

Pharmaceutical Chemistry

Role of media in the preparation of *Apamarga Ksharataila*Hitaba Gohil, Kinnari Dhruve¹, P. K. Prajapati²

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Abstract

Generally, *Tailas* and *Ghrithas* have been prepared by using *Kalka* (paste) and *Drava dravya* (liquid media usually *SwaRasa* or *Kwatha*). However, *Apamarga Kshara taila* is prepared by using *Apamarga Kshara drava* (the alkali is obtained after dissolving it in water, after obtaining it by burning, dissolving, and filtration of the same plant). Therefore, to evaluate the role of the media during the preparation, the *Taila* was prepared in different samples by using the fresh and dry paste of *Apamarga* along with *SwaRasa* and *Kwatha* of *Apamarga*. All the samples were tested through various analytical parameters, that is, pH, acid value, iodine value, saponification value, and soon. Finally, it was found that *Apamarga Kshara taila* prepared by using fresh *Kalka* and *Ksharajala* was better and it was also an easy pharmaceutical procedure.

Key words: *Kalka*, *Kshara* and *Kshara Drava*, *Swarasa*, *Decoction*, *taila*

Introduction

Apamargakshara taila (AKT) is frequently used in ayurvedic therapeutics for the treatment of *karnaroga* (ear disorder), especially for *Badhirya* (deafness) and *Karnanada* (sound in ears), as *karna puran* (filling of ears with oil).^[1] It is a common treatment principle, advocated by all Acharyas for a maximum number of ear disorders. It is a very simple medicine having ingredients like *Apamarga* (*Acyranthes aspera*) and *Tila taila* (sesame oil),^[2] which are very cheap and easily available in their authentic form. *Sneha kalpana* (Oleaginous preparations) are prepared with *Kalka* (paste), *Sneha* (oleaginous material), and *Drava* (liquid substance) in the ratio of 1:4:16.^[3,4] A verse with regard to the preparation of AKT does not clearly mention the paste. Either the paste of *kshara* (water soluble ash after complete burning of organic matter – alkali) or *Apamarga Panchanga* (paste of whole fresh plant) should be taken.^[5,6] *Apamargakshara* is difficult to prepare, and is also a time-consuming process and expensive, while the fresh drug paste is easy to prepare. During the preparation of AKT, oil and alkali (as a paste and alkali water in sesame oil) are mixed together. Therefore, the fats are hydrolyzed by the alkali, yielding glycerol and crude soap,^[7] which is a problem during preparation. Considering these points, the study is designed to prepare AKT with different paste drugs, that is, fresh plant paste and dried plant paste instead of / and *Apamargakshara*

(water soluble ash after complete burning of organic matter – alkali). Also liquid media is changed, that is, *Apamarga swaRasa* (fresh juice of *Apamarga*) and *Apamarga Kwatha* (decoction of *Apamarga*) instead of *Apamargakshara jala* (water of *Apamarga* alkali).

Aims and Objectives

1. To compare the different samples of *Apamargakshara taila*, which were prepared with different forms of *kalka dravya* (paste) and *drava dravya* (liquid).
2. To decide the suitable *drava / kalka* in the preparation of AKT.

Materials and Methods

Apamargakshara taila was prepared in five different samples changing the *kalka dravya* and *drava dravya*. The samples were designated as,

AKT-KK *Apamarga Kshara Taila* with *Apamarga Kshara Drava* plus *Kshara Kalka*

AKT-KF *Apamarga Kshara Taila* with *Apamarga Kshara Drava* plus Fresh Plant *Kalka*

AKT-SF *Apamarga Kshara Taila* with *Apamarga* Fresh Plant *SwaRasa* plus Fresh Plant *Kalka*

AKT-FF *Apamarga Kshara Taila* with Decoction and *Kalka* of fresh material of *Apamarga*.

AKT-DD *Apamarga Kshara Taila* with Decoction and *Kalka* of dry material of *Apamarga*.

To prepare *Apamargakshara taila*, the raw material, that is,

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Apamarga and *taila* were procured from the pharmacy attached to I.P.G.T. and R.A., G.A.U., Jamnagar. Soft water was used, where needed. It was prepared as per the reference from Ayurvedic Formulary of India.^[8]

Preparation method

Apamargakshara taila was prepared with the intermediate processes similar to those used for preparing *Apamarga Kshara*, *Apamarga Kshara Jala* (water of *Achyranthus aspera* linn), *Apamarga swaRasa* (fresh juice of *Achyranthus aspera* linn), and *Apamarga kwatha* (decoction of fresh or / and dry *Achyranthus aspera* linn). *Apamarga Kshara* was prepared by burning dry *apamarga* till it attained a white color; the ash was strained and four times (v/v) water was added. It was soaked and kept overnight and again strained thrice. After evaporation of the water portion, the white color powder was collected.^[9] *Apamargakshara drava* was prepared by adding four times (w/v) water into *Kshara*. *Apamarga kwatha* (dry and fresh) was prepared by adding four times (w/v) water and reduced upto one-fourth and strained. For *Apamarga swaRasa*, it was crushed in the Edge runner and squeezed.

For the preparation of *Apamargakshara taila*, four parts of *Tila taila* was taken in a wide mouthed stainless steel utensil and heated till fumes emerged from the oil. The *taila* was warmed, and one part of *kalka dravya* (paste) and sixteen parts of *drava dravya* (liquid substance) were added. It was continuously stirred. Cooking was done on moderate heat. When the entire watery portion had evaporated (*Sneha Siddhi Lakshana*), the oil was strained in a warm condition. It was collected in a glass bottle. The whole procedure was completed within three days. The procedure was the same for all samples; only the paste material and liquid substances were changed.

Analysis of *Apamargakshara taila* was carried out after the *Taila* (final product) was prepared by using different media. Organoleptic characteristics like *Sparsh* (consistency), *Rupa* (color), *Rasa* (taste), and *Gandha* (odor) of the samples were perceived by the *Jnanendriya* (sensory organs). However, the physicochemical parameters, such as, pH, specific gravity, total solid content, ash value, refractive index, acid value, free fatty acid as oleic acid, saponification value, iodine value, ester value, unsaponifiable matter, rancidity test, and so on, were conducted as per pharmacopoeial standards.^[10]

Observation and Results

- *Apamarga* of 30 KF was taken initially to prepare *kshara*; it yielded 3.9 KF of *Kshara*, which means 11.58%.
- Six liters of *Kshara drava* was obtained after adding 8 L of water into 2 L of *kshara*.
- Six liters of *SwaRasa* was obtained from 40 KF of fresh *Apamarga* after adding 2 L of water.
- Yield of prepared oil is summarized in Table 1.

During the preparation of AKT, the stages observed are: Initiation of boiling of liquid, stage of mixing, stages of separation of oil, stages of boiling of oil, completion of *snehapaka*.

Specific observation for Kshara Taila

Specification of Kalka (paste)

- Initially, the paste was soaked in the mixture of oil and liquid.

- The paste was separated; it started rising during heating and showed on the surface of the mixture of oil and liquid.
- The paste got mixed with the emulsion.
- At the end of the process, the paste separated from the emulsion and set at bottom of the vessel.
- The color of paste became darker and is more viscid.

Specification of Drava (liquid media)

- Slight boiling starts when the temperature reaches 80°C.
- Boiling starts from the center of the liquid and then reaches the periphery and bubbles appear at the boundary.
- Liquid becomes thicker during the mid stage of the heating.
- Color of liquid changes and becomes darker.
- At the end of the stage, more bubbles emerge from the mixture.

Specification of Taila (oil)

- Initially, scattered oil was seen on the surface of the liquid.
- Oil and liquid mixed when the temperature started increasing.
- The color of the oil changed.
- At the final stage of cooking, the oil also escaped out by bubbling along with the liquid.
- Oil and liquid separated at end of the final stage, when the liquid part evaporated.
- Froth rose and came up from the oil at the end of the final stage.
- When it is prepared with *Apamargakshar kalka* and *Apamargakshar jala*, then at the last stage, the spoiled milk like appearance was observed and *kshar* and oil were separated. This may be counted as a specific sign for the particular preparation.

The observation and comparison of the yield [Table 1], the organoleptic characters of different batches of AKT, [Table 2] and the physicochemical properties of the finished product AKT [Table 3] are summarized in these three tables.

Discussion

Oleaginous preparations (*Taila* and *Ghrita Kalpana*) are widely used in Ayurvedic therapeutics since ages back and it is the only form frequently used internally as well as externally for all routes. The ingredients of *Sneha kalpana* comprises of *Sneha* (oleaginous substances), which are glycerides of fatty acids, *Kalka* (paste), which contains many potent therapeutically effective bioconstituents and *Drava* (liquid substance), which is the prime source of the hydroxyl group, and also helps in the dissolution of active principles into the oil, thereby enhancing the therapeutic value.^[11] The oil interacts with the liquid and undergoes hydrolysis. Some of hydrolyzed lipids (*Tila taila*) are amphipathic in nature, and comprise of a hydrophobic exterior and hydrophilic interior. The agitation process breaks the oil in the form of globules. These globules get exposed to the paste drugs, and may be helpful in the extraction of fat-soluble material from the paste drugs. The water-soluble constituents in the paste interact with the hydrophobic end, that is, these amphipathic lipids get oriented at the oil–water interface, with the polar groups in water phase and the non-polar groups in the oil phase. When a critical concentration of these amphipathic lipids is present in an aqueous media, they form micelles. The driving force for micelle formation is hydrophobic,

as the tail end cannot break the hydrogen bonds between the water molecules and as a result cluster together in close proximity. This may be the reason that the stage when oil and liquid mix together, cannot be seen separated and appears as a vicious cluster.^[12] When triglycerides (*Tila taila*) are hydrolyzed by an alkali (*Kshara jala*), the process is known as saponification. The products are glycerol and soaps.^[13] It may be the reason for more foaming during the mixing of oil and alkali (*Kshara*). The percentage of lye (saponifiable constituent, mainly Potassium hydroxide or / and Sodium hydroxide, may be taken as *Kshara*) and the percentage of water are not at the correct amount, also the *Kshara* is not entirely only hydroxides, and this may be the reason that the finished product could not form into a soap.^[14]

Continuous heating energized the hydrolyzing of fatty acids into crude soap, but continuous stirring and addition of water avoided the preparation of soaps. Continuous heating and agitation during the oleaginous preparations also enhanced the extraction process by weakening the bonds, thereby, separating

the hydrophobic substance from hydrophilic substance. This hydrophobic matter would act as a surface active agent, which gets solubilized in fatty material after the evaporation of water. Hence, due to micellization the finished *Sneha* may contain both oil-soluble as well as water-soluble active principles.^[15]

The reference of *Apamargakshara taila* is taken from the *Chakradutta*, although Acharya *Chakrapani* mentioned the ingredients of the *Apamargakshara taila*, but the paste of *Kshara* or *Apamarga* is not clarified. Therefore, different paste and liquid media are taken.

For the preparation of *Kshara*, the dry plant material should be burnt in an open pan till it becomes a white powder. All the organic matter should be burnt, to get the white color *kshara*. It is prepared in a stainless steel vessel to prevent reaction between the vessel and *Kshara*. *Kshara* is the water-soluble ash left after the burning of organic substances. *Kshara* is mainly the Potassium and Sodium portion of the plant along with the chlorides, sulfates, sulfides, phosphates, magnesium, an

Table 1: The yield of *Apamarga Kshara Taila*

Name of the samples	Duration of Paka (in hours)	Color of Sample	Initial volume (in ml)	Final yield (in ml)	Initial wt. (in g)	Final yield (in g)	(%) loss in v/v	(%) loss in w/w
AKT (KK)	5	Pale yellow	500	435	458	372.65	13	11.90
AKT (KF)	6.30	Dark yellow	500	450	458	414.56	10	9.45
AKT (SF)	9	Green	500	470	458	425	5	7.2
AKT (FF)	6.30	Green	500	470	458	411.9523	6	6.5
AKT (DD)	6.45	Brownish Green	500	453	458	916.77	9.2	9.0

AKT: *Apamarga kshara taila*

Table 2: Organoleptic characteristics of *Apamarga Kshara Taila*

Samples	TT	AKT KK	AKT KF	AKF SF	AKT FF	AKT DD
Color	Darkish yellow	Pale Yellow	Dark yellow	Green	Green	Brownish green
Odor	Characteristic of Tila	Characteristic	Characteristic	Bitter	Characteristic of bitter	Bitter
Taste	Characteristic of Tila	Slightly saline taste	Characteristic	Bitter pungent	Bitter	Bitter pungent
Touch	Oily	Oily	Oily	Oily	Oily	Oily
Appearance	Liquidly oily	Liquidly oily	Liquidly oily	Liquidly oily	Liquidly oily	Liquidly oily
Clarity	Clear	Clear	Clear	Not clear	Slightly clear	Not clear
Opalescence	Translucent	Translucent	Translucent	Translucent	Translucent	Translucent

AKT: *Apamarga kshara taila*

Table 3: Physicochemical parameters for finished products *Apamarga Kshara Taila*

Samples	AKT (KK)	AKT (KF)	AKT (SF)	AKT (FF)	AKT (DD)
Loss on drying % w/w	0.03651	0.03361	0.03700	0.03175	0.5391
Specific gravity at RT.	0.9200	0.9196	0.9188	0.9190	0.9180
Total Ash % w/w	0.06505	0.05490	0.02266	0.03203	0.03593
pH by pH paper	7.50	7.30	4.77	6.563	4.82
Refractive index at RT.	1.4640	1.4640	1.4650	1.4650	1.4645
Acid value	0.3559	0.5920	3.2380	4.8587	4.2438
Free fatty acid as oleic acid	0.1779	0.2960	1.6190	2.4293	2.1219
Saponification value	226.84	203.88	213.04	231.44	229.70
Iodine value	59.99	74.65	91.88	61.56	61.68
Ester value	226.48	203.208	209.802	216.5813	225.4562
Unsaponifiable matter	2.1852	2.9968	2.972	2.5588	2.5930
Rancidity test	-ve	-ve	-ve	-ve	-ve

AKT: *Apamarga kshara taila*

so on.^[16] *Ksharajala* is an aqueous solution. It was prepared by adding four times (v/v) water because of the general principle.^[17] *Apamarga* has very less water content; therefore, it was difficult to prepare *swarasa*. Thus initially, during the first churning, water was added to give smoothness, which reacted with the constituents in the fresh drug and yielded fresh juice. *Pamarga* is soft in nature, so, as per the general rule, four times (w/v) water was added and reduced up to one-fourth.

The data of organoleptic characteristics reveals that a lot of organoleptic variation is found in oils, because they are prepared by different liquid and paste media. The pH of two samples is a poor alkali, which is prepared from *Apamargakshara jala*, AKT (KK), and AKT (KF); the rest of the samples are acidic to slightly neutral, which are prepared by different fresh and dry pastes and liquids. Although it is an alkaline preparation, alkaline pH is desirable. Acid value indicates the amount of free fat present in oil and fat. A high acid value in the oil may lead to early rancidity of the oils. The acid value decreases in samples AKT (KK) and AKT (KF). These two samples are prepared with *Kshara drava*. Therefore, due to the presence of an alkali, the acid value may be less. The acid value is increased in samples AKT (SF), AKT (FF), and AKT (DD). These three samples, prepared with green plant *SwaRasa* and green and dry plant decoction may be acidic in nature, as the acid value is increased. The iodine value indicates the degree of unsaturation of the oil. The greater the degree of unsaturation, the greater will the possibility of the oil to become rancid, due to atmospheric oxidation and visa versa. The iodine value decreases in samples AKT (KK), AKT (KF), AKT (FF), and AKT (DD), may be due to the oxidation across the double bonds of unsaturated fats. The iodine value increases in AKT (SF), which may be due to heat-induced surface polymerization. The saponification value indicates the measure of fatty acid present as esters in a given oil; it gives an idea about the molecular weight of oils. The saponification number and molecular weight of oil are inversely proportional to each other, thus a high saponification value indicates that the oil is made up of low molecular fatty acid and vice versa. The saponification value increases in AKT (KK), AKT (DD), and AKT (FF), whereas, in the AKT (SF) sample, it is slightly decreased. The rest of the observations have minute variations, and may not contribute to the conclusion.

Conclusion

Apamarga Kshara taila prepared with *Apamarga Kshara kalka*

and *Apamarga Kshara jala* (AKT-KK), and *Apamarga Kshara taila* prepared with *Apamarga* fresh drug *kalka* and *Apamarga Kshara jala* (AKT-KF) showed almost equal and better results. Therefore, it may be concluded that *Apamarga Kshara taila* prepared with *Apamarga* fresh drug *kalka* and *Apamarga Kshara jala* (AKT-KF) should be taken for pharmaceutical preparation.

References

1. Chakrapani, Chakradutta, Karnaroga. Varanasi: Chaukhambha Sanskrit Sansthan; 2005. p. 339.
2. Acharya Sodhala, Gadanigraha, Chaukhambha Sanskrit series, Varanasi. p.g no 54.
3. Agnivesha, Charaka Samhita. Hindi commentary by. Shastri K, Chaturvedi G, editors. 1st ed. Varanasi: Chaukhamba Bharati Academy; 2001 .p. 957.
4. Sharangadhara Acharya. Sharangadhara Samhita. Adhamala, Kashiram. 4th ed. Varanasi: Chaukhamba Orientalia; 2000. p. 212.
5. Indradeva Tripathi, Yoga ratnakar, krishnadas academy Varanasi 1st edition 1998 p.g. 732.
6. Das G. Bhaishajya Ratnavali. Hindi Commentary by. Mishra S, editor. 1st ed. Karnarogadhar. Varanasi: Chaukhamba Surbharti Prakashan; 2005. p. 895.
7. Soap from wikipedia, from site www.alkali and fats.com
8. The Ayurvedic formulary of India part -2, Government of India ministry of health & family welfare dept of ISM new delhi-2000 p.g 139.
9. Sharma S. Rasatarangini, Hindi commentary by. Shastri K, editor. Delhi: Motilal Banarasis; 2000. p. 337.
10. Pharmacopoeial Standards for Ayurvedic Formulations, Central Council for research in Ayurveda and Siddha, Ministry of Health and Family Welfare, Government of India, 1st ed. New Delhi: 1987. p. 465.
11. Hitaba G. A Comparative Pharmaceutical Study of *Apamarga Kshar Taila* prepared with *Apamarga Kshar Drava*, *SwaRasa* and *Kwatha*, M. Pharma Dissertation Jamnagar; 2006.
12. Gandhi PK. A comparative study of different formulations of Vasa (Avalaha Sneh Sandhana) w.s.r. to its Swasahara effect, M.D. Dissertation, submitted to I.P.G.T and R.A., G. AYU. U, Jamnagar; 2005.
13. Sharangadhar prof. K.R. Srikanth Murthy third edition, Chaukhambha orientalia varanasi third edition 1997 p.g 115.
14. SAPValues and Lye to Make Soap, Certified Lye™, from site www.soap making procedures.com.
15. D.M. Vasudevan, S. Sreekumari. Text book of Biochemistry for medical student. 4th ed. Jaypee Brothers. Medical Publishers; 2005 p. 76.
16. Pharmacopoeial Standards for Ayurvedic Formulations, Central Council for research in Ayurveda and Siddha, Ministry of Health and Family Welfare, Government of India. 1st ed. New Delhi: 1987. p. 191.
17. Sharangadhara Acharya. Sharangadhara Samhita. Adhamala, Kashiram, editors. 4th ed. Varanasi: Chaukhamba Orientalia; 2000. p. 5.

हिन्दी सारांश

अपामार्ग क्षार तैल के निर्माण में माध्यम का महत्व

हिताबा गोहिल किन्नरि ध्रुव पी. के. प्रजापति

सामान्यतः तैल एवम् घृत बनाने में कल्क एवम् द्रव्य (स्वरस, क्वाथ या जल) का प्रयोग किया जाता है। परन्तु अपामार्ग क्षार तैल बनाने में द्रव के रूप में क्षार द्रव का (अपामार्ग को जला कर श्वेत वर्ण की राख प्राप्त करते हैं। तथा इसे जल में घोल कर छान लेते हैं) प्रयोग किया जाता है। तैल बनाने में माध्यम का महत्व जानने के लिये उपर्युक्त तैल का अपामार्ग के ताजे व सूखे कल्क एवं स्वरस तथा क्वाथ से बना कर उसका रासायनिक परिक्षण किया गया जिसमें अपामार्ग क्षार तैल जो कि ताजे कल्क एवम् क्षार द्रव से बनाया गया उसको निर्माणात्मक गुणों के आधार पर अन्य से अच्छा पाया गया।