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Comparative Pharmaceutico - Analytical Study of *Kushthaghna Mahakashaya* and its *Ghanavati* w.s.r. to evaluate its shelf life

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ABSTRACT

In this present era of utilization of active principles as a medicine the basic formulations of *Bhaishajya Kalpana* remain a main source for modern research. The basic formulations are described as *Panchavidha Kashaya Kalpanas*. Out of these *Kashaya Kalpanas*, *Kwatha Kalpana* is an important formulation which is having more potency after *Swarasa* and *Kalka Kalpana*. *Kashaya* has very short shelf life (*Saveeryatavadhi*). These *Kashayas* cannot be preserved for longer period. These have to be prepared fresh every day and also the method of preparation is time consuming. *Rasakriya (Ghana)* is a type of formulation where in the active components can be stored for more days i.e. 3 years (D&C act 161B, w.e.f. 1st April 10). Converting this *Kashaya* in to *Ghana* form and then into *Ghanavati* form may increase the shelf life of the formulation. Along with this it will give a proper shape and dose for the easy administration of medicament. Hence the present research was planned to convert *Kushthaghna Mahakashaya Kwatha* into *Kushthaghna Mahakashaya Ghanavati* using standard operating procedure to potentiate active principle in it, and to evaluate shelf life of *Kushthaghna Mahakashaya Ghanavati*.

Key words: *Kashaya Kalpana, Kwatha, Kushthaghna Mahakashaya Ghanavati, Shelf life.*

INTRODUCTION

The science of life "Ayurveda" is in practice for more than 5000 years. The real strength of this science lies in its literature. The ancient literature being in Sanskrit remains in want of research, in the present era. Many treatment modalities and formulations are suggested in the ancient literatures to prevent and

cure many diseases arising out of a condition called as vitiation of the *Doshas*.

In classics, there is detail and careful explanation of the observations, information and presentation of the available knowledge which can contribute to the medicine. In this present era of utilization of active principles as a medicine the basic formulations of *Bhaishajya Kalpana* remain a main source for modern research.

These basic formulations are described as - *Panchavidha Kashaya Kalpanas*^[1] Out of these *Kashaya Kalpanas*, *Kwatha Kalpana* is an important formulation which is having more potency after *Swarasa* and *Kalka Kalpana*. *Kwatha* is also known as *Kashaya*. *Kashaya* is prepared by method of boiling the drug with water for a specified period. *Kashaya* has very short shelf life (*Saveeryatavadhi*) i.e. only one day. These *Kashayas* cannot be preserved for longer period. These have to be prepared fresh every day

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and also the method of preparation is time consuming.

Rasakriya (Ghana)^{[2],[3]} is a type of formulation where in the active components can be stored for more days i.e. 3 years (D&C act 161B, w.e.f. 1st April 10).

Converting this *Kashaya* into *Ghana* form and then into *Ghanavati* form may increase the shelf life of the formulation. Along with this it will give a proper shape and dose for the easy administration of medicament.

There is no doubt that our ancient *Acharyas* were well aware of the *Saveeryata Avadhi* (Shelf life period) of various formulations. The *Acharyas* may have prepared formulations with small shelf life due to,

- Small scale production
- Availability of fresh raw drugs
- Pharmaceutics at its development stage
- Lack of mass production
- Unavailability of sophisticated equipments.

Acharya Sharangadhara was the first to explain the shelf life of various formulations generally used during those periods. (Sha. Sa. Pra. 1/51-53).

Charaka in his *Sutrasthana* has mentioned fifty *Mahakashayas*, each containing ten herbs. One of them is *Kushthaghna Mahakashaya*,^{[4],[5]} which is used to treat various skin diseases.

Converting the *Kashaya* into *Ghana* and then to *Ghanavati* of "*Kushthaghna Mahakashaya*" will increase the shelf life of the formulation. Physico-chemical analysis of both the formulations along with the shelf-life of the *Ghanavati* which will be determined with the help of modern methodologies. An effort will be carried out to determine the antimicrobial effect of *Kushthaghna Mahakashaya* and *Kushthaghna Mahakashaya Ghanavati*.

OBJECTIVES OF THE STUDY

The aim of this present study is to convert the *Kashaya* into *Ghana* and then to *Ghanavati* by using S.O.P. (Standard Operating Procedure) and then to evaluate the shelf life of *Kushthaghna Mahakashaya Ghanavati*.

MATERIALS AND METHODS

Table 1: Ingredients of *Kushthaghna Mahakashaya*^[6-9]

SN	Drug	Latin name	Part used	Quantity
1.	<i>Khadira</i>	<i>Acacia catechu</i> Wild.	Stem bark	20 g.
2.	<i>Abhaya</i>	<i>Terminalia chebula</i> Retz.	Fruit	20 g.
3.	<i>Amalaki</i>	<i>Emblica officinalis</i> Gaertn	Fruit	20 g.
4.	<i>Vanharidra</i>	<i>Curcuma aromatica</i> Salisb.	Rhizome	20 g.
5.	<i>Shuddha Bhallataka</i>	<i>Semicarpus anacardium</i> Linn.	Mature Fruit	20 g.
6.	<i>Saptaparna</i>	<i>Alstonia scholaris</i> R.Br.	Stem Bark	20 g.
7.	<i>Aragwadha</i>	<i>Cassia fistula</i> Linn.	Fruit Pulp	20 g.
8.	<i>Shuddha Karavira</i>	<i>Nerium odorum</i> Saland	Root	20 g.
9.	<i>Vidanga</i>	<i>Embelia ribes</i> Burm. F.	Fruit	20 g.
10.	<i>Jati</i>	<i>Jasminum officinale</i>	Leaf	40 g.
11.	Water	-		3.520 litres

Equipments for *Kushthaghna Mahakashaya Kwatha*^[10-11]

1. Weighing machine
2. Measuring cylinder 2000 ml, 500ml, 100 ml.
3. Stainless Steel Vessel 20L, 1L.

4. Heating Device - Gas burner with LPG cylinder
5. Stainless steel ladle
6. Pair of tongs
7. Cloth
8. Sterile airtight containers.

Kushthaghna Mahakashaya Kwatha Preparation [12],[13]

1. 220 g. *Kushthaghna Mahakashaya* coarse *Churna* was taken and mixed with sixteen parts of water i.e. 3.520 litre in stainless steel container.
2. It was allowed to soak for overnight.
3. Stainless steel container containing above mixture was kept for decoction on mild heat.
4. The temperature was maintained between 92° - 93° C.
5. Continuous mild heat was given till it reduced to 1/8th part.
6. Prepared *Kwatha* was filtered by white clean cotton cloth.
7. After cooling of *Kwatha*, it was kept for analytical study in sterile glass bottle.
8. Sample labeled and kept in dry and cool place.

Kushthaghna Mahakashaya Ghanavati

Equipments

1. Weighing machine
2. Measuring cylinder 2000 ml, 500ml, 100 ml.
3. Stainless Steel Vessel 20L, 1L.
4. Heating Device - Gas burner with LPG cylinder
5. Stainless steel ladle
6. Stainless steel tray
7. Pair of tongs
8. Cloth
9. Sterile airtight containers.

Kushthaghna Mahakashaya Ghanavati Preparation^[14-15]

1. Prepared *Kushthaghna Mahakashaya* was filtered in stainless steel container by white clean cotton cloth.
2. It was subjected to mild heat.
3. Continuous stirring was done.
4. The temperature was maintained at 68° c.
5. Obtained Ghana was placed for drying for two days.
6. Pills were made manually.
7. Pills were kept for drying in shade for six days.
8. The glass containers were autoclaved.
9. Kept in oven for drying.
10. Prepared *Ghanavati* was packed in the container for shelf life study and other analytical study tests.

OBSERVATIONS AND RESULTS

Table 2: Total yield of Kwatha

1.	Time taken for preparation of <i>Kwatha</i>	2:45 hrs.
2.	Final quantity of <i>Kwatha</i> obtained	430 ml.
3.	% of <i>Kwatha</i> obtained	12.21 %

Table 3: Total yield of Ghana

1.	Time taken for preparation of <i>Kwatha</i>	13:20 hrs
2.	Final quantity of <i>Kwatha</i> obtained	2250 ml
3.	% of <i>Kwatha</i> obtained	12.78 %
4.	Time taken for preparation of <i>Ghana</i>	5:40 hrs
5.	Quantity obtained before drying	488.4 gm
6.	Quantity obtained after drying	428 gm
7.	% of <i>Ghana</i> obtained	19.02%

Table 4: Total yield of Ghanavati

1.	Quantity of Ghanavati obtained before drying	390 gm
2.	Quantity of Ghanavati obtained after drying	357 gm
3.	% of Ghanavati obtained	15.86%

Table 5: Organoleptic characteristics of Kwatha and Ghanavati

SN	Name	Kwatha	Ghanavati
1.	<i>Sparsha</i>	Liquid, <i>Sheeta</i>	Solid, <i>Snigdha</i> , <i>Sheeta</i>
2.	<i>Roopa</i>	Brown	Blackish brown
3.	<i>Rasa</i>	Bitter	Less bitter
4.	<i>Gandha</i>	Characteristic	Characteristic

Table 6: Physico-chemical parameters of Kushthaghna Mahakashaya Kwatha

SN	Name of Test	Unit	Value
1.	Loss on drying	%	95.01
2.	Ph	-	3.71
3.	Specific gravity	%	1.033
4.	Clarity test	%	Turbid
5.	Water soluble extractive	%	9.01
6.	Assay	%	7.01

Table 7: Physico-chemical parameters of Kushthaghna Mahakashaya Ghana

SN	Name of test	Initial Value (at '0' month)	Final value (at '9th' month)
1.	Loss on drying at 105 ⁰ C (%)	15.72	9.18
2.	Total ash (%)	9.69	9.27
3.	Acid insoluble ash (%)	1.14	1.04

4.	Lead	Not detected	-
5.	Mercury	Not detected	-
6.	Arsenic	Not detected	-
7.	Cadmium	Not detected	-
8.	Microbial contamination	Not detected	-
9.	Hardness	7.2	8.6
10.	Friability test	0.01	0.01
11.	Uniformity of weight	208mg	202.1mg
12.	Disintegration time	24 minutes	24 minutes 30 seconds
13.	pH	-	5.13
14.	Water soluble extractive (%)	51.12	49.78

Table 8: Comparison of Physico chemical parameters of Kwatha and Ghanavati

SN	Name of test	Kwatha	Ghanavati
1.	pH	3.71	5.13
2.	Loss on drying (%)	95.01	9.18
3.	Water soluble extractive (%)	9.01	49.78

DISCUSSION

Aacharya Charaka mentioned *Kushthaghna Mahakashaya* i.e. *Kwatha Kalpana* which has its own disadvantages. The shelf life of the *Kwatha Kalpana* is 24 hrs, so modification was necessary to increase the shelf life, easy to swallow, easy to handle. So it was decided to convert *Kwatha* into the *Ghanavati*. With the reference of *Sharangdhara Samhita*, *Kwatha* was converted into *Rasakriya* which is semisolid in nature by giving continuous mild heat to *Kwatha*. *Rasakriya* was turned into *Ghana* and then into *Ghanavati*. As *Ghanavati* does not contain moisture it becomes easy to store than that of *Kwatha* which is having water in large quantity. Continuous mild heat was given to *Kwatha* and water was evaporated to make *Ghanavati*.^[16]

All drugs were taken in coarse powdered form individually and then mixed together in steel vessel. The object of powdering the material is to rupture the organ, tissue and cell structure of the plant material so that the medicinal ingredients present in it are exposed to the solvent with which is to be extracted. The size reduction provides maximum surface area of the particle size, which in turn enhances the mass transfer of active principle from plant material in to the solvent.

Kwatha Churna was mixed with water and kept for overnight. Here, the herbal drugs tissues are treated with water to dissolve out the active principles. The cell tissues and most of inactive and inert components remain undissolved. The water molecules easily penetrate into the soft drug tissue.

Jatiprawala was taken in double quantity. In any compound preparation of dry and wet drugs are together, then wet drugs should be freshly collected taken in double quantity of dry ones (*Sharangdhara Samhita* 1/48). In relation with wet drugs, dry drugs are guru and tikshna in nature. Moreover, the wet drugs do posses larger amount of water content in them which adds for their weight and if these drugs are taken in equal quantity to that of dry ones, the real quantity of drug taken excluding the water part will be less.

During *Kwatha* preparation, all drugs sank down after two hrs of heating except *Jatiprawala*. *Jatiprawala* is light in weight, so that it took more time to sink down. Initially *Kwatha* was brown in colour which converted into dark brown coloured solid material due to evaporation of the moisture content.

For *Ghana* preparation continuous stirring was done carefully to avoid burning of the reduced drug material. *Kushthaghna Mahakashaya Ghana* becomes stickier in nature because of containing *Aragwadha Phala Majja*. This sticky material was completely water soluble. It was easily washed off from fingers. *Ghana* was dried for 2 days in shade to get proper consistency and then *Vati* were rolled out. Prepared pills were dried in shade for 6 days before storing to keep them completely dry and in proper shape. Drying is preferred under shade because *Kushthaghna*

Mahakashaya Ghanavati softens when dried in sunlight. After drying of *Kushthaghna Mahakashaya Ghanavati*, transfer into autoclaved airtight container with precaution to prevent from foreign matter, micro organisms and fungal growth. Total yield of *Kushthaghna Mahakashaya Kwatha* is 12.21% and that of *Ghanavati* is 15.86%. The method of preparation of *Ghanavati* is more time consuming than that of *Kwatha*. *Kwatha* preparation is the first step of making *Ghanavati*. *Kwatha* is water extractive, so it took more time to evaporate water part from it to convert into *Ghana* and then into *Ghanavati* by achieving proper consistency.

Analytical Study

pH - pH of *Kushthaghna Mahakashaya Kwatha* is less than *Kushthaghna Mahakashaya Ghanavati*, which indicates that *Kushthaghna Mahakashaya Kwatha* is more acidic in nature than *Kushthaghna Mahakashaya Ghanavati* because some acids evaporate with moisture during preparation of *Kushthaghna Mahakashaya Ghanavati*. So, the pH is more in *Kushthaghna Mahakashaya Ghanavati*.

Clarity test - The appearance of *Kushthaghna Mahakashaya Kwatha* was seen in the sunlight. The test is done to check whether the solution is clear or turbid. *Kushthaghna Mahakashaya Kwatha* was turbid in nature.

Loss on drying - Moisture content of '9th' month sample is less than that of '0' month sample because the *Kushthaghna Mahakashaya Ghanavati* released the moisture during the storage. Loss on drying of *Kushthaghna Mahakashaya Kwatha* is more than *Kushthaghna Mahakashaya Ghanavati* due to more water in it.

Ash value - Ash value of *Kushthaghna Mahakashaya Churna* was 9.35. Ash value of *Kushthaghna Mahakashaya Ghanavati* was decreased in '9th' month than that of '0' month. When vegetable drugs are incinerated, they leave an inorganic ash, which in case of many drugs varies within fairly wide limit and therefore it is evaluated. The total ash figure is of importance and indicates to some extent the amount of care taken in the preparation of the drug. In the determination of total ash values the carbon must be

removed at low temperature as possible. The total ash usually consist mainly carbonates, phosphates, silicates and silica.

Water soluble extractive value - Water soluble extractives are more in *Kushthaghna Mahakashaya Ghanavati* than that of in *Kushthaghna Mahakashaya Kwatha*. *Ghanavati* is converted from *Kwatha*. Water content evaporated and remaining content become solidified. Solubility is depending on the potential (within the range of potentials under which the solid remains the stable phase). More content potentiate in *Ghanavati* so that it shows more value than that of *Kwatha*.

Shelf life study - The present analytical study has been carried out to know the quality and shelf life of finished product. Total plate count, total fungal count, enterobacter tests were carried out. Shelf life of *Kushthaghna Mahakashaya Kwatha* is one day as told in classics. Shelf life of *Kushthaghna Mahakashaya Ghanavati* is 6 months, After 6 months, total plate count and total fungal count increased which indicate that the *Ghanavati* cannot be used further.

CONCLUSION

The study reveals that sufficient Standard Operative Procedures were adopted during the study, 15.86% of *Kushthaghna Mahakashaya Ghanavati* was obtained from *Kushthaghna Mahakashaya Kwatha*. *Kushthaghna Mahakashaya Ghanavati* shows better antimicrobial activity which indicates increase in potency of active principles in it. Shelf life of *Kushthaghna Mahakashaya Ghanavati* is 6 months whereas of *Kushthaghna Mahakashaya Kwatha* is only one day.

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