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Saraswata Ghrita - A Comparative Pharmaceutico - Analytical Study

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ABSTRACT

Background:

- In Ayurvedic classics Sneha kalpana is given its own importance. Sneha Kalpana being a prime component where in the active principles of the drug are incorporated into Sneha & are made lipid soluble allowing the molecules to pass through the blood-brain barrier. *Aajanmasatmya & Samskarasya anuvartitwa* guna makes the ghrita outstanding with advantages easy absorption, assimilation, longer shelf life, & better bioavailability. Saraswata ghrita 1 and 2 are such special herbomineral and polyherbal formulations of Sneha kalpana described in Astanga sangraha and Astanga hrudaya, that are known for their cognitive capabilities (Medhya rasayana). In contrast to SG 2, which consists of eight ingredients mostly kasthoushadis, Ajadugdha, and murchita ghrita, SG 1 consists of 27 ingredients with kasthoushadis, Swarna, and godugdha as its primary constituents.
- **Materials & methods:** SG 1 & SG 2 were prepared by general method of preparation & both were analyzed as per the standard protocols.
- **Results:** Standardization of SG 1 & SG 2 with remarkable results regarding physicochemical analysis on loss on drying, microbial l imit, refractive index, Saponification value, refractive index, acid value, iodine value, peroxide value, Hptlc, ester value, iodine value, viscosity, specific gravity & Sem-edx, etc were observed.
- **Conclusion:** The prepared SG 1^1 & SG 2^2 matches the physicochemical parameters being effective & safe, natural alternative to synthetic nootropics, & imparting good therapeutic property. By considering all the analytical parameters, SG 1 proved better than SG 2. Loss on drying exhibited the least moisture content, no rancidity, & microbial count within limits thereby extending the shelf life. The SEM EDX revealed the presence of gold particles, higher ester value, higher refractive index, lower acid value & Decreased Peroxide value proved better quality of SG 1.

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KEYWORDS: *SG 1, SG 2, Ghrita, Swarna, Gold, Medhya rasayana, Nootropic activity*

INTRODUCTION

In today's world, people are overburdened with stress, tension, anxiety, and a lack of sleep, all of which have a negative impact on most people's memory. Cognitive deficiencies associated with a variety of neuropsychiatric diseases, as well as developmental abnormalities, need the use of nootropics to improve cognitive ability.

Ayurveda includes the list of plants recognized for their Nootropic action called *Medhya rasayana* that can improve quality of life by increasing stress

tolerance and memory. It is beneficial not just for memory but also for overall mental wellness. These medications strengthen *Buddh*i and improves functioning of manas & also memory, retention, grasping, discrimination, and recall skills specifically to improve memory and intellect by Prabhava.

Since Modern memory loss treatments might cause adverse effects such as nausea, diarrhoea, sleeplessness, vomiting, irritability, delirium, dizziness and exhaustion. In comparison to modern medications, medicinal plants, their secondary metabolites, and many traditional formulations are generally regarded less hazardous with the least side–effects. Hence to evaluate and bring about, effective and safe Nootropic drugs are the need of the hour.

At present, there are only a few drugs which have been shown to improve some aspect of cognition in medical reviews. The most commonly used class of drug is stimulants. Many drugs are marketed heavily on the Internet and having a variety of human enhancement applications as well. Nevertheless, intense marketing may not correlate with efficiency; while scientific study support the beneficial effect of some compounds, the marketing claims by manufacturers of over-the-counter products are not formally tested.

AIMS & OBJECTIVES:

- To prepare Saraswata ghrita by two different methods & carry out its comparative pharmaceutico – analytical study.

METHODOLOGY

Swarna *Samanya Shodhana(Ayurveda prakasha)*[3]

Materials: Swarna patras – 10.02 gms, kadalimoola swarasa - 200ml, No of patras – 10 & PH – 6. **Equipments:** Measuring glass, gas stove, lighter, holder, steel vessels, cloth weighing machine, steel spoon.

Procedure:

- The Swarna patras were heated to red hot and dipped into *Kadalimoola swarasa* .
- After they cool it was washed with warm water & wiped with clean cloth.
- The same procedure of heating and dipping in the swarasa was repeated for 6 more times.
- Each time 200ml fresh kadalimoola swarasa was taken.

Observations

- Time taken for heating *Swarna patras* to red hot was 18-20sec 1st time then decreased to 10-12s till 7th nirvapa.
- Patras were dipped when it turned aruna varna & hissing sound noticed
- Red streaks were observed & it became lustrous,
- There was no change in PH of swarasa & also there was no loss in weight.

Precautions taken

- *Swarna patras* were uniformly heated till red hot stage & handled carefully .
- Care was taken not to continue heating of Swarna patras after they became red hot.
- Drava dravya taken should be sufficient to dip all the Swarna patras.
- Each time fresh Swarasa was taken.

Swarna vishesha shodhana *(Brihath yoga tarangini)*[4]

Material: Swarna patras – 10.02 gms, Kanchanarapatra swarasa-200ml. No of patras – 10 PH – 8. **Equipments**: Measuring glass, gas stove, holder, steel vessels, cloth, weighing machine, steel spoon.

Procedure:

- The *Swarna patras* were heated to red hot and dipped into *Kanchanarapatra swarasa.*
- After they cool it was washed with warm water & wiped with clean cloth.
- The same procedure of heating and dipping in the swarasa was repeated for 2 more times.
- Each time 200ml fresh *Kanchanarapatra swarasa* was taken.

Observations

- Time taken for heating Swarna patras was 12-14sec 1st time then decreased to 8-10s till 3rd nirvapa.
- Patras became more wrinkled & lustrous.
- Also there was no change in the PH of swarasa also

Precautions taken

- Swarna patras were uniformly heated till red hot stage & handled carefully.
- Care was taken not to give continue heating of Swarna patras after they became red hot.
- Drava Dravya was taken sufficient to dip all the Swarna patras

Preparation of SG 1:

Apparatus: Weighing machine, ladle, wide mouthed vessel, filtering cloth, Gas stove, lighter, Khalwa yantra

Ingredients: Kashaya - 750 ml, Kalka – 70gms, Murchita ghrita – 300 ml, Godugdha & Jala – 1200ml

Table 1: Showing ingredients of *SG 1:*

KWATHA DRAVYAS:

Sl. no.	Ingredients name	Quantity
1.	*Haritaki*	18.7gm
2.	*Vibhitaki*	18.7gm
3.	*Amalaki*	18.7gm
4.	*Shweta Kantakari*	18.7gm
5.	*Durva*	18.7gm
6.	*Manjistha*	18.7gm
7.	*Sariva*	18.7gm
8.	*Vacha*	18.7gm
9.	*Brahmi*	18.7gm
10.	*Patha*	18.7gm
11.	*Brihati*	18.7gm
12.	*Kantakari*	18.7gm
13.	*Shalaparni*	18.7gm
14.	*Prishnaparni*	18.7gm
15.	*Shweta punarnava*	18.7gm
16.	*Rakta punarnava*	18.7gm
17.	*Sahadevi*	18.7gm
18.	*Mandukaparni*	18.7gm
19.	*Ashwagandha*	18.7gm
20.	*Aparajita*	18.7gm
21.	*Jala*	3000ml

Kashaya dravya total – 375 gm Water – 3000ml
Reduction to –750 ml

KALKA DRAVYAS:

Sl. no.	Ingredient name	Quantity
1	*Nirgundi*	10 gms
2	*Vacha*	10 gms
3	*Kushtha*	10 gms
4	*Pippali*	10 gms
5	*Saindhava Lavana*	10 gms
6	*Sarshapa*	10 gms

Sl. no.	Ingredient name	Quantity
1.	*Kashaya*	750 ml
2.	*Kalka*	70 gms
3.	*Murchita ghrita*	300 ml
4.	*Shodhita Swarna patras*	10gms
5.	*Godugdha*	1200ml
6.	*Jala*	1200ml

Method of preparation:

1. Ghrita was prepared on ***pushya nakshatra*** as told in the classics
2. A clean stainless steel vessel was taken.
3. Murchita Ghrita was melted and kept on mandagni.
4. Once Murchita Ghrita got melted, kalka was added later Kashaya, Godugdha, jala & Shodhita Swarna Patras were added and stirred well.
5. Heating was carried out on mandagni (around 80-100^{0}c).
6. Then boiling was continued until sneha siddhi lakshanas obtained.
7. The Day 1 – Snehapaka was done for 6 hours
8. Day 2 – Snehapaka was done for 4 hours 30min
9. Total duration of Snehapaka – 10 hours 30 min.

Observation:

- The procedure was completed in 2 days since dugdha was used as dravadravya.
- Yellowish tinge of ghrita with shining appearance was noticed due to Swarnapatras.
- Golden streaky lines were observed.
- Colour of ghrita obtained finally was golden yellow.
- After attaining paka all the siddhi lakshanas could be appreciated such as Shabdahinatva on Agnimikshepa, formation of Varti, Rasa and gandha could be appreciated.

Precautions:

- Milk was heated in a separate vessel and added
- In order to facilitate proper transformation of active principles of the drugs in to the ghrita water was added & Paka was done on mandagni
- Timely performance of the Paka Siddhi Parikshas and observations of Siddhi Lakshanas was done.

PASCHAT KARMA:

- The prepared *SG 1* was filtered by a clean cloth in warm state.
- Total time taken to complete the process was *10hrs and 30mins.*
- The collected Ghrita was stored in a clean air tight glass container.
- In liquid state, *SG 1* was ***Golden yellow*** in colour.

Preparation of SG 2:

Apparatus: Weighing machine, ladle, collecting vessel, wide mouthed vessel, filtering cloth, Gas stove, lighter, Khalwa yantra.

Ingredients: kalka – 125 gm, Murchita ghrita – 500 ml, Ajadugdha – 2ltrs, Jala – 2 ltrs

Table 2: Showing ingredients of *SG 2:*

Sl. No	*Drug Name*	Quantity
1.	*Haritaki*	15.6 gm
2.	*Shunthi*	15.6 gm
3.	*Maricha*	15.6 gm
4.	*Pippali*	15.6 gm
5.	*Patha*	15.6 gm
6.	*Vacha*	15.6 gm
7.	*Shigru*	15.6 gm
8.	*Saindhava lavana*	15.6 gm
9.	*Murchita ghrita*	500 ml
10.	*Ajadugdha*	2000 ml
11.	*Jala*	2000 ml

Method of preparation:

1. A clean stainless steel vessel was taken.
2. *Murchita Ghrita* was added and fire was turned on
3. When ghrita melted, kalka was added slowly, next to it *ajadugdha* was added later water was added and stirred well.
4. Ghrita was prepared in mandagni throughout the process(around 80-100^{0}c).
5. The boiling was continued till the Sneha siddhi lakshanas observed.
6. The Day 1- *Snehapaka* done for 6 hours
7. Day 2-snehapaka done for 2hours 15 min
8. Total duration of snehapaka - 8hours 15minutes.

Observation:

- The procedure was completed in 2 days since dugdha was used as drava dravya
- Colour of ghrita obtained finally was Olive green.
- Milk got condensed & started to stick at the bottom of the vessel lastly so stirring was done to avoid it.
- Sweet pleasant aroma was appreciated
- After attaining paka all the siddhi lakshanas could be appreciated such as Shabda hinatva on Agnikshepa, formation of Varti, rasa and gandha could be appreciated.

Precautions :

- Milk was heated in a separate vessel and added
- In order to facilitate proper transformation of active principles in to the ghrita water was added & Paka was done on mandagni
- Timely performance of the Paka Siddhi Parikshas and observations of Siddhi Lakshanas was done.

PASCHAT KARMA:

- The prepared *SG2* was filtered by a clean cloth when it was slightly warm.
- Total time taken to complete the process was 8hrs and 15mins.
- The collected Ghrita was stored in a clean air tight glass container.
- In liquid state, *SG2* was ***Olive green*** in colour.

RESULTS:

Table 3: Showing Results of *SG 1*

Quantity of *SG 1*	300 ml
Observations	All *Siddhi lakshanas* observed.
Yield	280 ml
Color	Golden yellow
Yield %	94%

Table 4: Showing Results of *SG 2*

Quantity of SG 2	500 ml
Observations	All *Siddhi lakshanas* observed.
Yield	480 ml
Color	Olive green
Yield %	96%

Table 5: Showing results from *Swarna Samanya & Vishesha shodhana*

Sl. No	Wt of Swarna	Wt of Swarna after shodhana	loss in gm	Yield %
1	10.02gm	10.02 gms	0	100%

Table 6: Showing Classical Parameters for Analysis of *SG 1 and SG 2*

TEST	OBSERVATION	
	SG 1	*SG 2*
Varna	Golden Yellow	Olive green
Gandha	Characteristic odour	Pleasant odour
Rasa	*Tikta*	*Tikta*
Kalka vartivat lakshana	+++	+++
Shabdahina when put on agni	+++	+++
Phenashanti	+++	+++

MODERN PARAMETERS

A. ORGANOLEPTIC CHARACTERS: Colour, odour, taste of the given sample was tested using sensory organs, and the same were noted.

Table 7: Showing organoleptic characters of *SG 1 and SG 2*

Physical test	*SG 1*	*SG 2*
Colour	Golden Yellow	Olive green
Odour	Characteristic odour	Pleasant odour
Taste	Bitter	Bitter
Texture	Greasy	Grainy greasy

B. PHYSICO-CHEMICAL PARAMETERS

Table 8: Showing Results of Standardization parameters

Parameters	*SG 1*	*SG 2*
Loss on Drying at 105°C	0.24%	0.31%
Saponification value	169.7	187.9
Iodine value	3.17	10.7
Acid value	2.07	2.13
Peroxide value	3.4	3.6
Ester value	185.8	167.62
Refractive index	1.473	1.471
Specific gravity	0.91	0.914
Viscosity (cP)	39.5	39.49
Rancidity test (Kreis test)	Negative	Negative

Table 9: Showing results of Total Bacterial count of *SG 1, SG 2*

Sl. No	*SG 1(GOLD)*	*SG 2*
Total bacterial count	2CFU/ML(Limit<10CFU/ML)	8CFU/ML(Limit<10CFU/ML)

Results: Bacterial count found in the sample *SG 1, SG 2* were within the limits & of SG 1 (gold) was much lesser when compared to SG 2.

Table 10: Showing results of Total fungal count of *SG1, SG2*

Sl. No	*SG 1(GOLD)*	*SG 2*
Total fungal count	1CFU/ML(Limit<10CFU/ML)	6CFU/ML(Limit<10CFU/ML)

Results: Fungal count found in the sample *SG 1, SG 2* were within the limits & of SG 1 (gold) was much lesser when compared to SG 2.

THIN LAYER CHROMATOGRAPHY:

Table 11: Showing results of TLC of *SG 1, SG 2*

	SG 1	*SG 2*
Under White light	0.575	0.562
UnderShort UV(254nm)	0.575	0.25
		0.48
	0.68	0.61
	0.9	0.7
		0.87
		0.95
Under Long UV(365nm)	0.25	0.25
		0.487
	0.575	0.612
	0.687	0.7
	0.887	0.875

HIGH PERFORMANCE THIN LAYER CHROMATOGRAPHY: HPTLC

In the present study HPTLC was carried out for SG 1 & SG 2.

Table 12: Showing results of Rf values of samples of *SG 1 & SG 2*

Short UV		Long UV		After derivatisation	
Saraswatagh rita I	*Saraswatagh rita II*	*Saraswatagh rita I*	*Saraswatagh rita II*	*Saraswatagh rita I*	*Saraswatagh rita II*
-	-	-	-	0.09 (Purple)	0.09 (Purple)
-	-	-	-	0.14 (Purple)	0.14 (Purple)
0.19 (Green)	0.19 (Green)	-	-	0.19 (Purple)	0.19 (Purple)
-	-	-	0.27 (F. blue)	-	-
-	-	-	-	0.30 (Purple)	0.30 (Purple)
-	0.33 (Green)	-	-	-	-
-	-	-	0.36 (F. blue)	0.37 (Purple)	0.37 (Purple)
-	0.40 (Green)	-	0.41 (F. blue)	-	-
-	0.45 (Green)	0.45 (F. blue)	0.45 (F. blue)	0.45 (Purple)	0.45 (Purple)
0.61 (Green)	0.60 (Green)	-	-	0.60 (Purple)	0.60 (Purple)
-	-	0.64 (F. blue)	0.64 (F. blue)	-	-
-	-	-	-	0.74 (Purple)	0.74 (Purple)
-	-	0.77 (F. blue)	0.77 (F. blue)	-	-
0.81 (Green)	0.81 (Green)	-	-	-	-
			0.89 (Purple)	0.89 (Purple)	

F –fluorescent

SCANNING ELECTRON MICROSCOPY (EDX) STUDY.

In the present study SEM- EDX was carried out for *SG 1*

Table 13: Showing SEM EDX result of *SG 1 (gold):*

Sl. No	Element	Mass %	Atom %
1.	C	ND	ND
2.	O	10.03	30.22
3.	Al	1.37	2.45
4.	Si	0.47	0.81
5.	S	0.21	0.32
6.	Cu	86.90	65.95
7.	Au	1.02	0.25

Discussion on *SG 1 and SG 2*:

Considering the physicochemical characteristics, **loss on drying** of SG1 was 0.24% and SG2 was 0.31%. SG 1 had the lowest moisture content as compared to SG 2, resulting in a longer shelf life. The **saponification values**

for SG 1 and SG 2 were 169.7 and 187.9, respectively. The higher the saponification value, the larger the absorption, leading in superior ghee efficacy. In this case, SG 2 had better absorption because to its higher saponification. The **iodine readings** for SG 1 and SG 2 were 3.17 and 10.7, respectively. The lower the unsaturation number, the less likely it is to rancidify. The **acid levels** of SG 1 were 2.07 and SG 2 were 2.13; a lower value reduces rancidity. **Peroxide readings** for SG 1 were 3.4 and SG 2 were 3.6, indicating a predisposition for rancidification i.e, reduced oxidation rate. The **ester values** for SG 1 were 185.8, and SG 2 was 167.62. As the esters increase, the likelihood of rancidity reduces. The **refractive index** readings for SG 1 were 1.473 and SG 2 were 1.471; an increase in the refractive value indicates an increase in density, which is caused by the dissolution of bio components. The **specific gravity** of SG 1 was 0.91, while SG 2 was 0.914. Specific gravity indicates the existence of bioactive components obtained from drugs. The **Viscosities** of SG 1 and SG 2 were 39.5 and 39.49, respectively. Fluids with high viscosity seem solid. SG 1 and SG 2 revealed no **rancidity**, implying that the fat was not oxidized, showing the presence of tocopherols as a natural antioxidant. Rancid fat generates harmful free radicals in the body, which are known to cause cellular damage.SG 1 had the lowest bacterial and fungal counts, although they were both within permitted limits. When compared to SG2. In **TLC**, SG 1 had stronger rf values than SG 2.The affinity of the solute to the solvent increases with increasing rf values. In **HPTLC** 10 peaks for SG 1 and 13 peaks for SG 2 were detected at 254 nm, 5 peaks for SG 1 and SG 2 at 366 nm, and 8 peaks for SG 1 and 9 peaks for SG 2 at 620 nm. These peaks verified phytochemical quantification and demonstrated the use of genuine raw drugs. Rf values, which vary from 0.09 to 0.89 and were nearly identical for both samples, show how far each component has traveled in relation to the solvent front. Compounds with greater rf values are often more nonpolar than those with lower rf values, which are polar. Here, various colour bands indicate the existence of phytochemical substances. The **SEM-EDX** analysis reveals that SG 1 includes 10.03% Oxygen, 1.3% Aluminum, 0.47% Silicon, 0.21% Sulphur, 86.90% Copper, and 1.02% Gold. The dominant Copper (Cu) signal is due to the copper plate used for sample evaporation; additionally, Gold (Au) is present in trace levels (1.02%), most likely in micro or nano form, resulting in no discernible weight loss in patras after preparation; the presence of gold is due to the use of shodhita Swarna patras in the preparation, which can be proven to have a better therapeutic effect. Oxygen can be helpful to health, and the small quantity of Al, Si, S, and C is due to the integration of phytochemical elements from the ingredients during the production process.

CONCLUSION:

Physicochemical characteristics are useful for assessing quality and understanding the pharmacokinetics and pharmacodynamics of SG 1 and SG 2. When all of the analytical characteristics listed above were taken into account, SG 1 outperformed SG 2. The loss on drying exhibited the least moisture content, microbial count, showed least CFU /ML thereby extending the shelf life. The SEM EDX revealed the presence of gold particles, higher ester value, higher refractive index. Also with lower acid value & Decreased Peroxide value proved better quality of SG 1. Rancidity testing revealed the presence of tocopherols and antioxidants, which prevented rancidity. The saponification value indicated a higher rate of absorption, while the iodine value, acid value, peroxide value, indicated reduced unsaturation, indicating the absence of rancidity.

The presence of gold particles in SG 1 increases its therapeutic potential when compared to SG 2 because "Swarna's inherent properties such as Medhya, Rasayana, and Smritikara enable it to target the nervous system and hippocampal region, interacting with receptors to produce cognitive-enhancing effects."

Furthermore, the lipoidal form of ghrita, as well as the combination of tikta and kashaya rasas, allow madhura rasa and its characteristics to transcend all blood-brain barriers (BBB) due to its features of Srotoshodhana and visha hara, and serve as an absorbent into intracellular space. However, SG 1 and SG 2 will provide a safe, natural alternative to synthetic nootropics, promoting cognitive development, rejuvenation, and detoxification. As a result, SG 1 exhibits superior absorption, metabolism, and therapeutic efficacy than SG 2.

FIGURES:

Swarna patras before shodhana

Kadalimoola swarasa

Red hot swarna patras

Swarna dipped in kadali swarasa

After 7 nirvapa

Kanchanara patra swarasa

Nirvapa in kanchanara swarasa

After 3 nirvapa

Kalka dravyas of SG 2

Ingredients made into kalka

Adding of ajaksheera

SG2 at initial stage of paka

After reduction

Varti lakshana

SG 2 After filteration

Kashaya dravyas of SG 1

Kashaya dravyas of SG 1

Kashaya at initial paka

kalka dravyas of SG 1

Making of kalka of SG 1

Adding of kashaya to SG1

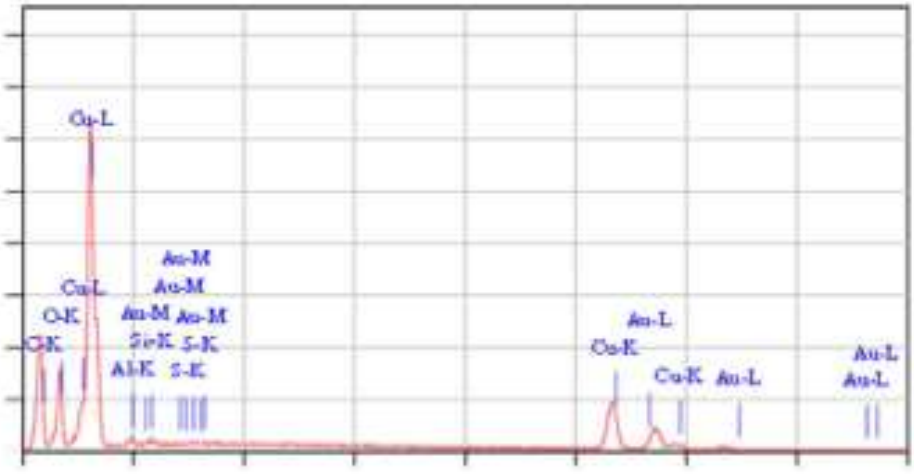
Adding of godugdha to SG 1

Adding of swarna patras

During paka of SG 1

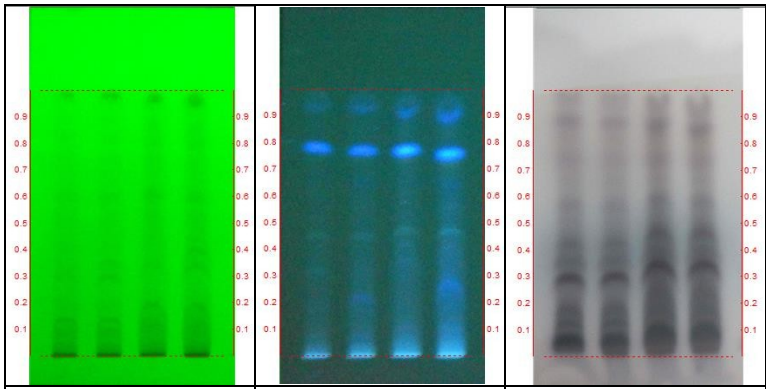
Attainment of siddhi lakshana SG 1 after filteration

Swarna patras after preparation of SG 1



Graph of sem edx of SG 1

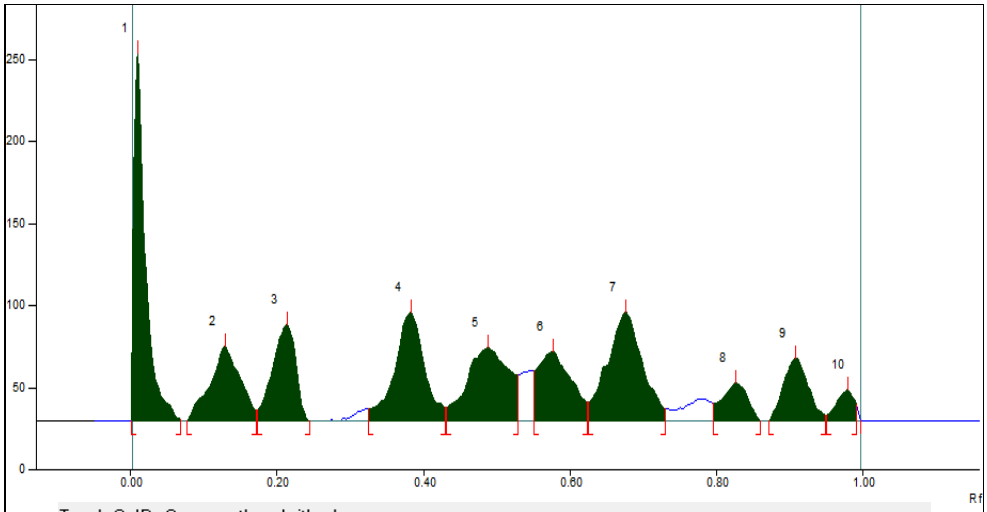
HPTLC photo documentation of Chloroform fraction of Saraswataghrita I and Saraswataghrita II : Fig



Short UV	*Long UV*	*After derivatisation*

Track 1-Saraswataghrita I – 4µl
Track 2-Saraswataghrita II– 4µl
Track 3-Saraswataghrita I – 8µl
Track 2-Saraswataghrita II– 8µl
Solvent system – Toluene: Ethyl acetate (9.0: 1.0)

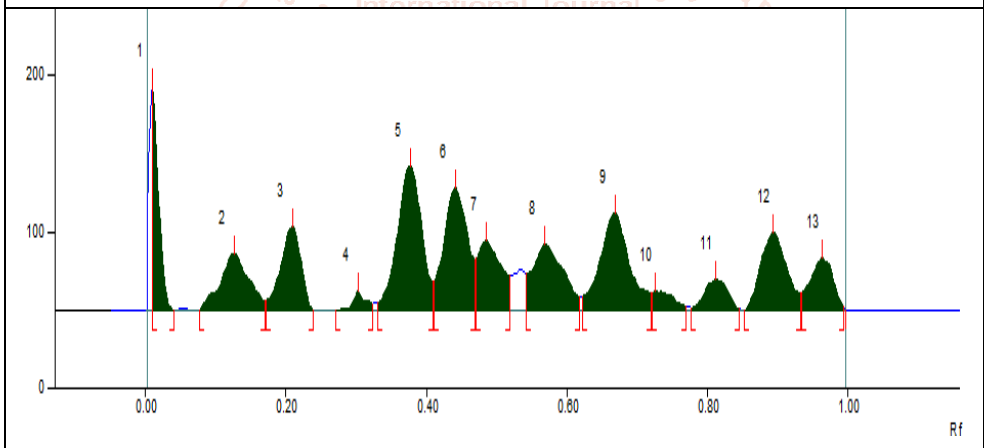
Fig: Densitometric scan of Saraswataghritha at 254nm



Track 3, ID: Saraswatha ghritha I

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	224.3 AU	35.74 %	0.07 Rf	0.8 AU	2513.8 AU	17.45 %
2	0.08 Rf	0.4 AU	0.13 Rf	45.1 AU	7.19 %	0.17 Rf	6.4 AU	1339.4 AU	9.30 %
3	0.17 Rf	6.8 AU	0.21 Rf	58.8 AU	9.37 %	0.25 Rf	0.0 AU	1330.0 AU	9.23 %
4	0.33 Rf	7.3 AU	0.38 Rf	66.2 AU	10.54 %	0.43 Rf	7.9 AU	1926.2 AU	13.37 %
5	0.43 Rf	8.0 AU	0.49 Rf	45.0 AU	7.16 %	0.53 Rf	28.1 AU	1809.5 AU	12.56 %
6	0.55 Rf	30.8 AU	0.58 Rf	42.0 AU	6.70 %	0.62 Rf	11.2 AU	1377.4 AU	9.56 %
7	0.63 Rf	11.5 AU	0.68 Rf	66.2 AU	10.55 %	0.73 Rf	7.4 AU	2278.1 AU	15.81 %
8	0.80 Rf	11.0 AU	0.83 Rf	23.1 AU	3.69 %	0.86 Rf	0.0 AU	579.6 AU	4.02 %
9	0.87 Rf	0.3 AU	0.91 Rf	38.0 AU	6.05 %	0.95 Rf	3.6 AU	930.9 AU	6.46 %
10	0.95 Rf	3.6 AU	0.98 Rf	18.9 AU	3.01 %	0.99 Rf	10.3 AU	322.7 AU	2.24 %

Fig 2a. Saraswataghrita I

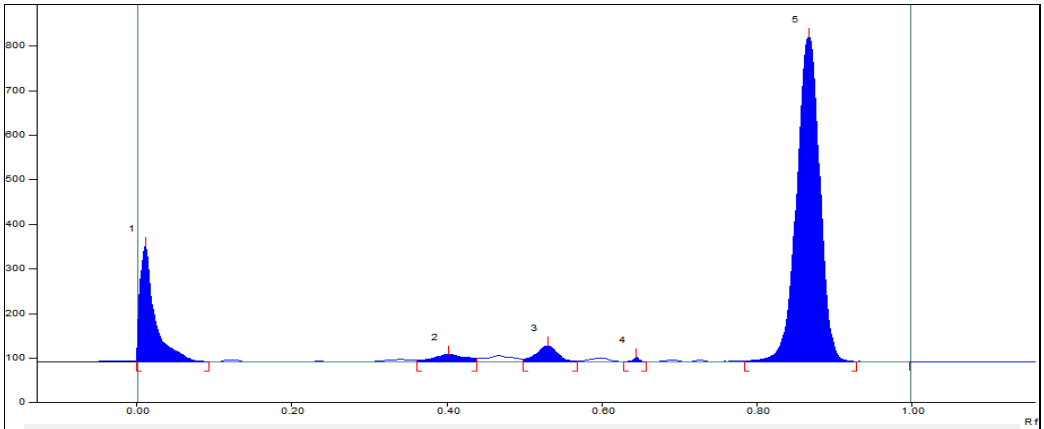


Track 4, ID: Saraswatha ghritha II

Peak	Start Position	Start Height	Max Position	Max Height	Max %	End Position	End Height	Area	Area %
1	0.01 Rf	142.5 AU	0.01 Rf	142.5 AU	20.98 %	0.04 Rf	0.0 AU	987.0 AU	6.73 %
2	0.08 Rf	0.2 AU	0.13 Rf	36.2 AU	5.33 %	0.17 Rf	5.9 AU	1069.3 AU	7.29 %
3	0.17 Rf	6.3 AU	0.21 Rf	53.9 AU	7.93 %	0.24 Rf	0.2 AU	1114.7 AU	7.60 %
4	0.27 Rf	0.3 AU	0.30 Rf	12.4 AU	1.82 %	0.32 Rf	4.3 AU	156.9 AU	1.07 %
5	0.33 Rf	5.1 AU	0.38 Rf	92.2 AU	13.57 %	0.41 Rf	18.3 AU	2310.8 AU	15.76 %
6	0.41 Rf	18.8 AU	0.44 Rf	78.0 AU	11.49 %	0.47 Rf	32.8 AU	1894.7 AU	12.92 %
7	0.47 Rf	33.0 AU	0.49 Rf	44.8 AU	6.59 %	0.52 Rf	22.2 AU	1072.8 AU	7.31 %
8	0.54 Rf	23.9 AU	0.57 Rf	42.3 AU	6.22 %	0.62 Rf	9.1 AU	1325.6 AU	9.04 %
9	0.62 Rf	9.2 AU	0.67 Rf	62.2 AU	9.15 %	0.72 Rf	10.8 AU	1877.8 AU	12.80 %
10	0.72 Rf	11.1 AU	0.73 Rf	12.2 AU	1.80 %	0.77 Rf	2.9 AU	266.2 AU	1.81 %
11	0.78 Rf	1.8 AU	0.81 Rf	19.8 AU	2.92 %	0.85 Rf	1.1 AU	474.9 AU	3.24 %
12	0.85 Rf	0.0 AU	0.90 Rf	49.5 AU	7.29 %	0.93 Rf	11.5 AU	1332.4 AU	9.08 %
13	0.94 Rf	11.7 AU	0.96 Rf	33.2 AU	4.90 %	1.00 Rf	2.5 AU	783.9 AU	5.34 %

Fig 2b. Saraswataghrita II

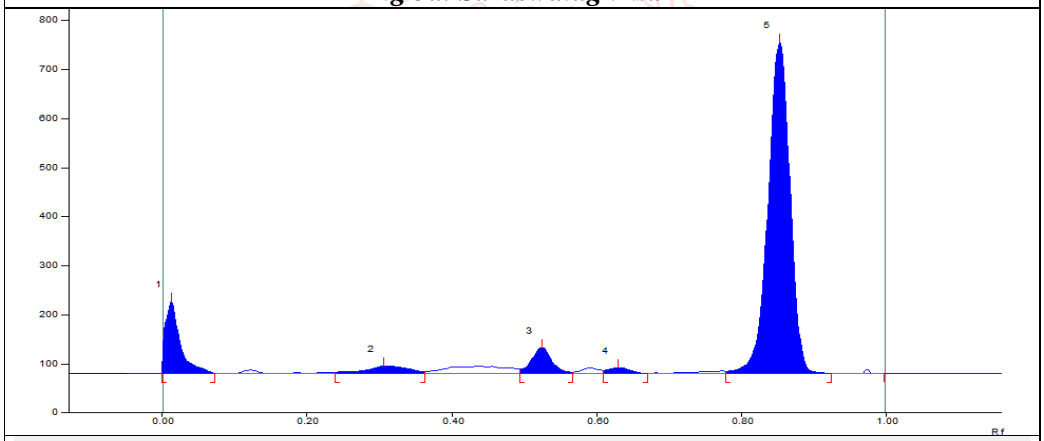
Fig Densitometric scan of Saraswataghrita at 366nm



Track 3, ID: Saraswatha ghritha I

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	260.1 AU	24.68 %	0.09 Rf	0.1 AU	3500.3 AU	17.25 %
2	0.36 Rf	3.7 AU	0.40 Rf	16.9 AU	1.61 %	0.44 Rf	8.4 AU	509.5 AU	2.51 %
3	0.50 Rf	6.7 AU	0.53 Rf	36.4 AU	3.45 %	0.57 Rf	1.9 AU	721.4 AU	3.56 %
4	0.63 Rf	0.6 AU	0.65 Rf	11.0 AU	1.05 %	0.66 Rf	0.1 AU	63.3 AU	0.31 %
5	0.79 Rf	2.7 AU	0.87 Rf	729.4 AU	69.22 %	0.93 Rf	0.9 AU	15491.8 AU	76.37 %

Fig 3a. Saraswataghrita I

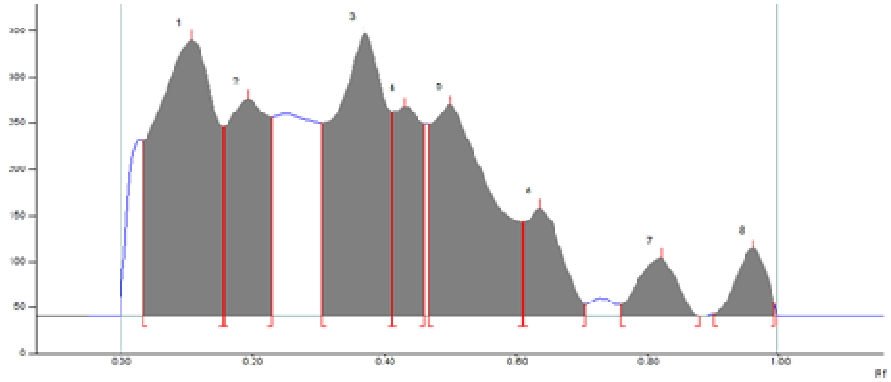


Track 4, ID: Saraswatha ghritha II

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	146.3 AU	16.25 %	0.07 Rf	0.1 AU	2120.0 AU	11.36 %
2	0.24 Rf	2.5 AU	0.31 Rf	15.3 AU	1.70 %	0.36 Rf	3.9 AU	630.9 AU	3.38 %
3	0.50 Rf	8.6 AU	0.53 Rf	52.8 AU	5.86 %	0.57 Rf	2.5 AU	1046.9 AU	5.61 %
4	0.61 Rf	6.1 AU	0.63 Rf	11.8 AU	1.31 %	0.67 Rf	0.2 AU	254.3 AU	1.36 %
5	0.78 Rf	4.5 AU	0.85 Rf	674.2 AU	74.88 %	0.93 Rf	0.1 AU	14615.0 AU	78.29 %

Fig 3b. Saraswataghritha II

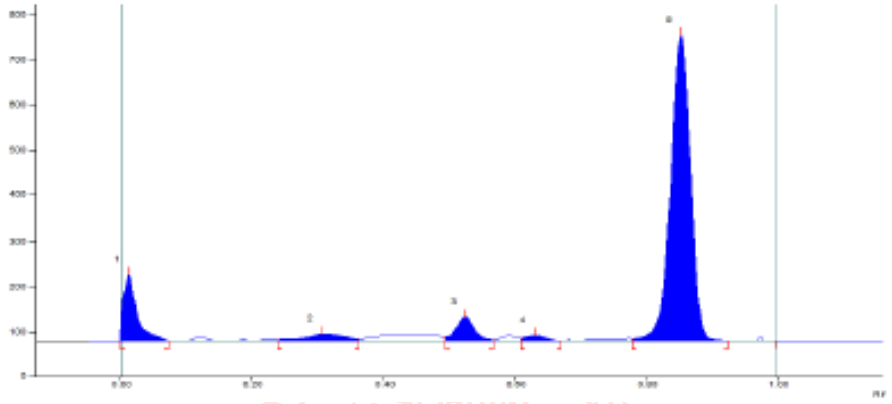
Fig . Densitometric scan of Saraswataghritha at 620nm



Track 3, ID: Saraswatha ghritha I

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	260.1 AU	24.68 %	0.05 Rf	0.1 AU	3500.3 AU	17.25 %
2	0.36 Rf	3.7 AU	0.40 Rf	16.9 AU	1.61 %	0.44 Rf	8.4 AU	509.5 AU	2.51 %
3	0.50 Rf	6.7 AU	0.53 Rf	36.4 AU	3.45 %	0.57 Rf	1.9 AU	721.4 AU	3.56 %
4	0.63 Rf	0.6 AU	0.65 Rf	11.6 AU	1.05 %	0.66 Rf	0.1 AU	63.3 AU	0.31 %
5	0.79 Rf	2.7 AU	0.87 Rf	729.4 AU	69.22 %	0.93 Rf	0.9 AU	15491.8 AU	76.37 %

Fig 3a. Saraswataghrita I



Track 4, ID: Saraswatha ghritha II

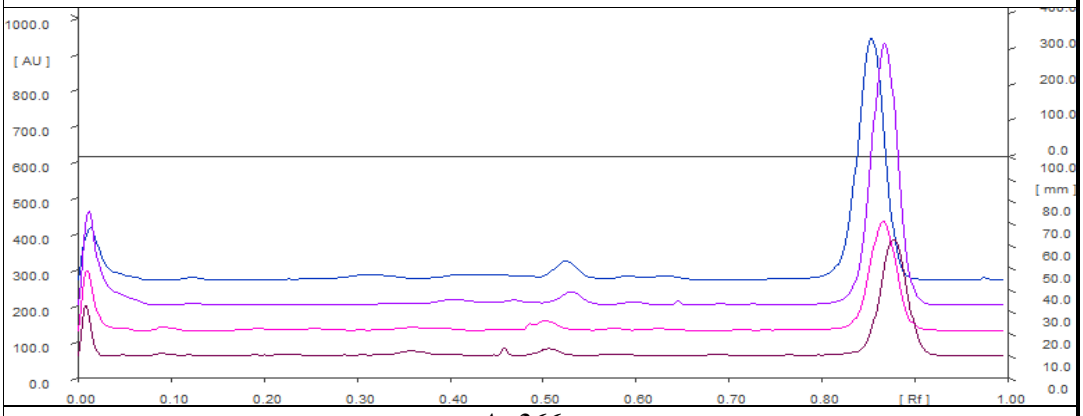
Peak	Start Position	Start Height	Max Position	Max Height	Max %	End Position	End Height	Area	Area %
1	0.00 Rf	0.0 AU	0.01 Rf	146.3 AU	16.25 %	0.07 Rf	0.1 AU	2120.0 AU	11.36 %
2	0.24 Rf	2.5 AU	0.31 Rf	15.3 AU	1.70 %	0.36 Rf	3.9 AU	630.9 AU	3.38 %
3	0.50 Rf	6.6 AU	0.53 Rf	52.8 AU	5.86 %	0.57 Rf	2.5 AU	1046.9 AU	5.61 %
4	0.61 Rf	0.1 AU	0.63 Rf	11.8 AU	1.31 %	0.67 Rf	0.2 AU	254.3 AU	1.36 %
5	0.78 Rf	4.5 AU	0.85 Rf	674.2 AU	74.88 %	0.93 Rf	0.1 AU	14615.0 AU	78.29 %

Fig 3b. Saraswataghritha II

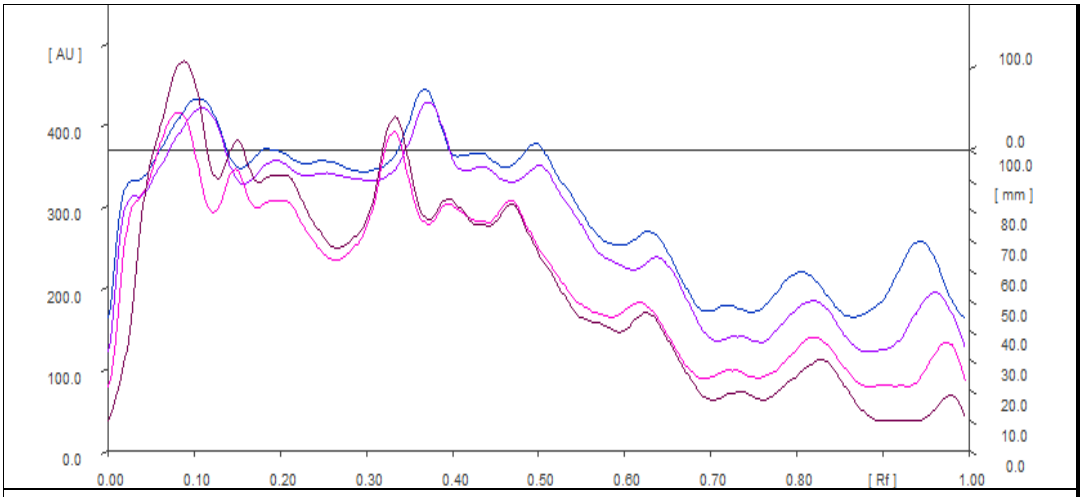
Fig . Densitometric scan of Saraswataghritha at 620nm

Sample ID	Color
Saraswatha ghritha I	
Saraswatha ghritha II	
Saraswatha ghritha I	
Saraswatha ghritha II	

At 254nm,



At 366nm



At 620nm

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