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COMPARATIVE PHARMACEUTICO- ANALYTICAL STUDY OF KSHEERABALA TAILA AND 7, 21, 50, 101 AVARTITA KSHEERABALA TAILA

HUDEDA S^{1*}, RAKSHITHA D² AND MITTI JG³

1: Professor, Department of Dravyaguna, JSS Ayurveda Medical College & Hospital, Mysuru

2: Junior Research Fellow, Peripheral Pharmacovigilance Centre, JSS Ayurveda Medical
College & Hospital, Mysuru

3: Professor, Department of Rasashastra and Bhaishajya Kalpana, JSS Ayurveda Medical
College & Hospital, Mysuru

*Corresponding Author: Dr. Shivaprasad Hudeda: E Mail: shivaprasadhuded@yahoo.com

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ABSTARCT

Introduction: Ksheerabala taila is a traditional Ayurvedic medicine used for the treatment of various diseases from vata dosha. Ksheerabala taila is an important Sneha kalpana prepared from goksheera, bala (*Sida cordifolia*) and tila taila as the ingredients. Avartana is a unique concept refers to the repetitive processing of the particular formulation to a specific number of times and avartita sneha aimed to fortify the sneha preparation. Owing to this, an attempt is made in this study to prepare Ksheerabala taila and Ksheerabala taila avartana 7,21,50,101 and to analyze their pharmaceutical, organoleptic and physico-chemical parameters for further documentation.

Materials and methods: Ksheerabala taila and its respective avartana were prepared as per the reference and their organoleptic and physico- chemical parameters were analyzed.

Observations and Results: A significant change in the consistency, colour, odour was noticed and after 19th avartana, ghrita pakasiddhi lakshanas were observed in contrary to the taila pakasiddhi lakshanas and also increase in the quantity of final filtrate was observed in successive avartanas.

Discussion: Avartana process has brought many changes in the nature of the drugs used. It follows different method of preparation and physico- chemical analysis conducted on Ksheerabala taila and its respective avartana showed marked difference in the values and were analyzed and discussed.

Conclusion: Duration of the preparation and also time required for pakasiddhi lakshana in each avartana varies depending on the final outcome of the taila. Physico-chemical parameters analyzed are within the standards and suggestive of difference in the nature and consistency of the final product of Ksheerabala taila and its respective avartanas.

Keywords: Ksheerabala taila, Avartana, Pakasiddhi lakshana, Sneha kalpana, Physico-chemical parameters, Phenashanti

INTRODUCTION

Bhaishajya Kalpana is the branch of Ayurveda which deals with the different aspects involved in the manufacture of medicine which helps in the enhancement of formulation and also increases its efficacy in the treatment. Ksheerabala taila is a traditional Ayurvedic medicine used for the treatment of various diseases from vata dosha. Ksheerabala taila is an important Sneha kalpana (oil formulation) prepared from goksheera (cow milk), bala (*Sida cordifolia*) and tila taila (sesame oil) as the ingredients. The formulation is commonly used in neurological disorders and claimed to be having property of Rasayana [1]. Ksheerabala taila has its first reference in Sahasrayogam and similar formulations have been mentioned in other classical Ayurveda texts with some different names. In Charaka Samhita, it is mentioned as shatapaka and sahasrapaka bala taila, Acharya Sushruta named it as bala taila and shatapaka bala taila and in Ashtanga

Hridaya it is mentioned as shatapaka-sahasrapaka bala taila. Chakradutta, Vangasena mentioned as dashapaka bala taila, shatapaka-sahasrapaka bala taila and Gadanigraha mentioned it as dashapaka bala taila. National Ayurvedic Formulary of India and Pharmacopeia Standards of Ayurvedic Formulations quoted as ksheerabala taila [2].

Avartana is a unique concept refers to the repetitive processing of the particular formulation to a specific number of times with the objective of making the formulation better with increased therapeutic efficiency and reduced dose. Sneha after subjecting to the repeated process of paka with kalka and drava dravya is referred as Avartita sneha, aimed to fortify the sneha preparation [3]. To emphasis on this an attempt is made in this study to prepare and compare the pharmaceutical changes and analytical parameters of Ksheerabala taila and Avartita Ksheerabala taila of 7, 21, 50, 101.

MATERIALS AND METHODS

Raw materials were procured from the natural habitat of Mysuru, Karnataka for the preparation of Ksheerabala taila and Ksheerabala taila avartana 7, 21, 50 and 101.

After collection, proper cleaning and authentication of all the drugs, respective taila and its avartana were prepared at JSS Ayur Pharmacy of JSS Ayurveda Medical College & Hospital, Mysuru.

Table 1: Details of the drugs used in Ksheerabala taila and its respective avartana [4]

Sl. No	Drugs	Quantity	Initial quantity taken in Ksheerabala taila	Quantity taken in 7 th avartana	Quantity taken in 21 st avartana	Quantity taken in 50 th avartana	Quantity taken in 101 st avartana
1	Balamula kalka	1/4 part	3.75 kg	3.7 kg	4.15 kg	4.45 kg	5.2 kg
2	Balamula Kashaya	4 parts	60 liters	59.2 liters	66.4 liters	71.2 liters	83.2 liters
3	Tila Taila	1 part	15 liters	14.8 liters	16.6 liters	17.8 liters	20.8 liters
4	Ksheera	1 part	15 liters	14.8 liters	16.6 liters	17.8 liters	20.8 liters

Method of preparation: Preparation follows the reference as mentioned in the AFI (Ayurvedic Formulary of India).

Preparation of Ksheerabala taila:

Initially balamula kashaya was prepared by taking coarse powder (level of grinding should pass through sieve no.10) of balamula 1 part and 16 parts of water was added which was taken in a vessel and heated in madhyamagni till it reduces to 1/8th volume. Then balamula kashaya was filtered using a clean cloth.

Balamula kalka was prepared by taking fine powder (level of grinding should pass through sieve no.85) of balamula 1/4th part and kalka was prepared using sufficient quantity of water.

Then tila taila was taken in a vessel and added with balamula kashaya and balamula kalka followed by ksheera in the specified quantity and heated in mandagni to madhyamagni till taila siddhi lakshana appears. Then the final product was filtered through a clean cloth.

Preparation of Ksheerabala taila avartana 7,21,50,101: 1/4th part of fresh balamula kalka, 4 parts of balamula kashaya and 1 part of ksheera was added to the 1 part of previously prepared ksheerabala taila and heating was carried out till taila siddhi lakshana appears. Similarly further avartanas were carried out using preceding avartita taila as a base by adding fresh balamula kalka, balamula kashaya and ksheera in the prescribed quantity each time and heated till we get proper siddhi lakshana.



Fig 1: Preparation of balamula kashaya



Fig 2: Filtering of balamula kashaya



Fig 3: Preparation of balamula kalka



Fig 4: Addition of balamula kashaya to tila taila



Fig 5: Addition of ksheera to tila taila



Fig 6: Process of boiling of Ksheerabala taila 7th avartana



Fig 7: Process of boiling of Ksheerabala taila 21st avartana



Fig 8: Process of boiling of Ksheerabala taila 50th avartana



Fig 9: Process of boiling of Ksheerabala taila 101st avartana



Fig 10: Process of filtration



Fig 11: Ksheerabala taila and Ksheerabala taila avartana 7,21,50,101

Figure 1-11: Preparation of Ksheerabala taila and its respective avartana

Analytical parameters

Analysis of the following parameters was done based on the references available in the CCRAS protocol [5].

Organoleptic characters like colour, odour, taste, consistency and Physico- chemical parameters like specific gravity, refractive index, loss on drying, etc were carried out.

1. Refractive Index:

Significance: The consistency of the media and solutes present in the media brings the difference in the refractive index. So, it is an important parameter for differentiating the oils.

2. Specific gravity :

Significance: The presence of dissolved substances in oil is expected to change its specific gravity. So it is considered to be an important parameter for analyzing medicated oils.

3. Loss on drying at 110°C:

Significance: Higher the moisture contents more will be the % of loss on drying of the substances.

4. Saponification value:

Significance: Saponification number or value is the quantity of potassium hydroxide

required in mgs to neutralize the acid formed by hydrolysis of fat present in the drug. This also indicates the fat content.

5. Acid Value:

Significance: Acid value of a fat or oil indicates the amount of free fatty acids present in it. The acid number is expressed as the number of milligrams of potassium hydroxide required to neutralize one gram of fat.

6. Ester Value:

Significance: High ester value indicates the presence of high amount of ester and low molecular weight fatty acid content.

7. Unsaponifiable matter:

Significance: The Unsaponifiable matter consists of substances present in oils and fats which are not saponifiable by alkali hydroxides and are determined by extraction with an organic solvent after saponification. Higher content of unsaponifiable matter may indicate the presence of mineral oils.

8. Iodine number or value [6]:

Significance: This indicates the unsaturation in organic compounds present in the drug formulations.

OBSERVATIONS AND RESULTS

Table 2: Properties of drugs used in Ksheerabala taila and its respective avartana [7]

Sl. No	Botanical Name	Rasa	Guna	Veerya	Vipaka	Karmukata
Bala	<i>Sida cordifolia</i>	Madhura	Snigdha, Sheeta	Sheeta	Madhura	Rasayana

Tila Taila	<i>Sesamum indicum</i>	Madhura	Tikshan, Vyavayi, Sukshma, Ushna, Sara, Vishada, Guru	Ushna	Madhura	Brihmana, Vrishya, Balya, Shoola prashamana
Ksheera	-	Madhura	Guru, Snigdha	Sheeta	Madhura	Rasayana, Hridya, Jeevaniya

Table 3: Organoleptic properties of Ksheerabala taila and its respective avartana

Parameters	Ksheerabala taila	7 th Avartana	21 st Avartana	50 th Avartana	101 st Avartana
Colour	Dark red	Pinkish red	Pink	Dull white	Creamy white
Odour	Characteristic oily	Oily ghee	Oily ghee	Characteristic Ghee	Characteristic Ghee
Taste	Astringent oily	Mild astringent + oily	Sweetish astringent	Sweetish astringent	Sweetish astringent
Appearance	Oily liquid	Oily liquid (upper) Semisolid (lower)	Semisolid (on cooling)	Semisolid (on cooling)	Semisolid (on cooling)
Consistency	Oily viscous	Oily viscous	Ghee viscous	Ghee viscous	Ghee viscous

After 19th avartana ghritha pakasiddhi lakshanas ('phenashanti' was observed instead of 'phenodgama') were observed in contrary to the taila pakasiddhi lakshanas during the pakasiddhi. The ratio of the ingredients and duration of the preparation

varies in each avartana as there was increase in the percentage of gain in the final filtrate and meanwhile temperature gradient should also be maintained throughout the process to achieve proper paka lakshana.

Table 4: Changes observed during the preparation of Ksheerabala taila and its respective avartana

Sl. No	Stages of Ksheerabala taila	Initial quantity of taila taken	Final quantity of taila after filtration	Loss/ Gain
1	Ksheerabala taila	15 liters	14.4 liters	0.6 liters
2	Ksheerabala taila avartana 7	14.9 liters	15.1 liters	0.2 liters
3	Ksheerabala taila avartana 21	15.8 liters	16.1 liters	0.3 liters
4	Ksheerabala taila avartana 50	16.6 liters	16.9 liters	0.3 liters
5	Ksheerabala taila avartana 101	20.8 liters	21.3 liters	0.5 liters

Table 5: Analytical parameters of Ksheerabala taila and its respective avartana

Sl. No	Properties	Ksheerabala taila	Ksheerabala taila avartana 7	Ksheerabala taila avartana 21	Ksheerabala taila avartana 50	Ksheerabala taila avartana 101
1	Refractive Index	1.461	1.481	1.483	1.487	1.493
2	Specific gravity (mg/g)	0.910	0.939	0.921	0.918	0.909
3	Loss on drying (w/w%)	0.56	0.96	0.77	0.71	0.83
4	Saponification value (mg/g)	196.36	129.32	95.32	93.85	106.83

5	Acid value (mg/g)	3.23	4.34	4.54	4.72	4.92
6	Ester value	190.97	192.72	193.87	195.24	197.29
7	Unsaponifiable matter (w/w%)	1.44	1.25	1.82	1.93	1.76
8	Iodine value	105.36	199.32	195.32	193.85	196.83

DISCUSSION

Avartana is a technique of potentiating the formulation and enhancing the vatahara properties of the sneha kalpas by repetitive processing and simultaneous addition of the kalka and drava dravya which may further result in obtaining the maximum concentration of phyto-constituents of the drug into the lipid extractive media making the formulation more efficacious. Process of avartana helps in providing the maximum surface area for the active constituents of the formulation which may lead into maximum bio-availability of the drugs. The varied range of simple to complex constituents present may help to maintain the required serum level concentration of the pharmaceutically active principles of the drugs used in the formulation.

Avartana is a technique by which oleaginous medicaments can be reduced into small dosage forms, meanwhile increasing its potency. As the preceding oil base is used for succeeding taila paka, each time bio-constituents will increase in their concentration. Hence it is possible to get a

desired potency of the formulation for which it is used. Avartana refers to the repetitive processing of the particular formulation to a specific number of times with the objective of making the formulation better with increased therapeutic efficiency and reduced dose [8].

Different varieties of bala have been explained with respect to the types of bala in the classics and *Sida cordifolia* was preferred in this study for the preparation based on the reference and also the properties of the drug concerned. The concept of avartana has brought many changes in the nature of the drugs used. Owing to this during the preparation of Ksheerabala taila and its respective avartana, duration and time taken for the proper paka varies as there was change in the quantity of the whole contents taken in successive avartanas and also temperature gradient should be maintained to get proper paka lakshana. On successive avartanas change in the consistency of oil has been appreciated. Initially the oil was liquid in consistency but as the avartanas carried out the final filtrate turned to semisolid consistency on cooling. This change could be

because of the gradual conversion of milk fat into ghee that could have changed the consistency in succeeding avartanas.

During initial avartanas taila pakasiddhi lakshanas was observed but unique observation was that after 19th avartana gradually phenashanti lakshana was found when madhyama paka was attained contrary to the phenodgama lakshana. This is suggestive of gradual conversion of milk fat into ghee in succeeding avartanas. Probably 19th avartana onwards most of the oil may get converted into ghee as the milk fat accumulates in each avartana and also in each and every avartana there was a gain in volume and weight in the final products which was clearly appreciated; this could be because of the conversion of the milk fat into ghee. Adding to this change in the colour of the final filtrate was also differs from initial dark red to pinkish red, dull white and creamy white on succeeding avartanas with change in characteristic oily to characteristic ghee odour with marked difference in the taste of the content due to samskara.

Physico- chemical analysis conducted on Ksheerabala taila and its respective avartana showed marked difference in the values. Refractive index of the samples denotes the consistency of the final product. Specific gravity obtained from the samples is

an indication for the conversion of milk fat into ghee. Decrease in the saponification value from ksheerabala taila to 101 avartita ksheerabala taila suggestive of accumulation of milk fat in successive avartita ksheerabala taila. Gradual increase in the acid value of the samples from ksheerabala taila to successive avartana suggestive of complex nature of the end product. Increase in the unsaponifiable matter suggestive of the complex nature of the respective avartita ksheerabala taila. Increase in the iodine value in successive avartita ksheerabala taila indicates the degree of unsaturation in the final product.

CONCLUSION

Ksheerabala taila and its successive avartana 7,21,50 and 101 follow unique method of preparation and also have difference in the form of usage and also varies in the quantity of dosage. Duration of the preparation and also time required for pakasiddhi lakshana in each avartana varies depending on the final outcome of the taila. During the preparation change in the colour, appearance, taste and consistency from liquid oily into semi solid mass on cooling in the final filtrate in successive avartanas is an indication of gradual conversion of milk fat into ghee which was added in the course of preparation. During the course of preparation the gradual shift from the taila pakasiddhi

lakshana ('phenodgama') to ghrita pakasiddhi lakshana ('phenashanti') suggestive of accumulation of more milk fat in the final product. Physico-chemical parameters analyzed are within the standards and suggestive of difference in the nature and consistency of the final product of Ksheerabala taila and its respective avartanas.

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