Research Article

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PHYSICO CHEMICAL ANALYSIS OF TRIVIDHA SNEHA PAAKA OF KOTTAMCHUKKADI TAILA

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ABSTRACT

Kottamchukkadi Taila is a widely used ayurveda formulation for alleviating vaata vitiation disorders. Kottamchukkadi Taila is available in market in khara paaka only. The Physico Chemical properties of Kottamchukkadi Taila prepared in mrdu, madhyama and khara paaka have not been reported. Aim of the study was to assess the physico-chemical characters of Kottamchukkadi Taila prepared in mrdu, madhyama and khara paaka. Study setting: Research and development division, Oushadhi Pharmacy, Thrissur, Kerala and Arya Vaidya Sala, Kottakkal, Kerala. The physico-chemical characters like colour, odour, refractive index, specific gravity, acid value, saponification value, iodine value, peroxide value, optical rotation, rancidity test, loss on drying of Kottamchukkadi taila prepared in mrdu, madhyama and khara paaka were analyzed. On analytical study of trividha paaka of Kottamchukkadi Taila, the loss on drying, iodine value and acid value were less in khara paaka indicating fewer chances of early rancidity and thereby a prolonged shelf life whereas Acid value, Saponification value and Peroxide value were higher in mrdu paaka. On experimental study, mrdu, madhyama and khara paaka showed significant difference in molecular level, concentration of active ingredients and penetration co-efficient of active ingredients.

Keywords: Kottamchukkadi Taila, Trividha sneha paaka

INTRODUCTION

Kottamchukkadi Taila is a commonly used Ayurveda formulation meant for alleviating disorders caused by vaata vitiation. As per available Ayurveda literature almost all ingredients are katu, tikta rasa, katu vipaka, ushna veerya, kapha vatahara and nontoxic. Kottamchukkadi Taila available in the market is prepared in khara paaka only. The Physico-Chemical properties of Kottamchukkadi Taila prepared in mrdu, madhyama and khara paaka are not reported.

Kottamchukkadi taila dravyas are mostly ushna, teekshna, laghu, ruksha in properties and thereby ascertain kaphavatahara and shophahara effect. .

Table 1: Latin name and parts used of Kottamchukkadi taila dravyas

Sr no.	Ingredients	Latin name	Part used
1.	Kottam	*Saussurea lappa*	Root
2.	Cukku	*Zingiber officinale*	Rhizome
3.	Vayambu	*Acorus calamus*	Rhizome
4.	Shigru	*Moringa oleifera*	Stem bark
5.	Lashuna	*Allium sativum*	Bulb
6.	Kartotti	*Capparis spinosa*	Root
7.	Devadruma	*Cedrus deodara*	Heart wood
8.	Siddhartha	*Brassica campestris*	Seed
9.	Suvaha	*Alpinia galanga*	Rhizome
10.	Tilaja	*Sesamum indicum*	Oil
11.	Dadhi	Curd from cow's milk	
12.	Chincha rasa	*Tamarindus indicus*	Leaf

Table 2: Pharmacological profile of dravyas used in Kottamchukkadi Taila

SN	Ingredient	Rasa	Veerya	Vipaka	Guna	Karma	Dosaghnata
1.	Kottam (Kustha)	Tikta, Katu	Ushna	Katu	Laghu, Ruksha, Tikshna	Lekhaniya	Kaphavata hara
2.	Chukku (Sunthi)	Katu	Ushna	Madhura	Guru, Ruksa, Tiksna	Dipana, Bhedana	Vatakapha hara

3.	Vayambu (Vacha)	Katu, Tikta	Ushna	Katu	Laghu, Tiksna	Lekhaniya, Medhya	Kaphavata hara
4.	Sigru	Katu, Tikta	Ushna	Katu	Laghu, Ruksa, Tikshna	Sukrala, Grahi, Dipana, Krimighna	Kaphavata hara
5.	Lashuna	Madhura, Lavana, Tikta, Katu, Kasaya	Ushna	Katu	Snigdha, Guru, Tiksna, Sara	Balya, Brmhana, Vrsya, Netrya, Rasayana	Kaphavata hara
6.	Kartotti (himsra)	Tikta, Katu	Ushna	Katu	Laghu, Ruksa	Shothahara, Dipana	Kaphavata hara
7.	Devadruma (Devadaru)	Tikta, Katu, Kasaya	Ushna	Katu	Laghu, Ruksa	Shothahara, Dipana	Kaphavata hara
8.	Siddhartha (Sarsapa)	Katu, Tikta	Ushna	Katu	Laghu, Snigdha	Vidahi, Vamaka	Kaphavata hara
9.	Suvaha (Rasna)	Tikta	Ushna	Katu	Guru	Vayahsthapana	Kaphavata hara
10.	Tilaja (Tila)	Madhura, Kasaya, Tikta	Ushna	Madhura	Guru, Snigdha	Balya, Vrsya, Tvachya, Kesya	Vatahara
11.	Dadhi	Tikta, Katu	Ushna	Katu	Laghu, Tiksna	Hikkahara, Swasahara, Parsvasulahara	Kaphavatahara
12.	Chincha rasa	Madhura, Amla	Ushna	Amla	Guru, Ruksa	Dipana	Kaphavatahara

MATERIALS AND METHODS

Objective
To study the Physico-chemical properties of Kottamchukkadi Taila prepared in mrdu, madhyama and khara paaka

Methodology
Physico-chemical study

Blinding technique
Coding method

Trial Drug
The trial drug- Kottamchukkadi taila was prepared in three different paaka in a GMP certified company- Oushadhi, The Pharmaceutical Corporation (I.M) Kerala Ltd., Thrissur.

Batch number- 5796/C/2013-14

Settings
1. Analysis of physico chemical characters of Kottamchukkadi Taila at Research and Development Division, Oushadhi pharmacy, Thrissur, Kerala.
2. Analysis of physico chemical characters of Kottamchukkadi Taila at Research and Development Section, Arya Vaidya Sala, Kottakkal, Kerala after one year.

The following physico-chemical parameters of Kottamchukkadi Taila prepared in mrdu, madhyama and khara paaka were assessed by means of scientific techniques.

Refractive index
The refractive index (n) of a substance with reference to air is the ratio of the sine of the angle of incidence to the sine of the angle of refraction of a beam of light passing from air into the substance [1]. It is the measure of number of molecules the light ray hits when it traverse through specific paaka of taila. It is the direct measure of active ingredients present in taila.

Specific gravity
It is defined as the density of taila compared to density of water. It indicates the presence of solutes content in a solvent [2].

Acid value
It is defined as amount of potassium hydroxide in milligrams required to neutralize the free fatty acids present in 1 gram of oil [3]. It indicates free fatty acids [FFA] present in the taila. Liberation of free fatty acid of taila is due to hydrolysis of triglycerides and promoted by reaction of taila with moisture [4].

Saponification value
It is defined as amount of potassium hydroxide in milligrams required to neutralize the fatty acids resulting from complete hydrolysis of 1 gram of oil or fat [3]. It is inversely proportional to the average molecular weight of fatty acids present in the oil. Long chain fatty acids have low saponification value and short chain have high saponification value [5]. Short chain fatty acids are readily absorbed and help in potential drug delivery.

Iodine value
It is defined as the weight of iodine absorbed by 100 parts weight of sample of fat or oil [3]. It is a direct measure of unsaturation. This unsaturation is in the form of double bonds, which react with iodine compounds. Higher the iodine value more is unsaturated bond in taila. High level indicates taila has rich source of poly unsaturated fatty acids that possess health benefits like regulating cholesterol levels [6].

Peroxide value
The peroxide value is the number of milliequivalents of active oxygen that expresses the amount of peroxide contained in 1000 g of the substance [3]. Peroxide value is the direct indicator of rancidity happened to taila [2]. The formation of peroxide happens only by the presence of moisture present in taila.

Optical rotation
Optical rotation (optical activity) is the turning of the plane of linearly polarized light about the direction of motion as the light travels through certain materials. It is very specific to each paaka of taila.

Mineral oil test
Indicates the presence of mineral oil in specific sample which is also an indicator of rancidity.

Rancidity test
Indicates the spoilage happened to taila either by moisture or by some other materials.

Loss on drying [LOD]
It determines the volatile matter i.e. water drying off from the drug [2].

RESULTS

Table 3: Physico- chemical parameters of Kottamchukkadi Taila

Parameters	Gingelly Oil (Tila Taila)	Kottamchukkadi Taila		
		Mrdu	Madhyama	Khara
Colour	Yellowish brown	Pale brown	Light brown	Dark brown
Odour	Characteristic	Pleasant	Pleasant	Pleasant
Refractive Index	1.463	1.469	1.471	1.472
Specific gravity	0.922	0.922	0.926	0.927
Acid value	4.24	7.27	6.45	5.89
Saponification value	200.34	169.61	164.95	161.17
Iodine value	111.48	103.29	102.34	100.04
Peroxide value	0.49	0.46	0.45	0.43
Mineral oil test	-ve	-ve	-ve	-ve
Rancidity test	-ve	-ve	-ve	-ve
Optical rotation	0.455	0.397	0.383	0.408

Table 4: Loss on drying of Kalka- Kottamchukkadi Taila

Sample of Kalka	Percentage LOD
Chali paaka	56.46% w/w
Mrdu paaka	52.53% w/w
Madhyama paaka	28.83% w/w
Khara paaka	1.19% w/w

Table 5: Standards of other ingredients

Sample	pH of curd	pH of tamarind juice
Mrdu	2.34	3.16
Madhyama	2.46	3.23
Khara	2.36	3.26

The analysis of physico chemical characters of Kottamchukkadi Taila was repeated at Research and Development Section, Arya Vaidya Sala, Kottakkal, Kerala after one year of previous experiment.

Table 6: Physico-chemical parameters of Kottamchukkadi taila after one year

	Mrdu paaka	Madhyama paaka	Khara paaka
Colour	Light green oil	Light green oil	Light green oil
Acid value	8.99	8.94	8.56
Saponification value	185.54	183.25	181.31
Iodine value	95.85	94.84	94.63
Rancidity test	-ve	-ve	-ve

Table 7: Loss on drying of Kalka- Kottamchukkadi Taila after one year

Paaka	Percentage LOD
Mrdu paaka	0.37%
Madhyama paaka	0.15%
Khara paaka	0.13%

DISCUSSION

The Refractive index of mrdu, madhyama and khara paaka of Kottamchukkadi Taila are higher than tila taila which indicates that active ingredients are incorporated in Kottamchukkadi taila.

Specific gravity indicates the presence of solutes content in a solvent. Here solvent is oil and solutes are the extracted active principles from kalka and kvaatha dravya of Kottamchukkadi taila. The specific gravity of khara paaka was 0.927 and mrdu paaka was 0.922(Table 3). This change may be due to more time taken for khara paaka preparation and thereby extraction of more active principles.

High Acid value indicates the presence of free fatty acids in the sample. It implies that mrdu paaka having highest acid value is more susceptible to rancidification compared to other two paaka.

Saponification value was comparatively high in mrdu paaka compared to madhyama and khara. This signifies more amount of short chain or low molecular weight fatty acids present in mrdu paaka which indicates comparatively high penetration co-efficient. This can impart mrdu paaka a better penetration of gastric mucosa than other paaka when used for snehapaana (drinking of sneha).

Iodine value was found higher in mrdu paaka indicating more amount of unsaturated fatty acids present in mrdu paaka and thereby the susceptibility to rancidification.

Comparatively high peroxide value in mrdu paaka signifies more moisture content present in mrdu paaka which is responsible for the formation of peroxides.

Difference in optical rotation observed between paaka clearly indicates difference in paaka at molecular level.

There was more moisture content (indicated by highest Loss on drying value) in mrdu paaka kalka i.e when compared to madhyama and khara paaka.

In analytical study of trividha paaka of Kottamchukkadi Taila, the loss on drying, iodine value and acid value were less in khara paaka indicating fewer chances of early rancidity and thereby a prolonged shelf life.

The analysis repeated after one year showed changes in values of parameters but the results that is Acid value, Saponification value, Peroxide value of mrdu paaka compared to other paaka were higher and rancidity test was found negative.

CONCLUSION

On analytical study of trividha paaka of Kottamchukkadi Taila, the loss on drying, iodine value and acid value were found to be less in khara paaka indicating fewer chances of early rancidity whereas Saponification value and Peroxide value were higher in mrdu paaka indicating better penetration in gastric mucosa when used for Snehapaana (internal administration of taila). On experimental study, mrdu, madhyama and khara paaka showed significant difference in molecular level, concentration of active ingredients and penetration co-efficient of active ingredients.

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