Periodic Research

Pharmacopoeial Standards of Ayurvedic Formulations with special reference to Vasa Ghrita

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Setting a standard for an Ayurvedic formulation is a very tedious task due to numerous variables involved during the entire sequences of events. Before drawing a final conclusion, adequate repetitions of experiments are required & the same have been done here in case of Vasa Ghrita. During the preparation of Vasa Ghrita, especially pushpa kalka (Paste of Flowers) is used, which differentiate it from other types of Sneha Kalpana. Different proportions of pushpa kalka have been used here & in total 12 samples have been prepared. One sample has been prepared without addition of any kalka dravyas to evaluate the role of pushpa kalka in different proportions. Another sample has been prepared where distilled water has been used in place of vasa kwatha. Every precautionary measure has been taken & Standard Operating Procedures (SOP) has been followed to the possible extent. All the pharmacopoeial standard parameters adopted for the Sneha Kalpana have been selected for the analysis of all the samples of Vasa Ghrita along with the untreated ghee to make a comparative study. The basic principles of snehapaka kalpana have been vitalized with the help of these parameters & the pharmacopoeial standards for Vasa Ghrita have been given basing on the above experimentations. At the end of the study, it has been found that 1/4th proportion of pushpa kalka is used to get the pharmacological properties of the drugs used & 1/8th proportion of pushpa kalka is used for the augmentation of sneha.

Keyword: Vasa Ghrita, Pushpa kalka, Sneha Kalpana, Kalka, Pharmacopoeial standards, SOP

Introduction

Ayurveda is the eternal & oldest science of life. Its origin is as old as that of human race. It not only treats the ailment but also treats the person as a whole. The holistic approach of Ayurveda has turned the attention of a large community of the world. After receiving the fatal consequences through modern synthetic and chemotherapeutic preparations, people are turning towards this holistic approach of health care. Ayurveda is gaining momentum in all spheres. Right from the proper identification of raw materials to extreme clinical application, a special branch of Ayurveda has evolved which is known as Bhaishajya Kalpana. Sneha Kalpana is one of the important Kalpana, which has been included under Bhaishajya Kalpana. A large number of Sneha Kalpanas have been described in almost all the treaties of Ayurveda. This shows the importance of Sneha Kalpana in Ayurvedic therapeutics. Despite such importance, difference in opinion still exists, regarding the basic principles of Sneha Kalpana. Different views are prevailing as per the author concern.

In a Sneha Kalpana, three essential components are required, such as - kalka dravya, sneha dravya & drava dravya. These are taken in a proportion of ¼:1:4, as a general principle[1]. But when pushpakalka (Paste of flowers) is used for kalka purpose, as in the case of Vasa Ghrita, then the proportion of kalka dravya should be 1/8th that of sneha, according to Acharya Sharangdhar[7]. Kwatha is used as a drava dravya during the preparation of Vasa Ghrita.So according to general principle, the proportion of kalka dravya should be 1/6th of sneha[8]. Again, Acharya Chkrapani Dutta comments that the proportion of kalka dravya should be 1/4th that of sneha, as snehakalpana is kalka pradhanya[2]. These types of difference in opinion are seen in Ayurvedic classics. It is also quite natural, because in ancient times, different schools of thought used to exist basing upon distinctive specialization. The then commentators flourished from a particular school

of thought and the commentary of a particular commentator obviously interpreted the facts keeping in mind the school of thought he belongs to. Therefore many opinions came into floor. So the question obviously arises that what should be the proportion of kalka dravya in a Sneha Kalpana? To clear this confusion, all the proportions of kalka, i.e - 1/4th, 1/6th & 1/8th have been taken for the preparation of Vasa Ghrita. Vasa Ghrita has been prepared thrice each by taking the above proportions of pushpa kalka into account. Without addition of any kalka dravya, one sample has been prepared. Another sample has also been prepared, where distilled water has been used in place of vasa kwatha as a drava dravya. All the above planning has been done to evaluate the role of pushpa kalka in different proportions. Dried powder of vasa flower has been taken up for kalka purpose in all samples, except in one, where fresh pushpa kalka has been used. So, in total, 12 samples of Vasa Ghrita have been prepared in different ways.

Out of all the varities of Vasa, *Adhatoda vasica* has been selected as the only herbal drug during the preparation of various samples of Vasa Ghrita. Britannia Milk Man pure ghee has been taken up as the base of Vasa Ghrita as it is considered to be pure cow's ghee.

Ayurveda is now a day's dealing in global platform. So it is important to present this system of medicine & it's principle in a systematic and a larger objective way, which will be more acceptable to the international scientific community. To produce a quality medicine is not the end of the story, but it is also equally important to prove its quality. This demands certain standardized parameters, which may not be exclusive, but by & large scientific. This present research work has been taken off in such a direction. Some Physico-Chemical parameters[4] have been selected which includes - Specific Gravity at 40^{0}C, Refractive Index at 40^{0}C, Loss on Drying at 110^{0}C, Peroxide Value, Acid Value, Iodine Value, Saponification Value, Unsaponifiable Matter & Ester Value.

Britannia Milk Man pure ghee, which has been used as a base for the preparation of samples, has also been analyzed for the above parameters. Basing on the value of various parameters, a comparative study has been done. The Pharmacopoeial standards for Vasa Ghrita have been given at the end of the study basing on the above experimentations.

Aim of Study:

Present research work has been undertaken with the following aims & objectives –

- Evaluate the role of pushpa kalka in various proportions.
- The basic principles of Sneha Kalpana have been vitalized with the help of modern parameters.
- A pharmacopoeial standard has been given for Vasa Ghrita.

Materials & Method:

12 samples of Vasa Ghrita have been prepared according to the reference of Charak Samhita Raktapitta Chikitsa 4/88[3]. Different proportions of pushpa kalka, i.e, 1/4th, 1/6th & 1/8th to that of sneha have been used during the preparation of samples. Samples containing the above proportions of pushpa kalka have been prepared thrice each. In another sample, only distilled water has been used in the place of vasa kwatha. Dried powder of vasa pushpas have been used in all the samples for kalka purpose except in one sample where fresh pushpa kalka have been used to have a comparative study between fresh & dried flowers of vasa. In another sample, no pushpa kalka have been used, where the preparation has been done with the decoction of vasa plant. In this way 12 samples have been prepared. The planning behind the preparation of 12 samples of Vasa Ghrita can be summarized from the table given below.

Table 1:
Raw Materials taken for the preparation of various samples of Vasa Ghrita

Sample No.	Condition of flower taken for kalka	Amount of dried powder of flower taken for kalka	Amount of fresh flower taken for kalka	Amount of ghee taken	Amount of vasa kwatha taken	Amount of distilled water taken
01	Dry	75 gm	X	300 gm	1200 ml	X
02	Dry	75 gm	X	300 gm	1200 ml	X
03	Dry	75 gm	X	300 gm	1200 ml	X
04	Dry	50 gm	X	300 gm	1200 ml	X
05	Dry	50 gm	X	300 gm	1200 ml	X
06	Dry	50 gm	X	300 gm	1200 ml	X
07	Dry	37.5 gm	X	300 gm	1200 ml	X
08	Dry	37.5 gm	X	300 gm	1200 ml	X
09	Dry	37.5 gm	X	300 gm	1200 ml	X
10	Fresh	X	75 gm	300 gm	1200 ml	X
11	X	X	X	300 gm	1200 ml	X
12	Dry	75 gm	X	300 gm	X	1200 ml

For the preparation of Vasa Ghrita, the following three (3) essential components have been required, such as -

- Ghee,
- Vasa Kwatha &
- Vasa Pushpa kalka.

Ghee:

In the preparation of all the samples of Vasa Ghrita, Britania Milkman branded pure cow's ghee, manufactured by Modern Diaries Ltd, Karnal (Haryana) and marketed by Britannia Industries Limited, Kolkatta has been used. 300 gms of ghee has been used in the preparation of of Vasa Ghrita. 300 gm of ghee when melted becomes 325ml in volumetric measurements.

Vasa Kwatha:

The decocotion of vasa has been prepared out of the whole plant of *Adhatoda vasica*. 1200gms of vasa has been used for the preparation of kwatha, which includes -

Stems - 660 gms
Leaves - 330 gms
Roots - 210 gms

In the preparation of all the sample of vasa kwatha, this proportion of vasa plant has been used. Though there is a general principle in Ayurveda that all the parts should be used in equal proportion, if the proportion has not been mentioned[9], but during the

research work, a mean observation has been made that the single whole plant of vasa consists of the parts in the above proportions. So this proportion has been used for the preparation of kwatha.

1200 gms of vasa was taken in a clean stainless steel vessel and to this 4800 ml of distilled water, i.e., 4 times that of vasa was poured. The vessel was kept on fire and boiled with the help of mild heat. When the quantity of water was reduced to 1/4th, i.e., 1200ml, the vessel was taken out of fire and the kwatha was poured into another vessel with the help of a double-layered clean white cloth. The obtained kwatha was greenish in colour, bitter in taste with the characteristic smell of vasa. The obtained kwatha was kept safely for further use. The details regarding the preparation of Vasa Kwatha can be summarized from the table given below.

Table 2:

Details regarding the preparation of Vasa Kwatha

Sample No.	Amount of fresh vasa	Quantity of distilled	Quantity of kwatha	Time taken for	Temperature for Preparati
1	1200 gm	4800 ml	1200 ml	3.15	95-99
2	1200 gm	4800 ml	1200 ml	3.25	95-99
3	1200 gm	4800 ml	1200 ml	3.00	95-99
4	1200 gm	4800 ml	1200 ml	3.15	95-99
5	1200 gm	4800 ml	1200 ml	3.10	95-99
6	1200 gm	4800 ml	1200 ml	3.00	95-99
7	1200 gm	4800 ml	1200 ml	3.00	95-99
8	1200 gm	4800 ml	1200 ml	3.20	95-99
9	1200 gm	4800 ml	1200 ml	3.30	95-99
10	1200 gm	4800 ml	1200 ml	3.15	95-99
11	1200 gm	4800 ml	1200 ml	3.30	95-99
12	X	X	X	X	X

Vasa Pushpa kalka:

In the preparation of all the samples of Vasa Ghrita, dried powder of the flowers have been used for kalka purpose except in one sample where fresh vasa flowers have been made into kalka form & used. The intention was to see the difference between the two.

Adhamalla, in his Dipika commentary of Sharangdhara Samhita quotes that required amount of raw materials should be taken and made into kalka form[1]. If the sample is dry powder, then the water is added to it & the kalka should be made. So, during the preparation of various samples, proportions of dried powder of vasa pushpas were taken and required amount of water was added. In a single sample, fresh pushpas were taken and directly made into kalka form. The details regarding the preparation of pushpa kalka have been tabulated in the table given below.

Table 3:
Details regarding the preparation of pushpa kalka

Sample No.	Condition of flower	Amount of Dry powder taken	Amount of Fresh flower taken	Quantity of water added	Weight after addition of water
1	Dry	75 gm	X	175 ml	250 gm
2	Dry	75 gm	X	175 ml	250 gm
3	Dry	75 gm	X	175 ml	250 gm
4	Dry	50 gm	X	115 ml	165 gm
5	Dry	50 gm	X	115 ml	165 gm
6	Dry	50 gm	X	115 ml	165 gm
7	Dry	37.5 gm	X	90 ml	127.5 gm
8	Dry	37.5 gm	X	90 ml	127.5 gm
9	Dry	37.5 gm	X	90 ml	127.5 gm
10	Fresh	X	75 gm	X	X
11	X	X	X	X	X
12	Dry	75 gm	X	175 ml	250 gm

Method of Preparation of Vasa Ghrita:

Vasa Ghrita as has been described by Acharya Charak in Charaka Samhita Chikitsa Sthana 4/88 has been taken as reference for the preparation of all samples3.

In a clean, dry stainless steel vessel, 300gms of ghee was taken and melted in mridu agni. When phena shanti takes place, it was taken out of fire & slightly cooled. Then pushpa kalka of required amount was added to the ghee and stirred regularly by keeping the vessel on fire. After sometimes, vasa kwatha was added into it & snehapaka was done with the help of mridu agni6. When the lakshanas of madhyama paka, i.e, kalaka dravya should be devoid of liquid and should be soft10, was seen, the vessel was taken out of fire and the prepared ghee was collected in slightly warm condition. Because when the ghee is fully cooled, it sticks to the kalka dravya & the percentage of loss is more. The ghee was measured when it was fully cooled and was preserved in a container for further physico-chemical analysis. The preparation of various samples of Vasa Ghrita can be summarized from the table given below.

Table 4:

Details regarding the preparation of various samples of Vasa Ghrita

Sample No.	Duration of Ghrita Paka (In hrs)	Quantities of Ghee obtained (In ml)	Loss of Ghee (In ml)	% Of Loss of Ghee	Amount of rejected kalka (in gms)	Colour of Ghee obtained
01	3.00	303	22	06.77	165	Brown
02	3.00	285	40	12.30	135	Brown
03	3.30	275	50	15.38	180	Brown
04	3.30	282	43	13.23	125	Brown
05	2.45	298	27	08.30	135	Brown
06	3.00	310	15	04.61	130	Brown
07	3.15	305	20	06.15	102	Brown
08	2.45	295	30	09.23	117	Brown
09	2.30	295	30	09.23	125	Brown
10	4.00	285	40	12.30	098	Green
11	2.30	302	23	07.07	060	Brown
12	3.45	282	43	13.23	140	Brown

During the preparation of samples, every precautionary measure has been taken and SOPs have been followed as far as possible. 325 ml of ghee

has used in each sample & each of the 12 samples was prepared in two days. The temperature range during the preparation of samples was 95-99^{0}C. As it is not possible to accurately measure the temperature, so duration of ghrita paka was also varied. Madhyama paka of sneha has been done in all the samples as it is clinically used for all purposes[8]. The quantity of ghee obtained at the end of preparation of samples was not varied significantly. The mean percentage of loss of ghee was 9.81%, which was considered as a manual loss. The rejected amount of kalka dravya was also weighed and found that it was lowest in samples no 11 where no pushpa kalka was added. The amount was comparatively lower in sample no 10 where fresh vasa pushpa kalka was added. The colour of the ghee obtained in sample no 10 was greenish in colour & the colour was brown in all other samples

Results:

All the samples of Vasa Ghrita along with the untreated ghee were analyzed for various Physico Chemical parameters prescribed for Sneha Kalpana, such as - Specific Gravity at 40^{0}C, Refractive Index at 40^{0}C, Loss on Drying at 110^{0}C, Peroxide Value, Acid Value, Iodine Value, Saponification Value, Unsaponifiable Matter & Ester Value at Oasis Test House Ltd, SP-2, 22 Godown Industrial Estate, Jaipur. The following readings came out from the test.

Table 5:
Physico - chemical values of various samples of Vasa Ghrita

Sample No	Specific Gravity at 400C	Refractive Index at 400C	Loss on Drying at 1100C	Peroxid Value	Acid Value	Iodine Value	Saponification value	Unsaponifiable Matter	Ester Value
1	0.9059	1.458	0.154	5.52	1.026	33.65	274.68	1.57	273.65
2	0.9020	1.456	0.205	1.77	1.399	17.06	208.43	0.68	207.63
3	0.8933	1.458	0.144	3.30	1.250	20.40	257.50	1.48	256.25
4	0.9017	1.456	0.679	3.14	0.946	26.75	222.49	1.53	221.60
5	0.9005	1.457	0.063	3.27	1.105	19.63	235.18	1.03	234.07
6	0.9015	1.458	0.496	4.22	1.144	28.90	268.50	1.03	267.35
7	0.9006	1.457	0.411	3.53	0.930	18.55	209.37	0.97	208.40
8	0.8999	1.458	0.833	3.18	1.019	27.39	235.24	0.53	234.20
9	0.9008	1.458	0.179	5.87	1.113	27.29	248.90	0.60	247.83
10	0.9038	1.457	8.009	6.58	0.849	17.50	234.17	0.83	233.32
11	0.8977	1.457	0.050	5.60	0.680	18.50	233.53	0.78	232.84
12	0.9046	1.456	0.104	1.80	1.409	19.63	219.39	1.49	217.98

Britannia Milk Man pure ghee, which has been used as a base for the preparation of all the samples of Vasa Ghrita has also been analyzed for all the above parameters. Basing on the values of the various parameters, it has been easier for a comparative study between plain ghrita & Vasa Ghrita, containing various proportions of pushpa kalka. The readings of the plain ghee along with the readings of all the samples of Vasa Ghrita according to various proportions of pushpa kalka (1/4th, 1/6th & 1/8th) to that of ghee have been given in the table below.

Table 6:
Physico - chemical parameters of plain ghee & various samples of Vasa Ghrita according to various proportions of pushpa kalka

Sl. No.	Name of the Parameters	Values of plain ghee	Values according to various proportions of pushpa kalka		
			1/4th	1/6th	1/8th
1	Specific Gravity at 400C	0.9062	0.8933 - 0.9059	0.9005 - 0.9017	0.8999 - 0.9006
2	Refractive Index at 400C	1.456	1.456 - 1.458	1.456 - 1.458	1.457 - 1.458
3	Loss on Drying at 1100C	0.074	0.144 - 0.205	0.063 - 0.679	0.179 - 0.833
4	Peroxide Value	4.12	1.77 - 5.52	3.14 - 4.22	3.18 - 5.87
5	Acid Value	0.822	1.026 - 1.399	0.946 - 1.144	0.930 - 1.113
6	Iodine Value	17.12	17.06 - 33.65	19.63 - 26.75	18.55 - 27.39
7	Saponification Value	227.20	208.43 - 274.68	222.49 - 268.50	209.37 - 248.90
8	Unsaponifiable Matter	1.06	0.68 - 1.57	1.03 - 1.53	0.53 - 0.97
9	Ester Value	226.37	207.03 - 273.65	221.60 - 267.35	208.40 - 247.83

Discussion:

The Discussion is the most interesting part of a research work. In this section, the researcher is expected to justify the results in the light of what have already been known on the subject. The discussion is the argument put forth by the researcher based on the logical conclusion of the study.

The presence of dissolved substances in the final product of Vasa Ghrita can be measured from specific gravity. If the specific gravity is less than 0.9062 (Specific gravity of plain ghee) then it is considered that some dissolved substances are present in the final product. In all the 12 samples of Vasa Ghrita, specific gravity was less than 0.9062. So it can be considered that some content of vasa either from kwatha or from kalka has come to the final product.

Refractive index varies significantly with the temperature. So keeping the temperature at 40^{0}C, all the samples were analyzed & it has been seen that there is absolutely very little difference in values. The value of all the sample of vasa ghrita varies with in the range of 1.456 to 1.158.

In sample no 11, vasa pushpa kalka was not used. So the undissolved materials were very low in that sample leading to lowest loss on drying value. But in sample no 10, fresh vasa pushpas were used for kalka purpose. So Loss on Drying was maximum in that sample.

Peroxide value indicates the oxidation of active molecules in the final product. In various samples of Vasa Ghrita, this value was maximum in sample no 10 & minimum in sample no 02. So it can be commented that the oxidation is maximum & minimum in sample no 10 & 02 respectively.

Acid value indicates the amount of free acids present in the final product of Vasa Ghrita. It was lowest in sample no 11. It may be due to non-addition of kalka dravya for preparation of sample. Again it was minimum in sample no 02 which indicates that the presence of acidic constituent was more in that sample. In all the samples of Vasa Ghrita, the values were more than the plain ghee except in sample no 1, where no pushpa kalka was added in the preparation. So it can be said that there is importance of kalka dravya in a Sneha Kalpana.

Iodine value indicates the percentage of saturation of sneha. From the observation it has been found that this value was maximum & minimum in sample no 01 & 02 respectively. The decrease in Iodine value indicates the oxidation across the chain of fatty acids.

Saponification value is a measure of molecular weight of the fat and glycerides of small chains of fatty acid. This value was observed to be maximum in sample no 01 & minimum in sample no 02 respectively.

Unsaponifiable matter indicates the fat-soluble components present in the final product of Vasa Ghrita. This value was observed to be maximum in sample no 01 & minimum in sample no 08. So it indicates the fat-soluble materials were maximum & minimum in sample no 08 & 01 respectively.

Ester value is the difference of saponification value and acid value. So the amount of ester content in the final product of Vasa Ghrita can be measured from this value. This value was maximum & minimum in sample no 01 & 02 respectively.

Conclusion:

At the end of a research work, it is customary for a researcher to list the conclusions. Drawing conclusions of a research work is very important & requires repeated experimentations. The conclusions which comes out from the research work is that $1/4^{th}$ proportion of pushpa kalka is used to get the pharmacological properties of drugs used, whereas $1/8^{th}$ proportion of pushpa kalka is recommended for augmentation (gandha vridhi) of sneha. The values given in the results according to various proportion of pushpa kalka may be considered as a pharmacopoeial standard for the Vasa Ghrita.

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