



Analytical Standardization of Pravalpanchamrita Rasa

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ABSTRACT

Ayurveda, the science of healthful living is most rational & scientific amongst the ancient systems of medicine, which has struck its deep & permanent roots in the minds of the people of this country about its capacity to provide effective cure for all types of diseases. *Rasa-shastra* is a branch, which deals with herbs, minerals and metals to produce the drugs with higher efficacy in lower doses with good palatability. *Bhasmas* are unique dosage form of *Rasa-shastra*. The selected work of *Pravalpanchamrita rasa* is the most significant contribution of 'Yogratnakar'. All the constituents of *Pravalpanchamrita rasa* are from the marine origin. It is mainly used in *Anaha*, *Gulma*, *Shwas*, *Kasa*, *Agnimandhya*, *Meha*, *Mutraroga* and *Grahani*. This study includes the standardization of *Pravalpanchamrita rasa* with the help of *ayurvedic* analysis (*panchendriya pariksha*) & modern analysis (physico-chemical analysis). In this study, three samples of *Pravalpanchamrita rasa* will be prepared for analytical studies.

Keywords: *Ayurveda*, *Bhasma*, *Pravalpanchamrita rasa*, *Standardization*

INTRODUCTION

Rasa-shastra is a divine science, having its origin from the lord shiva. During the development, in the medieval period (8-10th Cen.A.D.) *Rasa-shastra* indulged in frequent use of *kharliya rasayanas*, *parpati*, *pottali*, *kupipakwa rasayana*, *bhasma*, *satva*, *druti* etc. *Bhasma* are among the most frequently used medicament in *ayurvedic* preparations. They are prepared by unique and special methods described in text as *shodhana* & *marana*. To Follow these procedures metallic or mineral matter are treated with plant juices then repeated calcinations in presence of air so that the metallic state is transformed into the corresponding oxide form and thus metals or minerals are converted into *Bhasma* form. There is a series of process through which the metal has to go, so that not only metal is converted into a dosage form that is acceptable to the body but is also extremely efficacious and safe. Here the selected research work chosen is

Pravalpanchamrita rasa. It is the most significant contribution of 'Yogratnakar'.¹ The constituents of *pravalpanchamrita rasa* are from the *shukla varga/sudha varga dravyas* named as *Praval, Mukta, Shankha, Kapardika, Shukti*. *Shukla varga* is described first time in the text 'Rasarnava'.² *Pravalpanchamrita rasa* is mainly prepared by *Bhasma* of all these ingredients, all these *bhasma* were impregnated by latex of *calotropis procera* & after impregnation pellets were made then subjected to incineration. The *pravalpanchamrita rasa* is mainly used in gastric disorders, dyspepsia, indigestion, flatulence, gastritis, cough, urinary disorder, osteoporosis etc.³

AIMS & OBJECTIVES

1. To prepare & fix a standard operative procedure of *Bhasma* of each & every ingredient of *Pravalpanchamrita rasa*.
2. To analyze physico-chemical properties of *Bhasma* through various analytical parameters.
3. To establish a standard of preparing good quality of *Pravalpanchamrita rasa*.

MATERIAL AND METHODS

PHARMACEUTICAL STUDY

In this study Shodhana of all ingredients (*Muktashukti*⁴, *Shankha*⁵, *Kaparda*⁶, *Mukta*⁷ & *Praval*⁸) was done as per reference of *Rasa tarangini*. Each *bhasma* (*Muktashukti Bhasma*⁹, *Shankha Bhasma*¹⁰, *Kaparda Bhasma*¹¹, *Mukta Bhasma*¹² & *Praval Bhasma*¹³) was prepared by following the guidelines mentioned in *rasa tarangini*. during Shodhana, *Bhavana*, *Marana* etc, procedure due care was taken to document each and every stage of process as temperature, duration, percentage of weight gain or loss, pharmaceutical standardization etc were carried out. For this following steps were taken.

Collection of Authentic raw material for preparation of *Pravalpanchamrita rasa*.

Study of weight gain or weight loss during preparation of various ingredient of *Bhasma* used in preparation of *Pravalpanchamrita rasa*.

Three samples of *Pravalpanchamrita rasa* were prepared to standardize operative procedures.

Table No: 1

Ingredients	Weight
<i>Praval bhasma</i>	20gm
<i>Mukta bhasma</i>	10gm
<i>Shankha bhasma</i>	10gm
<i>Kapardika bhasma</i>	10gm
<i>Muktashukti bhasma</i>	10gm
<i>Calotropis (latex)</i>	60ml

Procedure

For the preparation of *Pravalpanchamrita rasa*, *Praval bhasma* 2 parts and *Bhasma* of *Shankha, Mukta, Kapardika* and *Shukti* each one part respectively were mixed and then triturated with the latex of *calotropis procera*, till it attains the consistency like of dough. After this pellet were made from this dough, dried and kept into *Sharava samputa* & subjected to *Gajaputa*. Then *Sharava Samputa* was opened & material was powdered. The rest samples of *Pravalpanchamrita rasa* were prepared by using same procedure.

Table N: 2

Sample Name	Wt. before puta(in gm.)	Wt. of pellets (in gm.)	Wt.after puta(in gm.)	Loss in weight (in gm.)	% loss
<i>Pravalpanchamrita rasa A</i>	60	74	39	21	35.00
<i>Pravalpanchamrita rasa B</i>	60	70	40	20	33.34
<i>Pravalpanchamrita rasa C</i>	60	72	38	22	36.67

Observation

Initially 45ml of *Ark ksheera* was required to wet the drug. After trituration for three hours, again 15ml. of latex was added to form as mud like consistency.

The whole process took 6 hours for trituration.

The maximum temperature range was 900⁰C-1000⁰C.

After *gajaputa*, some percentage of weight loss of pellets was noticed.

ANALYTICAL STUDY

Physico-chemical study

This includes the standardization of *Pravalpanchamrita rasa* with the help of *Ayurvedic* analysis (*Panchendriya Pariksha*) & modern analysis (physico-chemical analysis)

Ayurvedic analysis (panchendriya pariksha/ organoleptic examination)

There are specific characters mentioned in the treatises of *Rasa-shastra* to evaluate the quality of *bhasma*. They are chiefly organoleptic characters, like *Rupa*(appearance), *Sparsh*(touch), *Rasa*(taste), *Gandha*(smell) etc. The organoleptic characters of all the samples were documented.

Table No: 3 Organoleptic Characters of *Pravalpanchamrita Rasa*

Sample	<i>Rupa</i> (appearance)	<i>Rasa</i> (Taste)	<i>Sparsh</i> (Touch)	<i>Gandh</i> (Odour)
<i>Pravalpanchamrita rasa A</i>	Off white	Slight Pungent	Smooth & fine	Odourless
<i>Pravalpanchamrita rasa B</i>	Off white	Slight Pungent	Smooth & fine	Odourless
<i>Pravalpanchamrita rasa C</i>	Off white	Slight Pungent	Smooth & fine	Odourless

Table No: 4 Organoleptic Characters of ingredients *Bhasma*

Characters	<i>Pravalmoola Bhasma</i>	<i>Shankha Bhasma</i>	<i>Mukta Bhasma</i>	<i>Kapardika Bhasma</i>	<i>Muktashukti Bhasma</i>
Appearance	White	White	Off White	White	White
Taste	Slight Pungent	Slight Pungent	Slight Pungent	Slight Pungent	Slight Pungent
Odour	Odourless	Odourless	Odourless	Odourless	Odourless
Touch	Smooth & fine	Smooth & fine	Smooth & fine	Smooth & fine	Smooth & fine
<i>Rekhapurnatva</i>	Positive	Positive	Positive	Positive	Positive
<i>Varitaratva</i>	Positive	Positive	Positive	Positive	Positive
<i>Nirdhumatva</i>	Positive	Positive	Positive	Positive	Positive
<i>Mridutwa</i>	Positive	Positive	Positive	Positive	Positive

Identification & Qualitative Analysis of Raw Materials

All the raw material are identified by the *grahya* (acceptable) properties mentioned in the text of *Rasa-shastra*

Qualitative test

Test for calcium

A small amount of powder was dissolved in the water to prepare a solution and the solution was treated with ammonium oxalate solution. A white precipitate, which is soluble in hydrochloric acid and insoluble in acetic acid, indicates the presence of calcium.

Test for carbonate

A small quantity of the sample was heated with dilute hydrochloric acid. Production of effervescent liberating carbon dioxide. This produces white precipitate in calcium hydroxide solution indicates presence of carbonate.

Table No: 5 Quantitative percentage of Calcium in raw material

Name of Raw Material	Weight % of Calcium
<i>Praval moola</i>	30.65
<i>Shankha</i>	43.19
<i>Muktashukti</i>	33.54
<i>Mukta</i>	34.11
<i>Kaparda</i>	32.34

Each component of *Pravalpanchamrita rasa* and its final product was analyzed by following parameters: organoleptic characters, loss on drying, pH value, total ash, acid insoluble ash, water soluble extractive, alcohol soluble extractive, presence of trace elements.

pH Value

Determination of pH value- pH represents the acidity or alkalinity of an aqueous solution. It may be defined as negative logarithm of hydrogen ion concentration.

$$\text{pH} = -\log[\text{H}_3\text{O}^+]$$

The pH range is taken as 0 to 14 for most of the practical purpose. Neutral solution has pH -7. Acidic solution has pH less than 7, while alkaline solution has pH more than 7.

Table No: 6 pH of ingredient of pravalpanchamrita rasa

S.No.	Name of <i>Bhasma</i>	Sample No. 1	Sample No. 2	Sample No. 3
1.	<i>Pravalmoola Bhasma</i>	12.85	12.13	12.72
2.	<i>Shankha Bhasma</i>	10.91	11.01	10.85
3.	<i>Muktashukti Bhasma</i>	12.91	13.01	12.86
4.	<i>Mukta Bhasma</i>	11.98	11.89	11.65
5.	<i>Kaparda Bhasma</i>	9.89	10.56	10.11

Loss on drying

It determines the amount of volatile matter of any kind (including water) that can be driven off under the condition specified. Loss on drying was calculated by means of digital moisture meter. Loss on drying is the loss in weight in present w/w (weight/weight) determined by the following procedure.

Procedure

1 gm of sample was directly placed in the plate of moisture meter, lid of moisture meter was closed and heating was started by pressing start button. The volatile matter or moisture, if any, was evaporated/ dried at 105⁰c ±2⁰c and final reading was recorded. It was subtracted by 100 which indicate loss on drying at this particular temperature.

Table No: 7 Percentage value of Loss on drying for various samples are given below table

S.No.	Name of Bhasma	Sample No. 1 %	Sample No. 2 %	Sample No. 3 %
1.	<i>Pravalmoola Bhasma</i>	0.39	0.29	0.34
2.	<i>Shankha Bhasma</i>	0.44	0.38	0.42
3.	<i>Muktashukti Bhasma</i>	0.38	0.45	0.43
4.	<i>Mukta Bhasma</i>	0.46	0.48	0.41
5.	<i>Kaparda Bhasma</i>	0.62	0.81	0.71

Percentage of Ash content / percentage of loss on ignition

This percentage is helpful in knowing the Organic & Inorganic matter present in a drug. Generally at 550⁰C or above temperature almost all organic compounds decompose to carbon dioxide & inorganic non volatile matter remains as residue.

Table No: 8 Ash value (%) of Ingredients of *Pravalpanchamrita Rasa*

S.No.	Name of Bhasma	Sample No. 1 %	Sample No. 2 %	Sample No. 3 %
1.	<i>Pravalmoola Bhasma</i>	82.46	83.68	88.92
2.	<i>Shankha Bhasma</i>	62.93	65.98	63.17
3.	<i>Muktashukti Bhasma</i>	96.12	95.86	92.16
4.	<i>Mukta Bhasma</i>	88.94	87.63	89.91
5.	<i>Kaparda Bhasma</i>	62.68	64.71	67.58

Acid insoluble ash

This parameter is helpful in knowing the silicates present in a samples. Silicates remain insoluble in acid.

Table No: 9 Percentage Acid insoluble ash value Ingredients of *Pravalpanchamrita Rasa*

S.No.	Name of bhasma	Sample No. 1 %	Sample No. 2 %	Sample No. 3 %
1.	<i>Pravalmoola Bhasma</i>	0.43	0.37	0.35
2.	<i>Shankha Bhasma</i>	0.44	0.39	0.41
3.	<i>Muktashukti Bhasma</i>	0.99	1.21	1.11
4.	<i>Mukta Bhasma</i>	0.67	0.69	0.65
5.	<i>Kaparda Bhasma</i>	0.59	0.54	0.51

Water soluble Extractive

It is the parameter to determine polar molecules responsible for therapeutics of drug.

Table No: 10 Water soluble Extractive value of Ingredients of *Pravalpanchamrita Rasa*

S.No.	Name of bhasma	Sample No. 1 %	Sample No. 2 %	Sample No. 3 %
1.	<i>Pravalmoola Bhasma</i>	9.35	9.56	9.48
2.	<i>Shankha Bhasma</i>	10.58	10.98	11.31

3.	<i>Muktashukti Bhasma</i>	11.45	11.39	11.82
4.	<i>Mukta Bhasma</i>	8.59	8.79	8.91
5.	<i>Kaparda Bhasma</i>	9.69	9.89	9.21

Alcohol soluble Extractive

It is the parameter to determine non polar molecules responsible for therapeutics of the drug.

Table No: 11 Alcohol soluble Extractive value Ingredients of *Pravalpanchamrita Rasa*

S.No.	Name of Bhasma	Sample No. 1 %	Sample No. 2 %	Sample No. 3 %
1.	<i>Pravalmoola Bhasma</i>	0.44	0.53	0.58
2.	<i>Shankha Bhasma</i>	0.34	0.39	0.28
3.	<i>Muktashukti Bhasma</i>	0.85	0.92	0.89
4.	<i>Mukta Bhasma</i>	0.49	0.39	0.48
5.	<i>Kaparda Bhasma</i>	0.59	0.58	0.56

Table No: 12 Alcohol soluble extractive of various sample of *Pravalpanchamrita Rasa*

S.No.	Sample Name	% of alcohol soluble extractive(w/w)	Mean
1.	<i>Pravalpanchamrita rasa A</i>	1.06	1.05
2.	<i>Pravalpanchamrita rasa B</i>	1.07	
3.	<i>Pravalpanchamrita rasa C</i>	1.03	

pH Value:

Method is same as previously described:

Table No: 13 pH of various sample of *Pravalpanchamrita Rasa*

S. No.	Sample Name	pH(1.0% w/v solution) value	Mean
1.	<i>Pravalpanchamrita rasa A</i>	12.75	12.55
2.	<i>Pravalpanchamrita rasa B</i>	12.66	
3.	<i>Pravalpanchamrita rasa C</i>	12.25	

Loss on drying

Method is same as previously described

Table No: 14 Loss on drying of various sample of *Pravalpanchamrita Rasa*

S. No.	Sample Name	% of Loss on drying(w/w)	Mean
1.	<i>Pravalpanchamrita rasa A</i>	0.039	0.041
2.	<i>Pravalpanchamrita rasa B</i>	0.040	
3.	<i>Pravalpanchamrita rasa C</i>	0.044	

Loss on Ignition

Method is same as previously mentioned

Table No: 15 Loss on Ignition of various sample of *Pravalpanchamrita Rasa*

S.No.	Sample Name	Loss on Ignition (%)	Mean
1.	<i>Pravalpanchamrita rasa A</i>	3.54	3.93
2.	<i>Pravalpanchamrita rasa B</i>	4.20	
3.	<i>Pravalpanchamrita rasa C</i>	4.04	

Acid insoluble Ash

Procedure is same as previously mentioned.

Table No: 16 Acid insoluble Ash in various sample of *Pravalpanchamrita Rasa*

S.No.	Sample Name	% of acid insoluble ash	Mean
1.	<i>Pravalpanchamrita rasa A</i>	0.35	0.52
2.	<i>Pravalpanchamrita rasa B</i>	0.36	
3.	<i>Pravalpanchamrita rasa C</i>	0.85	

Water soluble Extractive value

Method is same as previously mentioned

Table No: 17 Water soluble Extractive of various samples of *Pravalpanchamrita Rasa*

S.No.	Sample Name	% of water soluble Extractive(w/w)	Mean
1.	<i>Pravalpanchamrita rasa A</i>	9.440	9.480
2.	<i>Pravalpanchamrita rasa B</i>	9.490	
3.	<i>Pravalpanchamrita rasa C</i>	9.510	

DISCUSSION

The qualitative analysis of the raw material shows presence of calcium and carbonate. The present study was done to establish the standard operative procedure for three samples of *Pravalpanchamrita rasa*. Three samples of ingredient *bhasma* were prepared for preparation of formulation and analysis was done of all samples. The data are more or less same for the three samples. It suggests that the reproducible quality of *rasa* can be manufactured by following the method adopted in the study.

Table No: 18 Results of physico-chemical Analysis of all the Samples of *pravalpanchamrita Rasa*

Name of Test	<i>Praval Panchamrita Rasa A</i>	<i>Praval Panchamrita Rasa B</i>	<i>Praval Panchamrita Rasa C</i>	Average
pH(1.0% w/v solution value)	12.75	12.66	12.25	12.55
Percentage of Loss on drying(w/w)	0.03	0.04	0.04	0.04
Loss on Ignition (%)	3.54	4.20	4.04	3.92
Percentage of Acid insoluble ash(% w/w)	0.35	0.36	0.85	0.52
Percentage of water soluble extractive(% w/w)	9.44	9.49	9.51	9.48
Percentage of alcohol soluble extractive(% w/w)	1.06	1.07	1.03	1.05
% of calcium (wt %)	41	47	51	46

The pH of all the samples is basic. Average value of pH is 12.55. The basic pH is obvious due to fact that all these Bhasma are prepared from the raw materials which eliminate or oxidized to calcium oxide at elevated temperature. This calcium oxide when dissolved in water produces calcium hydroxide. The aqueous solution of different Bhasma showed variable alkaline concentration due to the presence of variable amount of calcium oxide in the solution, which may result minor variations in pH of different solution. The pH of solution also plays an important role in the solubility of the drugs. It has been found that the basic drugs are more soluble in solution of low pH and they get precipitated if the pH is raised by the addition of an alkali. Loss on drying gives an idea about the moisture content present in the sample. Average value of loss on drying is 0.04. As low value indicates lesser moisture content hence greater will be the shelf life of the substance. A high value of moisture will encourage microbial growth, the percentage of fungi and cause deterioration following hydrolysis. So, lesser the percentage of moisture content better is the efficacy and durability of the medicine. Loss on Ignition determines the quantity of non volatile inorganic material present in the drug. The average of loss on Ignition is 3.92. This indicates presence of more inorganic content in it. Acid insoluble ash indicates acid insoluble contents in the sample. The average value of acid insoluble ash is 0.52 which indicate that insoluble content is low in the sample.

CONCLUSION

This formulation was contributed by *Yogaratnakar* (18th cent A.D.). The ingredients of the formulation come under *Sudha Varga dravyas*. *Sudha Varga dravyas* are well known to the people of India from vedic period. But their internal usage was taken into consideration mainly from samhita period. Now a day, practically *Praval Shakha* is coming duplicate in the market, which is supposed to be produced by China. On the other hand all the pharmacies are taking *praval moola* instead of *Praval Shakha*. The cost of *Praval Shakha* is also higher than the *Praval Moola* and *Moola* is easily available in the market. So, considering this fact in the present work *Praval Moola* is taken instead of *Praval Shakha*. All the five ingredients of *Pravalpanchamrita rasa* were purified by *Dola Yantra* method with their liquid media respectively. Their *Bhasma* was prepared by giving them three *putas* each. In *Gajaputa*, peak temperature i.e. in the range of 900^oC-1000^oC reaches after 75 minutes, and then it remains in the range of 900^oC-800^oC up to 135 minutes. The temperature lowers down to about 600^oC in the next 60 minutes. This degradation in the temperature continues and the *puta* attain self cooled stage after about 45 minutes. The resultant *Bhasma* was white in colour. In *Shodhana* process the mean percentage of loss in *Praval, Shankha, Muktashukti, Mukta, Kaparda* was 4.5%, 2.2%, 4.8%, 0.0%, 3.0% respectively. In *Marana* process the mean percentage loss in *Praval, Shankha, Shukti, Mukta, Kaparda* was 34.3%, 32.1%, 34%, 43.2%, 36.3% respectively. Finally these ingredient *Bhasmas* were taken together and levigated with the help of *Ark Latex* & the formulation was prepared by giving one *Gajaputa*. Likewise, other two samples of *Pravalpanchamrita rasa* were prepared. Average Percentage yield of *Pravalpanchamrita rasa* was 65% with its percentage loss of 35.0%. Average calcium percentage in formulation is 46.63. Average pH of all the three samples is 12.55. Average loss on drying at 105^oC is 0.04%w/w. average loss on ignition is 3.93%w/w. average value of acid insoluble ash is 0.52%w/w. average water soluble extractive value is 1.05%w/w & alcohol soluble extractive is 9.48%w/w. Although the number of medicines are available in the market for this purpose but they are not up to mark in the Standard Parameters. Hence an attempt has been made through the present research work to find a safe and effective *Ayurvedic* Medicine.

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