

Preparation and Physico-Chemical Analysis of Lokanatha Rasa - A Herbo Mineral Preparation

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ABSTRACT

Lokanatha rasa is a popular potali kalpana (herbo mineral preparation) mentioned in many Ayurveda Rasasasthra literatures. There are about 12 yogas under the same name which differ in combination and quantity of ingredients. Reference from sarngadhara samhitha is more acceptable because of its special credentials like (i) less number of ingredients which are non-controversial and easily available (ii) simple preparation procedure and requires no technical expertise (iii) cost effectiveness. Lokanatha rasa which is a potali kalpana is found to be effective in conditions of ama and agnimandya and has proven results in increasing intestinal motility. It is indicated in various diseases such as rakthapitha, kasa, swasa, grahani, swarakshaya, agnimandya, atisara, vataraktha with different anupana. In this research paper, the work done on pharmaceutical aspect of Lokanatha rasa is detailed. Here the procedure includes sodhana of parada, gandhaka, sankha, varatika, tankana, Preparation of Kajjali and bhasma is prepared as per classics.

Keywords: Lokanatha rasa, Potali kalpana, Rakthapitha, Kasa, Swasa, Grahani

INTRODUCTION

Ayurveda is a comprehensive natural health care system that originated in India 5000 years ago. Ayurveda, the science of life is the healing gift from the ancient, enlighten Vedic culture. It is considered as one of the ancient medical system which has a scientific foundation formulated by experiments and observations of ancient wisdom. Now Ayurveda is being revived to suit the present medical needs. There comes the importance of research. Research is a systemic process, utilizing the scientific method for generating new knowledge that can be used to solve a problem or to improve the existing status of a system. Ayurveda is still widely used in India as a system of primary health care, and interest in it is growing worldwide. As well, Ayurveda has unique concepts and

methodologies to address health care throughout the course of life. Researches have been conducted worldwide on Ayurveda. There are encouraging results for its effectiveness in treating various ailments. Ayurveda, originally known as Ashtanga Ayurveda was divided by great Indian seers into destine eight branches. Rasa sasthra is a special branch which is not included under the eight. It is a specialized branch of Ayurveda science which deals with the use of certain minerals, metals and other organic and inorganic substances in the treatment of diseases.

Rasa sasthra literally means science of mercury. It is the ancient branch of wisdom which explains the theory and practise of chemotherapeutics in ayurveda. It is the sharp tool of ayurvedic physician to tackle acute and complicated diseases.

According to source of origin, the substances in the universe are classified as jangama¹ ie animal sourced, audbhida ie plant sourced and parthiva or khanija ie mineral sourced. The main attributes of these rasa dravyas are instant effectiveness, requirement of very small doses and extensive therapeutic utility irrespective of constitutional variation. Quick action of rasa dravyas make it an inevitable branch for the present fast moving at the same time ayurveda loving community. There are different methods to ensure safe processing of rasadravyas effective in therapeutics. One of such method among the 12 different yogas² is attempted here to prepare a Rasa Rasayana, Lokanatha Rasa³

MATERIALS AND METHODS

Pharmaceutical study comprises the preparation of lokanatha rasa which is a potali kalpana⁴ mentioned in Sarngadhara samhitha

Preparation of medicine⁵

It includes following steps

1. Collection of raw material
2. Pre-procedures for preparation of lokanatha ras
 - a) sodhana of parada
 - b) sodhana of gandhaka
 - c) sodhana of sankha
 - d) sodhana of varatika
 - e) sodhana of tankana
3. Preparation of lokanatha rasa
 - a) preparation of kajjali
 - b) preparation of lokanatha rasa

1. Collection of raw materials

Raw materials which satisfy grahya lakshana features as per classics were procured from reputed stores

Raw materials for lokanatha rasa include

1. parada-150g of purified mercury was purchased from a reputed shop (merck company-99.9% purified)
2. gandhaka-400 g of gandhaka was purchased from laboratory supplies (chemically pure, from Khona iinc)

3. varatika-400 g of varatika was purchased from a shop at Trivandrum
4. sankha-600 g of sankha was purchased from a shop at Trivandrum
5. tankana-100g of tankana was purchased from a shop at Trivandrum

Drugs used for Parada sodhana

Kanya-Directly collected from the original source

Chitraka- Directly collected from the original source

Kakamachi- Directly collected from the original source

Pre-procedures for preparation of lokanatha rasa

Sodhana of parada⁶

Sodhana of parada was done by a method explained in parada samhitha. Process explained was sodhana of parada by grinding it in kumari swarasa, chitraka kashaya, and kakamachi swarasam successively for 1 day each (12 hours each). 99.9% purified parada was purchased. So it undergone for visesha sodhana mentioned in Parada samhitha

Step 1: Bhavana in kumari swarasa

The parada was filtered through a double layered cloth and taken inside a mortar. 100 ml of kumari swarasa was added to it to soak the parada and grinding was done for 1 day (12 hours). Next day it was washed with hot water and filtered through a double layered cloth

Step 2: Bhavana in chitraka kashaya

Prior to making kwatha of chitraka it was undergone for bhavana in choornodaka. Choornodaka was made by adding 1 ratti of sudha to 5 tolas of water. The chitraka was kept immersed in choornodaka till the choornodaka became red colour. This was done till there was no colour change. The process was repeated for 4 times to get the optimum requirements. Then after chitraka kashaya was prepared and 85 ml of it was added to parada grinded in it for next 12 hours. After 12 hours it was washed in hot water and filtered.

Preparation of chitraka bhavana kashaya-sodhitha chitraka was crushed into small pieces and added 8 times of water and heated in mandagni, and reduced into 1/8

Step 3: Bhavana in kakamachi swarasa

Kakamachi was purchased from original source directly. 95 ml of swarasa was needed for immersing the parada and

grinded with it for 1 day (12 hour).After drying it was washed with hot water and filtered through a double layered cloth.

Preservation

Parada obtained was preserved in a glass bottle.

Table 1 Observations during parada sodhana

Wt of Parada	Kwatha/ Swarasa	Qty of Kwatha/ Swarasa	Wt after shodhana	Loss of Parada
150gm	Kumari swarasa	100ml	147gm	3gm
147gm	Chitraka kwatha	85ml	142gm	5gm
142gm	Kakamachi swarasa	95ml	136gm	6gm

Sodhana of gandhaka⁷

Sodhana of gandhaka was done by koorma puta method

400 g of gandhaka was taken and finely powdered. Then a mud pot was taken and ghee was smeared inside it and $\frac{3}{4}$ of the pot was filled with cow's milk. A double layered cloth was tied at the neck portion of the pot and over the cloth finely powdered gandhaka was spreaded and covered with sharava. Then mud smeared cloth was used for covering the joint of mud pot and sharava .it was done for seven times. Allow to dry the joint. Then the pot was placed inside the pit and covered with pieces of coconut husk. Totally 35 pieces are used. Firstly 18 are placed and ignited. More pieces were placed as and when top layers were getting burned off .It was then allowed to cool down.8 hours are taken for self cooling. After cooling small beads of purified gandhaka was collected from milk and washed with hot water and allow to dry. Then it was stored in a bottle. This method

was said as koorma puta method by Rasa raja tharangini.

Table 1 Observations during sodhana of Gandhaka-Quantity Variations

Qty before shodhana	Qty of cow's milk	Qty of ghee	Qty after shodhana
400gm	2L	100 ml	375 gm

Table 2 Observations during sodhana of Gandhaka

Particulars	Before sodhana	After sodhana
Smell of milk	No smell	Smell of sulphur
Colour of milk	White	Yellow
Colour of sulphur	Greenish yellow	Pale yellow
Smell of sulphur	Present	Slight smell of ghee

Sodhana of Sankha⁸

Sodhana of sankha was done by dolayantra method.

Here 600g of sankha was taken and was made into 2 potalis. Then a mud pot's $\frac{3}{4}$ th portion is filled with nimbu swarasa and the potali was tied in a rod in a way that it should immerse in it and dolayantra swedana was done for 1 yama (3hour). Sodhitha sankha was collected from the potali and washed well with hot water and stored well.

Table 3 Observations during Sodhana of Sanka

Wt of Sanka	Qty of Nimbu sarasa	Wt after shodhana	Observation
600gm	1L	538gm	It becomes more whitish and soft and brittle

Sodhana of varatika⁹

Sodhana was done by dolayantra method

400g of varatika was taken and washed well and dried. Then it was made into 2 pottali. Then the pottali was

immersed in a pot containing nimbu swarasa by tying it in a rod and undergone swedana for 1 yama (3 hours). After swedana sodhitha varatika was collected from the potali and washed with hot water.

Table 4 Observations during Sodhana of Varatika

Wt of Varatika	Qty of nimbu swarasa	Wt after shodhana	Observation
400gm	1L	306gm	It becomes more porous and whitish

Sodhana of Tankana¹⁰

100g of tankana was taken in a mortar and powdered well. This powdered tankana was taken in an iron vessel and bharjana was one with constant stirring. The process was continued till the moisture content was completely lost and the popping

sound ceased. Due to loss of water it becomes light and puffy in nature. After cooling it was collected, powdered well and stored in air tight containers. After purification no hard masses are found and when it is pressed between fingers it is finely powdered.

Table 5 Observations during Sodhana of Tankana

Wt of Tankana	Time taken for frying	Wt after shodhana	Observation
100gm	35min	60gm	Becomes whitish in colour. Light and puffy nature

Preparation of kajjali

Kajjali definition

Take suddha gandhaka and parada, keep it in khalwa yantra, grind without adding any drava dravyas upto it turns into black colour and free from mercury particles is known as kajjali. Here proportion of gandhaka is very important. We should use 1/2 or 1 or 2 or 3 or 4 or 5 or 6 or 8 or 16 to parada.

Synonyms: Kajjla, kajjali, kajjalika

Gunas

- Varna: black
- Rasa: katu, thiktha
- Guna: snigha
- Veerya: ushna
- Vipaka: katu
- Karma: tridosha hara

Preparation of kajjali

Take 136 g of sodhitha parada in a khalwa yantra and 136g of gandhaka is added little by little and mardana done until it attained kajjali sidha lakshanas

The grinding of kajjali was done in a khalwa yantra made of stone with uniform strokes applying pressure. After adding gandhaka to parada and started grinding, the colour of mixture gradually changed to grey. Gandhaka was added little by little. Here gandhaka added in fine powder form, after sieving through cloth and mesh. In this yoga samaguna parada and gandhaka are mentioned for making kajjali. After 30 minutes of grinding yellow coloured sulphur particles were still present and shiny particles of mercury was seen. After grinding for about 2-3 hours it got mixed properly and turned into fine black colour.

After 10 hours of grinding, kajjali become very fine but shining particles were still present. As the kajjali grinding proceeded, the resistance felt was highly reduced and the pestle moved easily. So the frequency of strokes for grinding made less.

The grinding was continued until kajjali attained siddha lakshanas ie tests mentioned for kajjali like kajjalabhasa, varitaratwa (floats on the surface of water, rekhapoomnatwa, nischandratwa (become lustreless)

Observations during grinding of kajjali

Table 6 Observations during grinding of Kajjali

Qty of Shodhita Parada	136gm
Qty of Shodhita gandhaka	136gm
No: of days grinded	23
No: of hours grinded	35
Wt of Kajjali obtained	260gm
Loss of wt	12gm

Kajjali siddha lakshanas

Table 7 Kajjali Sidha lakshanas

Features	Time Taken
Krishna varnatwa/kajjabhasa	16 hours
Sukshmatwa	30 hours
Rekha purnatwa	22 hours
Nischandratwa	30 hours
Varitaratwa	29 hours

Total 260 g of kajjali was obtained. It was carefully collected from the mortar and stored in a glass container

Precautions taken

Mask and gloves were used while grinding in order to prevent inhalation of fine particles

Preparation of Lokanatha Rasa¹¹

Sodhitha parada -2 parts
Sodhitha gandhaka-2parts
Kapardika-4 parts of parade
Tankana-1 part

Sankha-8 part

Prescribed quantities of drugs were taken. Two parts of purified mercury and 2 parts of purified gandhaka are macerated together and made into kajjali and filled into kapardika, four times the weight of parada. Tankana mixed with milk is made into paste and applied to the mouth of shells. It was allowed to dry. Cracks were found and the sealing was done again. Churnodaka lepana was done inside both mud plate and allowed to dry. Small pieces of sankha are placed in a mud plate, kapardika containing drugs are placed over it and covered with another pieces of sankha, another plate is covered over, their mouths were sealed with mud plaster and subjected to puta by placing it in a muffle furnace and a temperature of 750 was set. Rise in temperature was noted at regular interval and it attained the set temperature at 1 hour and it was maintained for 15minutes. After self cooling (1 day is taken for this) the contents were collected and nicely powdered. This powder, six

gunjjas by weight mixed with 29 maricha makes up one doss. The recipe is administered with ghee in diseases of vatha with butter in diseases of pitha, with honey in diseases of kapha and with other suitable vehicles in athisara, kshaya, aruchi, grahani, karshya, mandhagni, kasa shwasa, gulma.

Different indications with different anupana

Table 9 Indications with different anupana

Disease	Anupana
Aruchi	Ghrutha bhrushta dhanyaka with sarkara
Jwara	Guduchi dhanyaka kwatha
Kasa,swasa,raktapitha,swara kshaya	Ushira,vasa kwatha with madhu and sarkara
Nidra nasa, atisara, grahani, mandagni	Agni bhrushta jaya churna with madhu
Soola,ajirna	Sauvarchala,abhaya, krishna churna with warm water
Jwara, plihodara, vataraktha, chardi, Gudankura	Pippali churna with madhu
Nasikadishu raktha	Dadima pushpa juice/ durva swarasa with sarkara
Chardi,hikka	Kola majja, kana, barhi paksha bhasma, sarkara, madhu



Figure 1 Preparation of the Formulation



Figure 2 Formulation in powder form

RESULTS OF ANALYTICAL STUDY Organoleptic Characters of Lokanatha Rasa

Table 8 Organoleptic Characters of Lokanatha Rasa

Organoleptic characters	Observation
Colour	Grey
Odour	Slight Rotten egg
Taste	Taste of kshara
Touch	Fine

Bhasma Pareeksha of Lokanatha Rasa

Table 9 Bhasma Pareeksha of Lokanatha Rasa

Varitaratwa	When lokanatha rasa is spreaded over a cup of water ,it settle down after some time
Rekha poornatwa	The fine powder settles in between lines of finger
Nischandratwa	Absence of lustre
Sukshmatwa	Subtle in nature

Determination of pH Value

pH of 5% solution of lokanatha rasa was analysed and the result observed was 11.4

Determination of Total Ash Value

Total ash of the drug was calculated as follows
Weight of the crucible (W1) = 26.37

Weight of the drug = 1.82

Weight of the crucible and drug = 28.17

Weight of the crucible and ash (w2) = 27.88

% of total ash =

$$\frac{w2-w1}{1.82} \times 100 = 82.96\%$$

Determination of Acid Insoluble Ash

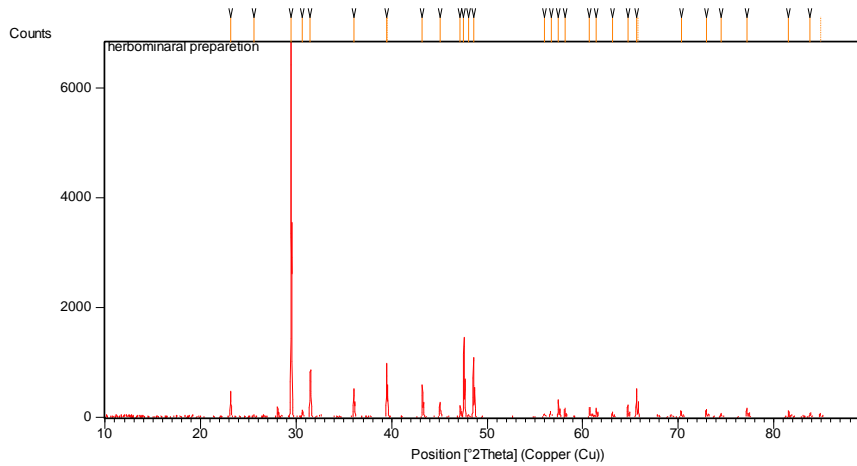
Acid insoluble ash was calculated as follows

Weight of crucible (W1) = 26.37

Weight of crucible and acid insoluble ash (W2) = 26.43

$$\% \text{ of acid insoluble ash} = \frac{w2-w1}{1.82} \times 100 = 3.29\%$$

X-RAY DIFFRACTION



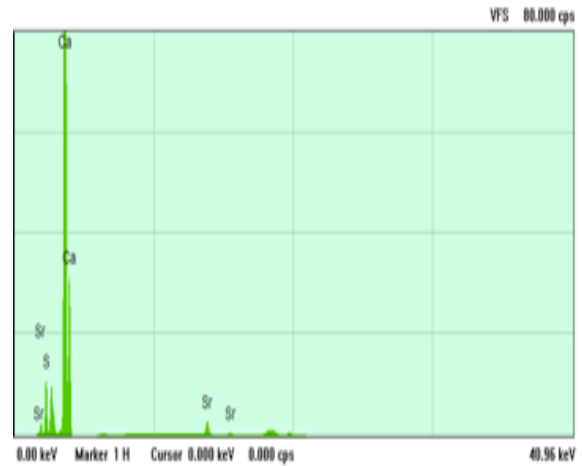
Graph 1 XRD pattern

X-RAY FLOURESCENCE

Live time: 60 s Processing Time : P2
XGT Dia.: 100 µm X-ray tube vol. : 50 kV
Current : 1.000 mA
X-ray Filter: Nonexistence Cell : Nonexistence
Quant. Corr.: Standard-less

Table 12 XRF Results

Element	Line	Mass %	2 Sigma %	Atomic %	Intensity (cps/mA)
S	K	3.3512	0.0710	4.1691	156.43
Ca	K	96.0093	0.0767	95.5399	3511.63
Sr	K	0.6395	0.0298	0.2911	60.60



Graph 2 XRF Pattern

ATOMIC ABSORPTION SPECTROSCOPY

Test for heavy metals

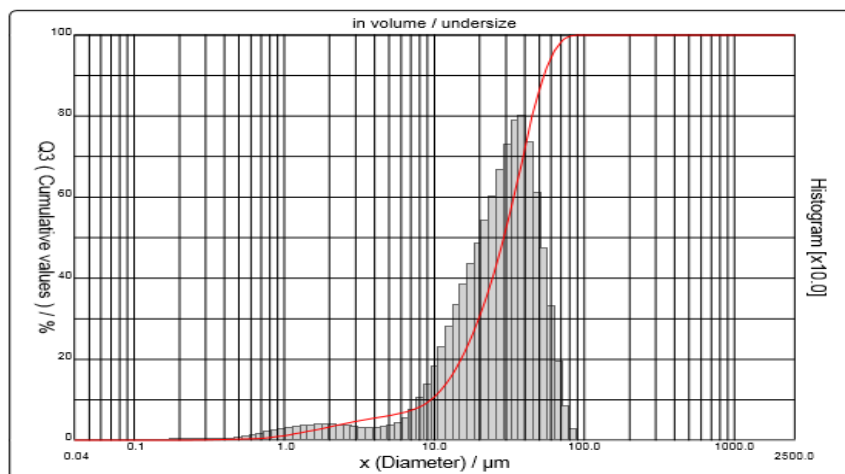
Table 13 Atomic Absorption Spectroscopy

Name	Quantity in the sample(in ppm)
Iron	1.2191
Cadmium	0.0442
Zinc	0.5491
Antimony	0.4056
Lead	0.0896

Result of Particle size analysis

Table 14 Results of particle size analysis

Sample ref. : LR	Ultrasounds : 60 s
Sample Name : Ayurveda	Obscuration : 8 %
Sample type : Powder	Diameter at 10%: 9.44 μm
Comments : Ayurveda College, 0.1863 g Liquid : Water (eau)	Diameter at 50%: 29.09 μm
Dispersing agent : calgon	Diameter at 90%: 53.65 μm
Operator : cessa	Mean diameter: 30.49 μm
Company : CESS	Fraunhofer
Location : Trivandrum	Automatic dilution: No / No
Date : 25-01-2017	Meas./Rins.: 60s/60s/4
Time : 11:36:53AM	SOP name : CES
Index meas. : 1683	
Database name : Granulog	



Graph 3 Particle Size Analysis

DISCUSSION

Discussion improves knowledge & discussion with support of science becomes base establishment of the concept. The discussion is the most essential part of the research work. Drug selected for the study was Lokanatha Rasa which is a potali kalpana mentioned in Sarngadhara samhitha madhyama khanda 12 th chapter Rasadi kalpana adhyaya found to be effective in the conditions of ama and agni mandhya. It is indicated in many diseases with different anupana. Ingredients of the preparation are sodhita parada, sodhitha gandhaka, kapardika, tankana and sankha in different proportions. Since the parada

purchased was 99.9% pure, visesha sodhana method mentioned in Parada samhitha was selected. Parada shodhana was done by bhavana in kumari, kakamachi and swarasa and chitraka kashaya. Shodhana of gandhaka was done by kurma puta method by using milk, ghee etc, Sankha and varatika shodhana was done by boiling in dola yantra using lime juice as drava dravya for 3 hours. Also tankana shodhana was done by bharjana. Firstly kajjali was made and it is filled inside the prescribed quantity of kapardika and sealed with tankana and undergone for puta by placing between plates of sankha at 750⁰C inside muffle furnace. Since the temperature set for

previous similar studies are 750⁰C, same was selected for the study. Gajaputa is mentioned in the classics for the preparation of formulation, but the height of the pit was said as 1 hashta not 1 rajahastha.

As a part of interest firstly lokanatha rasa was prepared with all ingredients in the same proportion, but it get burned off and it was black in colour.

On evaluating the drugs of the Lokanatha rasa, they were found to be having Katu, thiktha rasa predominant, and ushna veerya and katu vipaka in general. Also most of the drugs are kapha vata samana in nature and most drugs are agni deepana and lekhana in nature especially gandhaka which is used in the condition of amadosha, agni mandhya and amajirna. Rasayana property of parada and gandhaka has a major role in the rejuvenation of body at cellular level. Analytical study was done to determine the standard physico-chemical constituents. The p^H of the formulation was found as 11.4, so it is highly alkaline in nature similar to kshara dravyas. During the XRF analysis of the compound Calcium Carbonate is found as the major ingredient. Also Sulphur and Strontium were detected. In AAS, no heavy metal content was detected. Mercury was not detected in the XRF analysis.

CONCLUSION

- Lokanatha Rasa can be prepared in a single puta itself with a temperature of 750⁰C
- Gandhaka sodhana by kurma puta method enables uniform quantity of sodhitha gandhaka that can be handled with one time
- The pH value 11.4 shows the alkaline nature of the drug
- XRD Image shows the major peaks of Calcium Carbonate (Calcite), sulphur and strontium are also found.
- No mercury was detected in the formulation.

- No heavy metal content was detected in AAS
- Particle size analysis shows that the mean diameter of the particle was 30.49 μm

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