghrita__old.2.aspx**
7. Jariwala, K.N. (2011). Analytical Techniques for The Assessment of Physico–Chemical Properties of Ghee. *Indian journal of applied research*, 4, 325-328.
8. https://en.wikipedia.org/wiki/Saponification_value
9. Yashika Singh, Gautam. (2021) Pharmaceutico analytical study and standardization of Ashtanga Ghrita. *International Journal of Ayurveda and Pharmaceutical Chemistry*, 15(2), 222-232.
10. M. Subirade, L. Chen, 10 - Food-protein-derived materials and their use as carriers and delivery systems for active food components, Editor(s): Nissim Garti, In Woodhead Publishing Series in Food Science, Technology and Nutrition, Delivery and Controlled Release of Bioactives in Foods and Nutraceuticals, Woodhead Publishing, 2008, p.no. 251-278.
11. <https://www.pharmaacademias.com/analytical-constants-acid-value-saponification-value-ester-value-etc/>
12. Hartman, Leopold & Viana, Hudson & Freitas, Suely. (1994). Modified method for the determination of unsaponifiable matter in oils and fats. *Analyst*. 119. 10.1039/an9941901793.
13. Negi L, et al. Physico-Chemical Analysis of Murchita and Amurchita Shadanga Ghrita. *Nat Ayurvedic Med* 2023, 7(4): 000415. <https://medwinpublishers.com/JONAM/physico-chemical-analysis-of-murchita-and-amurchita-shadanga-ghrita.pdf>

ORIGINAL RESEARCH ARTICLE

14. Gayatri Nandkumar Patil, Pramodini Sachin Patil, & Mahesh Inamdar. (2023). Comparative Study of Physico-Chemical Analysis of Changeri Ghrita Prepared with Murchita and Amurchita Ghrita. *International Journal of Ayurveda and Pharma Research*, 11(2), 71-77.

<https://doi.org/10.47070/ijapr.v11i2.2675>

15. Mr Krunal N Jariwala Analytical techniques for the assessment of physiocochemical properties of ghee. *Indian Journal of Applied Research*, 4(6).

[https://www.worldwidejournals.com/indian-](https://www.worldwidejournals.com/indian-journal-of-applied-research-(IJAR)/article/analytical-techniques-for-the-assessment-of-physicoandndash-chemical-properties-of-ghee/NDA1MA==/)

[journal-of-applied-research-](https://www.worldwidejournals.com/indian-journal-of-applied-research-(IJAR)/article/analytical-techniques-for-the-assessment-of-physicoandndash-chemical-properties-of-ghee/NDA1MA==/)

[\(IJAR\)/article/analytical-techniques-for-the-](https://www.worldwidejournals.com/indian-journal-of-applied-research-(IJAR)/article/analytical-techniques-for-the-assessment-of-physicoandndash-chemical-properties-of-ghee/NDA1MA==/)

[assessment-of-physicoandndash-chemical-](https://www.worldwidejournals.com/indian-journal-of-applied-research-(IJAR)/article/analytical-techniques-for-the-assessment-of-physicoandndash-chemical-properties-of-ghee/NDA1MA==/)

[properties-of-ghee/NDA1MA==/](https://www.worldwidejournals.com/indian-journal-of-applied-research-(IJAR)/article/analytical-techniques-for-the-assessment-of-physicoandndash-chemical-properties-of-ghee/NDA1MA==/)

16. Sourav Pal, Vinay R Kadibagil, Reshma Saokar. The Pharmaceutico-Analytical Study of Shatavari Ghrita. *International Journal of Ayurveda and Pharmaceutical Chemistry*, 12(1).