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RESEARCH ARTICLE

PHARMACEUTICO-ANALYTICAL STUDY OF TRAIKANTAKA GHRITA

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ABSTRACT

Background: In ayurvedic classics Sneha kalpana is given its own importance. Sneha kalpana was introduced as a Pharmaceutical preparation only in the Samhita period. Samskara anuvarthitwa guna makes the Ghrita kalpana somewhat superior in Sneha Kalpana.TG is such a Sneha kalpana which is formulated with a shilajatu, kastaushadhis, moorchita ghrita and dugdha as main ingredients and prepared by general method of Sneha Kalpana.
Aim: To prepare and do the physcico-chemical evaluation of Traikantaka Ghrita (TG)
Materials and Methods: TG is a unique formulation which comes under sneha kalpana prepared by the general method of sneha preparation. It is indicated in Mutrakrichra, Mutrasharkara, Ashmari and Mutradosha.
Results: Standardization of TG remarkable results regarding refractive index, saponification value, iodine value, peroxide value, etc were observed.
Conclusion: The prepared TG matches the physicochemical parameters and can impart good therapeutic property.

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INTRODUCTION

Ayurveda is the science of life, practiced by ancient Aryan's, which is based on Atharva veda. Evidence for the existence of well organized system of medicine in India can be traced to archaeological remains in Harappa and Mohenjadaro. Thus in the Indus valley civilization there prevailed a system of medicine in which the drugs of vegetable, animal and minerals origin were used. The object of Ayurveda is to counteract the imbalance of three very essential elements-- Vata, pitta and kapha which constitute the tridosha from which the body originate. There are several categories of kastaushadhi formulations such as Asavarista, Avaleha, Ghrita, Curna, Taila etc. which are described in Bhaishajya kalpana and the Rasaushadhis such as bhasma, pisti, lauha, mandura, kupipakawa etc., which are described in Rasashastra. The system of Ayurveda embraces with in fold of the drugs of plant, animal and mineral origin, both single drugs and compound formulations presently about 1000 single drugs and 8000 compound formulations of recognised merit are in vogue (Agnivesha, 2004; Shri Govind Das, 2014). According to Ayurvedic pharmacology, pharmacy is a well advanced branch where the crude drugs are rarely administered without the transformation into a dosage form by the samskaras like dilution, application of heat, cleansing churning, stirring, flavouring and preservation in containers etc.

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Aim

- To do shodhana of shilajatu.
- To prepare murchita ghrita (MG) and TG.
- To do physicochemical analysis of TG

MATERIALS AND METHODS

A) Shilajatu shodhana (Anonymous- Ayurvedic Formulary of India, 2003)

Ingredients

1. Ashudha Shilajatu = 2 Kg.
2. Triphala Kwatha = 1litre
3. Hot water = 4 litre

Procedure:

- Powdered Ashudha shilajatu was put into a clean stainless steel vessel, to this 1ltr of warm Triphala Kashaya was added and stirred well. At the end 4ltr of hot water was added and stirred well so that shilajatu gets dissolved in the liquid. (ratio- shilajatu:kashaya: water::1:1/2:2)
- The mixture was kept undisturbed in hot sunrays for 3hrs.

- After 3hrs the undisturbed mixture was macerated well and filtered. The external impurities like sand, mud, etc were filtered and the supernatant was kept in another vessel.
- To the soild filtrate obtained again some quantity of hot water was added and kept in sunlight.
- The collected supernatant liquid was kept in strong sunlight for suryatapi method of shodhana.
- The container was covered with a lid every day after sunset.
- The creamy layer so formed was collected, which is shudha shilajatu.
- Hot water was added periodically with a gap of 3-5 days.
- The process was carried out for 2months.

Observation:

- The color of supernatant liquid was Dark brown in color.
- The collected Sudha Shilajatu was sticky and pitch black in color.
- The collected shilajatu was dried in shade to remove the left over moisture.

Precautions:

- The suryatapi method of shodhana should be carried in strong sunrays, in summer.
- Sufficient quantity of hot water should be added so that there is adequate space for layer formation.
- The so formed creamy layer of Shilajatu should be collected carefully without disturbing the supernatant fluid.

Method of preparation

- All the kalka dravyas were made into coarse powder form, and then kalka was prepared with matulunga swarasa.
- Go Ghrita was taken in a steel vessel and heated on manadgni.
- Kalka was added slowly to the ghrita when it was warm and stirred simultaneously.
- When kalka became brown in color, water was added 4times to the of sneha.
- Mandagni was maintained throughout the process with intermittent stirring.
- Heating duration was adjusted so as to complete the sneha paka till the sneha sidhi lakshana appear and then sneha paka is complete.
- The vessel was taken out of the fire and ghrita was filtered through a clean cloth in its warm state.
- Moorchita ghrita was stored in a glass container.

Precautions

- Continuous stirring was carried out to protect from charring of kalka, especially at the last stage.
- Big size vessel was taken to avoid the loss of ghrita.
- Care should be taken while adding kalka and water to the warm ghrita.

C)Preparation of TG

Purvakarma

I. Preparation of kashaya for TG (Sharangadhara, 2012)

Table 1. Observations of MG

Day	Time	Observation
Day 1	10:00am	Fire ignited and kept on mandagni.
	10:15am	Slight boiling of ghrita observed. Ghrita was light yellow colored.
	10:20am	Kalka was added and Froath appeared.
		Water was added and stirred well.
	11:00am	Slight bubbles observed.
	12:00pm	Bubble and sound appeared. Smell of kalka dravya was appreciable.
	2:00pm	Occational stirring done
	3:00pm	Agni was switched off.
Day 2	10:00am	Agni ignited and kept on mandagni.
	1:00pm	Sound and bubbles continued
	2:00pm	Stirring continued
	3:00pm	Varti was formed but moisture present
		When kalka put on fire sound appeared mridu paka
		Phena was seen at circumference of the vessel.
	4:00pm	Kalka started getting like bolus.
		Continuous stirring done to avoid sticking at the base
	4:30pm	When kalka was put in between the
		fingers and no moisture was observed.
		Phena shanti observed madhyama
		When kalka was put on fire no paka
		Sound was observed.
	5:00pm	A layer of ghrita remained at the upper portion of the vessel
		Siddhi lakshanas were confirmed and boiling was stopped.
		Ghrita was dark yellow in color.

B)Ghrita Murchana (Shri Govind Das, 2014)

Ingredients:

Haritaki - 75gms, Vibhitaki - 75 gms,
Amalaki -75 gms, Musta -75 gms,
Haridra -75 gms, Matulunga Swarasa - 75Ml.
Ghrita - 1200 gms. Water – 4.8 litres

Ingredients: Kashaya dravya – 1500g
1. Gokshura -250g each
2. Ela -250g each
3.Pashanabheda-250g each
4. Yasti madhu-250g each
5. Satavari -250g each6. Shilajatu -250g each
Water -12000ml

Method of preparation

- Gokshura, Ela, Pashanabheda, Gokshura, Ela, Pashanabheda, Yastimadhu, Satavari were made into coarse powder. To this 8 times of water was added and the coarse powder was mixed. Boiling was continued till it reduced to ¼ th.
- To this kashaya 250g of shilajatu was added and mixed well till it gets completely dissolved in kashaya.

II. Preparation of kalka for TG (Sharangadhara, 2012)

Ingredients : Darbha -20.83gDraksha -20.83g
Musta -20.83gPippali-20.83g
Vasuka-20.83gVasira-20.83g
Kasa-20.83g Ikshu moola-20.83g
Matsyakshi-20.83g

Method of preparation

- Pippali and musta were dried in shade and made into powder.
- Arka, drabha mula, draksha, vasira, ikshumula, kasa, matsyakshi were taken in wet form.
- Kalka was prepared by adding very little quantity of water.
- Pre heating of Go- dugdha was done.

Table 2. Observations of TG

Day	Time	Observation
Day 1	12:00pm	Fire was ignited and kept on mandagni.
	12:20pm	Ghrita started slightly boiling. Kalka was added slowly and Froath was formed.
	12:30pm	Kashaya was added and stirred simultaneously and kept for boiling. Color changed to dark brown
	1:00pm	Pre heated godugdha was added slowly and stirred well.
	2:00pm	Color of ghrita changed to light brown
	3:00pm	Bubbles and sound observed.
	4:00pm	Aroma of kalka and kashaya were appreciable.
	5:00pm	Stirring continued
	6:00pm	Agni turned off.
Day 2	9:00am	Fire ignited and kept on mandagni.
	9:30am	Slight boiling started.
	11:00am	Continuous stirring was done.
	12:00pm	Color was yellowish brown.
	1:00pm	Kalka started becoming like a bolus
	2:00pm	Bubbling and sound observed. Kalka started adhering to the base. Continuous stirring was done.
	3:00pm	Mrudupaka lakshana: Minimal phena was observed. Varti was not properly formed, had moisture in it Kalka when put on fore produced sound.
	4:00pm	Varti vat lakshana was observed
	4:30pm	Madhyama paka lakshana: Phena shanti was observed. No sound was heard when kalka was put on fire. Vartivak lakshana seen. Smell of the ingredients was appreciable.
	5:00pm	Agni was turned off and vessel of ghrita was taken out from the stove

Pradhana karma

Preparation of TG (Dr. Nisteshwar and Dr. Vidyanath, 2014)

Ingredients: Kashaya -3000ml Kalka – 187.5g
Moorchita Ghrita- 750mlGo- Dugdha- 750ml

Method of preparation

- A clean stainless steel container was taken and Moorchita Ghrita was added and kept on mandagni.
- Once ghrita gets heated kalka was added slowly with continuous stirring, next to this kashaya was added and stirred well.
- As the ghrita, kalka, kashaya starts slightly boiling, Go dugdha was added and stirred simultaneously. Boiling was carried out in mandagni.
- The boiling was continued till sneha siddhi lakshanas were achieved.

Paschat karma

- The prepared TG was filtered by a clean cloth when it was warm.
- Total time taken to complete the process was 14hrs.
- The collected ghrita was stored in a clean air tight container.
- In liquid state, TG was having brownish colour. After solidifying attained yellowish green colour.

RESULTS

Table 3. Loss/gain of final product

Sl.No	Drug	Initial weight	Final weight	Yield	Loss /Gain
1	Shilajatu	2000g	800g	40%	1200g
2	Ghrita murchana	1200ml	830ml	70%	370ml
3	TG	750ml	650ml	86.67%	100ml

Table 4. Classical Parameters for Analysis of MG and TG

Test	Observation	
	MG	TG
Varna	Yellowish	Greenish yellow
Gandha	Characteristic odour	Characteristic odour
Rasa	Tikta	Tikta
Kalka vattivat lakshana	+++	+++
Shabda hina when put on agni	+++	+++
Phena shanty	+++	+++

Table 5. Organoleptic characters of M.G and T.G

Physical test	M.G	T.G
Colour	Yellow	Greenish yellow
Odour	Characteristic	Characteristic
Taste	Mildly Acrid	Acrid
Appearance	Semisolid liquid	Semisolid liquid

Table 6. Chemical tests of M.G and T.G

Parameter	Results n = 3 %w/w	
	Murchita ghritha	Trikantaka ghritha
Refractive index	1.46329	1.46279
Specific gravity	0.9329	0.9257
Acid value	0.54	1.02
Saponification value	197.46	189.50
Iodine value	34.93	36.55
Peroxide value	0.6	1.0

Table 7. HPTLC: R_f values of KALKA, KASHAYA, S.S, M.G and T.G At Long UV

Kalka	Kashaya	S.S	M.G	T.G
-	0.03(F L Violet)	0.03(F L Violet)	0.14 (FL. blue)	-
-	-	-	0.22 (FL. blue)	0.22 (FL. blue)
-	0.08(F L Violet)	0.09(F L Violet)	-	0.08(F L Violet)
0.10(F L Violet)	-	-	-	-
0.12(F L Violet)	0.12(F L Violet)	0.14(F L Violet)	-	0.12(F L Violet)
0.16(F L Violet)	-	-	0.51 (F aqua blue)	0.51 (F aqua blue)
-	0.18(F L Violet)	0.18(F L Violet)		-
0.20(F L Violet)	-	-	0.60 (FD. blue)	0.60 (FD. blue)
-	0.24(F L Violet)	0.26(F L Violet)	0.66 (D. green)	0.66 (D. green)
-	-	0.29(F L Violet)	0.74 (D. green)	0.74 (D. green)
0.33(F L Violet)	0.33(F L Violet)	0.33(F L Violet)	-	-
0.35(F L Violet)	-	0.38(F L Violet)	-	-
-	0.38(F L Violet)	-	0.89 (FD. blue)	0.89 (FD. blue)
0.41(F L Violet)	0.41(F L Violet)	-	0.96 (FD. blue)	0.96 (FD. blue)
-	-	0.46(F L Violet)	-	-
-	0.46(F L Violet)	0.52(F L Violet)		
-	0.55(F L Violet)	0.73(F L Violet)		
-	-	0.77(F Violet)		
0.61(F L Violet)	-	0.82(F Violet)		
-	0.64(F L Violet)			
-	0.71(F L Violet)			
-	0.76(F L Violet)			
0.80(F L Violet)	0.80(F L Violet)			
0.88(F L Violet)	0.88(F L Violet)			
-	0.94(F L Violet)			
0.96(F L Violet)	-			

*L-Light, D-Dark, F-Fluoroscence
*F – Fluorescent; L –Light; D – Dark

Microbial load:

Table 8. Microbial load analysis of M.G

Sl. No.	Dilutions	Number of Colonies (NOC)	CFU/ml
1	Direct	0	0
2	1/10 (10^1)	0	0
3	1/100 (10^2)	0	0

No microbial contamination is observed in MG

Table 9. Microbial load analysis of TG

Sl. No.	Dilutions	Number of Colonies (NOC)	CFU/ml
1	Direct	0	0
2	1/10 (10^1)	0	0
3	1/100 (10^2)	0	0

No microbial contamination is observed in TG.

DISCUSSION

a) Discussion on sneha kalpana: Ghritas are ayurvedic lipid based preparations in which oil or ghee is boiled with prescribed kashaya (polyherbal decoction) and kalka (fine paste of herbs) until the evaporation of aqueous phase transfers the contents into oily phase. The polyherbal decoction used in the preparation predominantly contains water soluble Active Botanical ingredients.

b) Discussion on shilajatu shodhana: The impurities of the substance cause several diseases and shows toxic effect. So it is advisable to administer the drug in pure form. The impure Shilajatu contains stony particles, sand, mud, wooden fibres and several metallic impurities. The following diseases will be caused if impure Shilajatu is used internally –

1. Murcha (unconsciousness)
2. Bhrama (giddiness)
3. Raktapitta (haemorrhage)
4. Shotha (oedema)
5. Agnimandya (dyspepsia)
6. Malabandha (constipation)

So purification of Shilajatu is very essential. After purification it becomes brittle.

c) Discussion on Ghrita murchana: Even though the Murchana procedure is not mentioned in Samhita Granthas. Later granthas like Bhaishajya Ratnavali, etc have specific information on the Murchana Procedure. This is done to neutralize its impurities. *Ama* dosha may be considered as unwanted components in the raw *Ghrita*, like intermediate chemical constituents, dissolved gases, adulterants, plant toxins and moisture present in raw *ghrita* or developed due to long time storage. Dourgandha maybe caused due to the long term storage of the ghrita, before the preparation it is ensured that only pure and potent ghrita is taken for siddha Ghrita preparation. Through the process of Murchana the capacity of the Ghrita to absorb the active components of the drug is increased. Murchana helps in maintaining the necessary ratio of unsaturated and saturated fats suitable for human physiology.

Shilajatu Shodhana

Ingridents for shilajatu Shodhana

process of shodhana

shudha shilajatu

Ghrita Murchana:

Ingredients

Procedure of Murchana

Siddi lakshanas

Murchita ghrita

Traikantaka ghrita

Kalka dravyas

Kashaya dravyas

Ingredients of TG

Process of preparation

Hence pre-preparatory Murchana procedure is important to increase the potency of the siddha ghrita.

d) Discussion on TG: For the preparation of TG 15 raw materials were included and shilajatu was one of the ingredients. The procedure was followed according to the general method of preparation. Kashaya was prepared first, though shilajatu was included in the kashaya dravyas it was just dissolved in the kashaya when warm. As shilajatu is in the pure form and there might be a chance of losing the volatile constituents. Pre heated godugdha was used for the procedure. Preheating is required to remove the bacteria present in the raw milk.

Siddhi lakshanas: **Shabda heeno agni nikshepta-** suggests reduction of water i.e. extent of moisture content. When water remains in the *ghrita* it produces the cracking sound and this sound disappears gradually after reduction of water. When *kalka dravya* of *Sneha* was put on fire it did not produce any sound that indicated *kalka dravya* was devoid of moisture. **Phenashanti-** specifically for *Ghrita* suggests that there is no production of any gases resulting in absence of frothing. **Vartivat lakshana-** When *kalka dravya* was rolled between two fingers, it attains *varti* like shape that indicate proper sign of *Sneha paka*. During this stage the active component of *kalka* will properly assimilate in the *Ghee (Ghrita)*. **Gandha varna rasodbhava-** suggest that production of desired specific

characteristics of odor, colour and taste because of active constituents are transferred into the *ghrita* media.

e)Discussion on analytical study: Saponification Value**:** Low saponification gave an idea of the molecular weight of ghrita and it contains long chain fatty acids. There was no microbial contamination seen be MG and TG, denoting to good shelflife of the formulation.

Conclusion

Sneha kalpana is one of the special preparations in Bhaishajya Kalpana where the therapeutic effect of the drug is achieved in fat/oil media. The stability of the drug can also be enhanced by preparing ghrita. Ghrita Murchana was done and the yield obtained was 70%. Total duration to prepare TG was 14hrs. 86.6% yield is obtained in TG. The chemical analysis of ghrita shows the unsaturation increases from Murchita Ghrita to Traikantaka Ghrita.

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