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EXPERIMENTAL STUDY

COMPARATIVE PHARMACEUTICAL AND ANALYTICAL STUDY OF BADARASHMA BHASMA AND PISHTI

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Abstract:

Context: *Badarashma* (Lips Judaicus/ Jew's stone) was used in two different forms to treat the urolithiasis condition. **Aims:** To prepare the Basarashma Bhasma and Pisti by classical reference and subject them for analytical test. Settings and Design: It a comparative analytical test on two type Pharmacutical preparation of Badarashma bhasma and Pisti. **Methods and Material:** As per the reference Rasamrita and Sidhayoga sangraha the preparation of Pisti and Basarashma Bhasma was prepared respectively. The prepared *bhasma* and *pisthi* were compared by subjecting them to analytical parameters along with organoleptic characters. **Results:** The colour of *bhasma* was Hay and *pisthi* was white. The result obtained from analytical study shows that *bhasma* is more alkaline when compared to *pisthi*. Moisture content of *pisthi* was more compared to *bhasma* as there is no heat application during *pisthi* preparation. Ash content was more in *bhasma* than *pisthi*. Water soluble ash content of *Badarashma bhasma*(59.62%) was less compared to *pisthi*(70.83%). Hence the absorption of *pisthi* may be more compared to *bhasma*. Silica content is more in *pisthi*(1.02%) to that of *bhasma*(0.98%). Particle size of *pisthi* is less than that of *bhasma*. Percentages of Calcium, Sodium, Chloride, Magnesium, Sulphate, Nitrate content were more in *bhasma* compared to that of *pisthi*. Potassium content of *bhasma* was less than *pisthi*. **Conclusions:** Acharyas intentions of preparing the Bhasma which is agneya in nature is highly suited to Kapha – vataja Mutra vikaras and the Pisti which is soumy is better for Pitta – Vataja Mutra vikaras can be easily inferred from the above analytical study.

Key Words: *Badarashma, bhasma, pishti, mootrala,* Diuretics

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INTRODUCTION

Badarshma (Lips Judaicus/ Jew's stone) is a drug which comes under *sikatha varga dravya* (compound of silica and lime). Eventhough there is no reference of this drug in *rasa* text but later authors after 20th century included this *Badarashma* under *sikatha varga dravyas* [1]. *Badarashma* is called so because of its shape. It resembles like fruits of jujube. *Badarashma* is an animal origin fossil obtained from Arabian countries. When remnants of an animal or plant are exposed to the air or buried in dry earth, they generally decompose and pass off almost entirely as gases, but when buried under water or in damp earth, there will be preservation of these are called as fossil. Therefore, the species most likely to become fossilized are those living in water or marshes. *Badarashma* is also called as Fossil encrinites. Here encrinites means fossilized stone.

The internal administration of this *Badarashma* can be done in two forms i.e *bhasma* and *pisti*.[2] It is stated that *bhasma* prepared out of this drug is helpful in treating the urinary diseases like *mutraashmari* (urinary calculi), *mootraghata*(obstruction of urine), *mootrakrichra*(difficulty during micturation) etc and is considered as *Mootrala*(Diuretic)[2]. The *pishti* of *Badarashma* is also having the same indication like *bhasma*[3]. Here is an attempt to know the difference between pharmaceutical and analytical aspect of *bhasma* and *pisti* form of *Badarashma*.

MATERIALS AND METHODS

Pharmaceutical Study

The raw drug *Badarashma* was purchased from S.D.M Ayurveda Pharmacy, Udupi and preparation of *bhasma* and *pisti* in practical hall of S.D.M College of Ayurveda, Udupi.

The prime objective of pharmaceutical research is to produce a safe, effective and quality drug. Efficacy and safety depend solely on the quality of the drug. The quality of the pharmaceutical product depends not only on the care taken in its preparation, but also in confirming that the genuine raw materials have been used and the material has been correctly processed.

Table No. 1 Physical characteristics of Raw material (unpurified *Badarashama*)

Physical characteristics	Findings

Colour	Grayish white
Size	½- 1 inch
Shape	Oval
Lusture& touch	Lustureless &Smooth

Pharmaceutical procedure:

1) *Shodhana* (purification) of *Badarashma*. 2) Powdering of *shodhita* (purified) *Badarashma*.3) Preparation of *Pisti*. 4) Preparation of radish (Raphanus sativus) juice. 5) Marana of Badarashma

Shodhana* of *Badarashma*:-Shodhana* was carried out according to the reference of *Sidda yoga sangraha* [4]. *Ashudha Badarashma* was taken in a clean stainless steel vessel and boiled water was added. Rubbing was done by hand till water turns into white colour. Then the water was drained out after the wash. Same procedure was carried out till it become free from the impurities. After completion of *shodhana, Badarashma* was dried under shade.

Table No.2 Observation during *shodhana*

Wash	***Badarashma***	**Water**
Before wash	Greyish white with dust	Clear
After 1st wash	Greyish white	White
After 2nd wash	Grey white	White
After 3rd wash	Grey white	White
After 4th wash	Grey	Clear

Table No.3 Result found after *shodhana*

Badarashma	Before shodhana	After shodhana	Loss	% Loss
Weight	490 gm	480gm	10gms	2.04%
Colour	Greyish white with dust	Grey	_	_

Powdering of *Shodhitha Badarashma*: Reference followed for this preparation *Sharangadhara Samhita* [5].*Shudha Badarashma* was weighed and taken in mortar and pistil and powdered. This powder was sieved through the dry, clean, thick white cotton cloth. By this process fine powder of *Badarashma* was obtained.

Table No.4 Observation on colour and consistency

	Colour	**Consistency**
Before pounding	Grey	Hard
After pounding	Greyish white	Soft

Table No.5 Result found in powdering procedure

Initial weight	Final weight	Loss
480 gm	475gm	5gm

Preparation of *Badarashma Pishti*

Procedure: The reference followed for *pisthi* preparation is *Rasamrutha* [6]. The 200gms of *Shudha Badarashma* powder was taken in mortar and pistil, rose water was added in sufficient quantity till the powder of *Badarashma* becomes wet. *Bhavana* (triturating with liquid media) was carried out till it gets complete dry. Same procedure was carried out for six more times. After 7th *bhavana*, the final product was dried under shade.

Table No. 6 Quantity of Rose water used for the preparation.

No.of *Bhavana*	Quantity of Rose water used	Colour of *Badarashma* powder
1st *Bhavana*	60 ml	Greyish white
2nd *Bhavana*	60ml	Grayish white
3rd *Bhavana*	50ml	Grayish white
4th *Bhavana*	45ml	White
5th *Bhavana*	45ml	White
6th *Bhavana*	40ml	White
7th *Bhavana*	40ml	White

Table No.7: Organoleptic observations of *Badarashma* powder after each *Bhavana* during *Pishti* preparation

No.of Bhavana	Colour	Taste	Odour	*Rekhapoornata*	*Varitara*

1st *Bhavana*	Greyish white	Tasteless	Not specific	-	-
2nd *Bhavana*	Greyish white	Tasteless	Not specific	-	-
3rd *Bhavana*	Greyish white	Tasteless	Rosewater smell	+	-
4th *Bhavana*	White	Tasteless	Rosewater smell	+	-
5th *Bhavana*	White	Tasteless	Rosewater smell	+	-
6th *Bhavana*	White	Tasteless	Rosewater smell	+	-
7th *Bhavana*	White	Tasteless	Rosewater smell	+	-

Table No. 8: Results found in *Badarashma Pishti*

Initial weight	Final weight	Loss/ gain	% loss/ gain	Amount of rose water used
200 gms	190 gms	10 gms	5%	340 ml

Preparation of radish juice: Reference taken is from *Sharangadhara Samhita*[7]. Matured radish (Raphanus sativus) was taken and washed with clean water to remove the mud. After washing, outer covering of *radish* was peeled off and weighed. Then it was made into small pieces. These small pieces of radish were crushed further with the help of mortar and pistil. This is taken in a dry, clean cotton cloth and squeezed to a clean and dry glass.

Table No.9 Organoleptic observations during juice preparation

No.	**Weight of *radish* taken**	**Juice obtained**	**Colour of Juice**	**Odour of Juice**	**Taste of Juice**
1.	250gms	120ml	Creemish White	Odour of radish	*Katu*

2.	200gms	110ml	Creemish White	Odour of radish	*Katu*
3.	150gms	60ml	Creemish White	Odour of radish	*Katu*
4.	170gms	90ml	Creemish White	Odour of radish	*Katu*
5.	150gms	60ml	Creemish White	Odour of radish	*Katu*
6.	160gms	65ml	Creemish White	Odour of radish	*Katu*
7.	150gms	60ml	Creemish White	Odour of radish	*Katu*

Preparation of *Badarashma Bhasma*: Reference followed is *Sidda yoga Sangraha* [8]**.** *Shudha Badarashma* powder is taken in a mortar and pistil. *radish* juice was added to it till the powder becomes wet. *Bhavana* was carried out till it was made into 8 and roughly around 2 inches in diameter of *chakrikas* were prepared and dried in shade. After complete drying, *chakrikas* were taken in *sharava* (lid of the mud pot) with the dimensions roughly equal to 9 inchs in diameter and it is closed with the help of another *sharava* and *samputa* is prepared. After complete drying, it is subjected for *Gaja Puta* (incineration).

Table No.10 Temperature and observations seen are presented in tabular form below.

Number of *puta*	**Weight of *Badarashma***	**Quantity of *radish* Juice**	**Weight of *Chakrika*(before *Puta*)**	**Weight of *Chakrika* (After *Puta*)**	**Weight of *cow dung cakes* used**	**Loss**	**Peak temp**
1st puta	250 gms	120ml	255gms	205 gms	30 kg	50gms	909^0c
2nd puta	205gms	110ml	215gms	180 gms	30kg	35gms	1002^0c
3rd puta	180gms	60ml	190gms	150gms	30kg	40gms	1004^0c
4th puta	150gms	90ml	160gms	140gms	30kg	20gms	1002^0c
5th puta	140gms	60ml	140gms	145gms	30kg	**Gain**-5gms	1005^0c
6th puta	145gms	65ml	145gms	135gms	30kg	**Gain**-10gms	1005^0c
7th puta	135gms	60ml	140gms	135gms	30kg	5gms	1002^0c

Table No.11: Variation in weight observed after each successive *Puta*

No. of *Puta*	Initial Weight	Weight after *Puta*	Loss/Gain in weight	% Loss/ Gain
1.	250gms	205gms	45gms ↓	18% ↓
2.	205gms	180gms	25gms ↓	12.19% ↓
3.	180gms	150gms	30gms ↓	16.66% ↓
4.	150gms	140gms	10gms ↓	6.66% ↓
5.	140gms	145gms	5gms ↑	3.57% ↑
6.	145gms	135gms	10gms ↓	6.89% ↓
7.	135gms	135gms	_	_

Table No.12: Yield of *Bhasma*

Initial weight	Final weight	Loss	% Loss
250gms	135gms	115gms	46% ↓

Table No. 13: Results of *Bhasma Pareeksha*(test) and *Badarashma pishti*

Bhasma pariksha	***Puta* 1**	***Puta* 2**	***Puta* 3**	***Puta* 4**	***Puta* 5**	***Puta* 6**	***Puta* 7**	***Badarashma pishti***
Rekhapurnata	_	_	_	+	+	+	+	+
Varitara	_	_	_	_	_	_	_	_
Unnama	_	_	_	_	_	_	_	_
Gatarasatwa	_	+	+	+	+	_	_	+
Mrudutwa	_	_	+	+	+	+	+	+
Dantagre kachakachatwa	+	+	+	_	_	_	_	_
Sookshmatwa	_	_	_	+	+	+	+	+
Vishista varnotpatti	_	_	_	+	+	+	+	+
Nisschandratwa	+	+	+	+	+	+	+	+

Analytical Study: To understand the quality and composition of manufactured

drug, analytical study was carried out according to the modern parameters. The manufactured drugs were analyzed with the help of organoleptic and physico-chemical parameters.

First, raw drug is identified and *bhasma* was prepared after its purification. Then the *Bhasma* was subjected to some analytical parameters like classical methods and also by physico chemical parameters.

Table No.14: Organoleptiic observations of *Badarashma Bhasma* and *Pishti*

Organoleptic parameter	*Badarashma Bhasma*	*Badarashma Pishti*
Colour	Hey colour	White
Odour	Not specific	Odour of rose water
Touch	Smooth	Smooth
Taste	Mild Alkaline	Tasteless

Table No.15: Physical evaluation of *Badarashma Bhasma* and *pishti*

Sl no	Parameters	*Badarashma Bhasma*	*Badarashma pishti*
1.	pH value	12.46	8.77
2.	Loss on drying at 105^0 c	0.08%	0.32%
3.	Total ash	83.58%	57.38%
4.	Acid insoluble ash	1.10%	1.13%
5.	Water soluble ash	59.62%	70.83%
6.	Silica content	0.98%	1.02%
7.	Particle size**(**1000micron mesh**)**	92%	97%
8.	Calcium content	52.61%	36.96%

1. **Estimation of other major elements:** Estimation of Sodium, Potassium is done by Atomic absorption Spectroscopy and estimation of Chloride, Nitrate, Sulphate is done by Ion exchange chromatography.

Table No16: Estimation of major elements

Elements	*Badarashma Bhasma*	*Badarashma Pishti*
Sodium	0.32%	0.30%
Potassium	0.12%	0.15%

Chloride	0.03%	0.01%
Magnesium	2.72%	3.33%
Nitrate	0.40%	0.08%
Sulphate	0.84%	0.20%

DISCUSSION

In *Rasa* texts, first reference of *Badarashma* [9] is available in *Rasamrutham* which is written by Yadavji tikamji acharya. He explained this by the name Hajr-ul-yahud [10]. He has explained purification and *Pishti* preparation. Most of the rasa texts followed same procedure for purification of *Badarashma* i,e washing with hot water. The *bhasma* of *Badarashma* is prepared by giving *bhavana* of *radish* Juice and applying the *Ardha Gajaputa* [11] (type of incineration). But number of *puta* are not explained which means that *puta* should be continued till we get the *bhasma sidhi laxana* [12]. radish is having *katu* and *tikta rasa, laghu guna, ushna veerya, katu vipaka*. radish is also one among the *kshareeya* [13](alkaline containing) drug which helps to remove malas (toxic) from the drug and also *kshareeya* drug will be having Diuretics effect. *Badarashma pishti* is explained by later authors where rose water is used for the preparation mainly to impart the *sheetha guna* (cold property) to the drug. Even though *bhasma* and *pishti* are having same indication, the selection of formulation depends on the *roga bala, rogi bala* and *yukthi* of the physician.

Washing was carried out for 4 times as after these dusty particles and other physical impurities present on the *Badarashma* was cleared the colour was changed. During *bhavana* with *radish* Juice, initially the quantity of *radish juice* required was more when compared to later *bhavanas*, may be due to reduction of quantity of drug as well as particle size. Along with this, the alkaline nature of radish helps in reducing the particle size of *Badarashma*. The peak temperature was observed to be 1005◦c. After 7th *puta Bhasma* passed the test of *rekhapoornata*. Because of alkaline nature of drug which was used for *bhavana, gatarasatwa* was not appreciated. As *Badarashma* comes under calcium content drug, test of *varithara* and *unnama* were negative. *Puta* procedure was carried out to achieve the microfine particle size of the material to be incinerated, to change chemical and

physical nature and to induce the desired qualities to the drug.

During preparation of *pisti*, the *bhavana* with *gulab jala* helps to impart cold property to the formulation. Total 7 *bhavanas* were given to get the *Badarashma Pishti*. The quantity of rose water for the *bhavana* is reduced with successive *bhavana* process.

When tested for *bhasma siddhi lakshanas*, the *bhasma* and *pishti* both have passed the *rekhapurnata* test and test for *varitara* and *unnama* were negative for both, because of the hygroscopic nature of calcium.

pH of *Badarashma bhasma* was 12.46 and *pishti* was having the pH of 8.77. It indicates *bhasma* is more alkaline to that of the *pishti*. Loss on drying of *bhasma* was 0.08% and *pishti* was 0.32%. It indicates presence of moisture content of *pishti* was more compared to *bhasma*.

Total ash of *Badarashma bhasma* was 83.58% and *pishti* was 57.38% which indicates ash content was more in *Badarashma bhasma*. In the preparation of *bhasma, bhavana* was given with radish juice. During heating the inorganic content of radish may mix with the *Badarashma* and may increase the ash content of *bhasma*.

Percentage of acid insoluble ash is slightly more in case of *Badarashma pishti*(1.13%) when compared to *Badarashma bhasma*(1.10%) which indicates dilution of both trial drug in dilute Hydrochloric acid is more.

Water soluble ash content of *Badarashma bhasma* (59.62%) was less compared to *pishti*(70.83%).

Difference in Silica content is marginally more in *pishti*(1.02%) to that of *bhasma*(0.98%). Particle size of *Badarashma bhasma* was 92% and *pishti* was 97% (through the 1000micron mesh). It indicates particle size of *pishti* is less compared to *bhasma*. Because of long duration of *bhavana*, continuous friction occurs in the *pishti* preparation. It may be the reason for lesser paticle size of *pishti*.

The sodium, nitrate and sulphate content of *Badarashma bhasma* is more when compared to the *pisti*. On the other hand the potassium, chloride and magnesium content of *Badarashma pisti* is more than the *bhasma*

Except Calcium, Magnesium and sulphate there is no considerable differences in both the formulation analytical parameters. Do they make a substantial finding for their *Agneya* and *Soumy bhavas* as they are warranted for use in *Kapha* and *pitta samsrusta avasthas* is

debatable, but the Magnesium is a softer element to consider with Calcium. So the indications of both the formulation can be substantiated.

CONCLUSION

Pharmaceutical procedure reveals that, after 4th wash with hot water, white colour of the *Badarashma* was obtained. *Bhasma sidhi laxanas* were observed after 7th Puta. *Badarashma pishti* was prepared by giving 7 *bhavanas* with rose water. In Organoleptic examination, the colour of *Badarshma* was brown and *pishti* was white. It is observed from pH value that *bhasma* is more alskaline than *pisti*. Loss on drying of *pishti* was more as compared to *bhasma* indicating the presence of moisture content in *pishti*. Because of inorganic content of *radish*, the total ash content of Bhasma was more than the *pishti*. Water soluble ash was more in *pishti* compared to *bhasma*. In sieve analysis, the particle size of *pishti* was less when compared to *bhasma*. Calcium content was also more in *bhasma* compared to *pishti*, but Magnesium content was more in *pishti* compared to *bhasma*. There is no much change observed in percentage of sodium, Potassium, Chloride, Nitrate and sulphate in both samples.

Acharyas has formulated various kalpanas with the same drug but the pharmaceutical preparation methods bring unique indications exactly suiting to the clinical presentations.

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