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Pharmaceutico - Analytical study of *Trailokyamohana Rasa*

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ABSTRACT

Herbo-mineral formulations occupies significant seat in Ayurvedic pharmaceutics. Nearly 70% formulations include combination of one or more metallic/mineral with several herbs which have supporting role in treating the disease. *Trailokyamohana Rasa* is one of the herbo- mineral formulation prepared by the *Kupipakwa Rasayana* method explained in the context of *Prameha*. The present study deals with the preparation and analytical study of *Trailokyamohana Rasa*, a unique formulation prepared by *Antardhuma* method of *Kupipakwa Rasayana*. The analysis of *Trailokyamohana Rasa* showed 8.4pH, 1.36% loss on drying, 68.94% of total ash and 38.56% of acid insoluble ash. X-RAY Diffraction Study of the sample revealed the peak of mercury which was in HgS form. Peaks also showed traces of Calcium, Tin and sulphur which was crystalline in nature. AAS analysis was done which revealed the traces of Calcium 16%, Tin as 7.56%, sulphur as 3.8%, carbonate as 40.25% and loss on ignition was 49.30% and Hg level showed below 1 ppm. Peaks at intervals showed the traces of Hg (Mercury), S (Sulphur). Second peaks showed the traces of Ca(Calcium) and Sn (Tin). Some other components were found such as C (Carbon), O (Oxide), Na (Sodium), Al (Aluminium), Si (Silicon), P (Phosphorus), Cl (Chlorine), K (Potassium), Fe (Iron), Cu (Copper).

Key words: *Rasashastra, Trailokyamohana Rasa, Anatrdhuma Method, Kupipakwa Rasayana.*

INTRODUCTION

Trailokyamohana Rasa[1] is a herbo-mineral preparation explained in *Brihat Rasa Raja Sundara*. It is *Sagandha Saagni Kupipakwa Rasayana*. It contains *Parada, Gandhaka, Vanga Bhasma, Mukta Bhasma* and *Shuddha Shilajatu* and is prepared by *Antardhuma Vidhi*. *Kajjali* prepared out of mixing *Shuddha Parada, Shuddha Gandhaka, Vanga Bhasma*

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Mukta Bhasma and *Shilajatu* is treated with *Bhavana* of *Pashanabheda Kwatha, Kumari Swarasa, Murva Kwatha, Guduchi Kwatha* and *Triphala Kashaya* for five days respectively. This *Kajjali* is used for the preparation of *Trailokyamohana Rasa*.

Any medicine should be of highest quality and to check the quality of the finished products, it becomes necessary to perform analytical studies of the products. Without the analysis of drug, the research of a drug is incomplete. Thus pharmaceutical processing of *Trailokyamohana Rasa* was carried out according to classical references and later final product was subjected to classical as well as modern analytical tests.

MATERIAL AND METHODS

Pradhana Dravya

The main components of *Trailokyamohana Rasa* are Shuddha *Parada, Shuddha Gandhaka, Vanga Bhasma,*

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Mukta Bhasma and *Shodhita Shilajatu*. Each drug was taken in 1 part.

Bhavana Dravya

Pashanabheda Kashaya, Murva Kashaya, Guduchi Kashaya, Kumari Swarasa and *Triphala Kashaya. Bhavana* of each drug was given each for 5 days.

PHARMACEUTICAL STUDY

Procurement of raw materials

Raw materials like *Parada, Gandhaka* and *Mukta* were procured from M/s Dorle and Son's, Kolhapur, *Vanga* was procured from M/s.Jirli, Jamkhanadi and Shilajatu from M/s. S P Kajrekar, Belgaum.

Preparation of *Trailokyamohana Rasa* was carried out at BVVS Ayurveda Pharmacy, Bagalkot.

Analysis

Basic physico-chemical analysis was done at Modern College of Pharmacy, Pune.

X-Ray Diffraction was done at College of Physics, Pune University, Pune.

SEM-EDAX was done at College of Physics, Pune University, Pune.

AAS was done at Gesra Labs, Chennai.

Pharmaceutical Study

Present part was carried out in three parts viz, Purva Karma, Pradhana Karma and Paschat Karma.

Purva Karma included the procurement of raw drugs and their authentication from experts to assess the genuinity of the drugs.

Pradhana Karma was again bifurcated in six steps as follows,

- Step I - Shodhana of the ingredients like Parada, Gandhaka, Vanga, Mukta and Shilajatu.
- Step II - Jaarana of Vanga.
- Step III - Marana of Vanga anad Mukta.
- Step IV - Kajjali Nirmana.
- Step V - Trailokyamohanana *Rasa* kajjali nirmana.
- Step VI -Preparation of *Trailokyamohana Rasa*.

Step I: Shodhana of Parada[2] was carried by following procedure 500 gms of Parada and 500 gms of slaked lime were taken in *Khalva* and triturated for 3 days. This mixture was filtered through double folded cloth and the parada was taken in another *Khalva Yantra* and 500gms of dehusked garlic and 250gms of *Saindhava Lavana* was added and was triturated till it attains black in colour and this was washed with lukewarm water and *Parada* was separated.

Shodhana of *Gandhaka*[3] was done by heating 1000 gms of *Gandhaka* in pan along with little quantity of ghee and was poured in the vessel, mouth closed with cloth wherein the vessel containing 4 litres of cow milk. This procedure of heating and pouring into the media was carried for 3 times.

Shilajatu Shodhana[4] was carried in the *Triphala Kashaya* as media. 2 kgs of *Raw Shilajatu* was dissolved in 20 litres of *Triphala Kashaya* and kept undisturbed for 24 hours and then on next day the filtrate was kept on mild fire and allowed to boil. The scum which floated on the layer of *Kashaya* was collected and preserved.

Vanga Shodhana[5] was done in *Pithara Yantra* where in the vessel was containing the *Haridra Mishrita Nirgundi Swarasa*. 1 kg of *Vanga* was heated in a pan and the melted *Vanga* was added to *Haridra Mishrita Nirgundi* through *Pithara Yantra.* This procedure was carried out for 7 times.

Mukta Shodhana[6] was done in *Dola Yantra* using *Jayanti Swarasa* as media for *Shodhana* by *Swedana* method for 1 *Yaama* (3 hours). 1 kg of *Mukta* was tied in the pottali and this was suspended in the *Ghata Yantra* containing 3 litres of *Jayanti Swarasa.*

Step II: *Vanga Jaarana*[7] 960 gms of *Shodhita Vanga* was heated in an iron pan and melted and to this melted *Vanga Apamarga Panchanga* was added and properly mixed with the ladle and was continued till all the shining particles of *Vanga* disappears.

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Step III: *Marana* of drugs

***Marana* of *Vanga*[8]:** 930 gms of *Jarita Vanga* was taken *Bhavana* of *Kumara Swarasa* was given for 3 hours and then *Chakrikas* were prepared and dried. These *Chakrikas* were added to *Sharava* and *Samputa* was made by applying the *Bandhana* with *Gopichanadana* and dried. Later *Puta* was given. Such 7 *Putas* were given to the *Vanga* till it attains the *Bhasma Lakshana.*

***Marana* of *Mukta*[9]:** 960 gms of *Mukta Choorna* was prepared out of *Shodhita Mukta* and then *Bhavana* of *Kumari Swarasa* was given for 3 hours and *Chakrikas* were prepared and dried. These *Chakrikas* were added to *Sharava* and *Samputa* was made by applying the *Bandhana* with *Gopichanadana* and dried. Total 11 *Putas* were given to *Mukta* by confirmation of the *Bhasma Siddha Lakshanas*.

Step IV: Kajjali Nirmana[10]

400 gms *Parada* and *Gandhaka* respectively were taken in *Khalva Yantra* and trituration was carried out for 80 hours till the *Kajjali Siddha Lakshanas* were seen.

Step V: *Trailokyamohana Rasa Kajjali Nirmana*.[11]

This part included preparation of kajjali for *Kupipakwa Rasayana* where the 400 gm of *Parada Gandhaka Kajjali* was added to the *Khalva Yantra* and then were added the 200 gms of *Shilajatu,* 200 gms of *Vanga Bhasma* and 200 gms of *Mukta Bhasma* and the *Bhavana* of *Pashanabheda Kashaya, Murva Kashaya, Guduchi Kashaya, Triphala Kashaya* and *Kumara Swarasa* respectively for 5 days and was dried and stored in air tight container and this was used further for *Kupipakwa Rasayana*.

Step VI: Preparation of *Trailokyamohana Rasa* by *Kupipakwa* method:[12]

300 gms of *Bhavita Kajjali* prepared was *Dravya* was dried and powdered. Later this *Kajjali* was filled in *Kachakupi* and the mouth of *Kachakupi* was closed with *Churna, Masha* and *Vatsanabha. Agni* is given for 4 *Prahara* in *Valuka Yantra* and preparation is collected after *Swangasheeta.*

Analytical Study[13]

Physico-chemical analysis

Prepared *Trailokyamohana Rasa* was sent for physico-chemical analysis at Modern College of Pharmacy, Pune.

Organoleptic analysis

The final product will be analyzed for texture, smell, taste, colour wih the help of the sense organs.

Determination of pH value

The pH value of the sample was determined by a digital pH meter. One gram of *Trailokyamohana Rasa* was weighed accurately and dissolved in 100ml of water and pH was noted in the digital pH meter.

Loss on drying at 105°C

Two grams of *Trailokyamohana Rasa* was weighed in a silica crucible and dry in a hot air oven at 105°C till a constant weight is obtained. The difference in the two weighing gives the loss on drying and then the percentage of loss on drying was calculated.

Determination of Total Ash

Take about 2 gms accurately weighed, ground drug in a previously traced silica dish, previously ignited and weighed. Scatter the ground dry in a fine even layer on the bottom of the dish. Incinerate by gradually increasing the heat not exceeding dull red heat (4500°C) until free from carbon. Cool and weighed. Then the percentage of ash with reference to the air dried drug was calculated.

Determination of Acid Insoluble Ash

Boil the ash obtained in the process described under determination of total ash for 5minutes with 25ml of dilute hydrochloric acid. Collect the insoluble matter on an ash less filter paper. Wash with hot water and ignite. Weigh it and calculate the percentage of acid insoluble ash with reference to the air dried drug.

Instrumental Analysis

X-Ray Diffraction[14]

X-ray diffraction is a technique though which the study of special arrangement of structural units of a

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substance in the crystalline state i.e. investigating the interior or a crystal is done. XRD analysis of the *Trailokyamohana Rasa* was done at College of Physics, Savitribai Phule University, Pune.

SEM-EDAX[15]

Scanning electron microscopy is performed at high magnifications, generates high-resolution images and precisely measures very small features and objects. SEM analysis of the *Trailokyamohana Rasa* was done at College of Physics, Savitribai Phule University, Pune.

Atomic Absorption Spectroscopy[16]

Atomic absorption spectrometry (AAS) is an analytical technique that measures the concentrations of elements. AAS was performed at Gesra Labs, Chennai.

OBSERVATION AND RESULTS

Step I: During procedure, the gradual change in the colour of *Sudha Choorna* on subjecting to trituration with mercury was observed. This was due to the contact of all the particles of the *Sudha Choorna* with that of *Parada* which was attained due to continuous trituration. During trituration of the *Parada* with *Lashuna Kalka* and *Saindhava Lavana*, the *Kalka* colour turned to dark grayish to black colour.

Totally at the end, we got 430gm of *Shuddha Parada* from 500gm *Ashuddha Parada* with 14% loss of *Parada*.

During *Gandhaka Shodhana*, the *Gandhaka* melted very quickly in the pan and gained orange colour on melting. After filtration, there was a layer of fatty medium found over the *Godugdha* which was some what brownish in colour. *Gandhaka*, which was in coarse powder in nature had collected in a mass form in the vessel in milk media, with many spiky projection like structure and slimy in nature.

At the end, from 1000gm *Ashuddha Gandhaka* we got 940gm *Shuddha Gandhaka* and there was 4% loss in the whole procedure.

During *Shilajatu Shodhana* the smell of *Gomutra* was felt throughout the procedure. *Shilajatu* dissolved completely in *Triphala Kashaya* leaving back the stones and pebbles at bottom of vessel. At the end of *Shodhana* 1465 gm of *Shilajatu* was obtained from 2000gm of *Ashuddha Shilajatu* with a gain of 73.25%.

During *Mukta Shodhana* changes in colour were observed after the *Shodhana*. *Mukta* gained greenish tinge colour after *Shodhana* that may be due to *Swedana* in *Dola Yantra*. The luster also reduced from shiny to dull.

At the end of the procedure, we got 970gm of *Shuddha Mukta* from 1000gm of *Ashuddha Mukta* with 3% loss. The loss may be due to the impurities in the *Mukta*.

During *Vanga Shodhana*, *Vanga* melted very fast in the pan and when added to *Peethara Yantra* made an explosive sound. *Vanga* after adding the *Shodhana* had yellowish tinge and had shiny lusture. At the end of procedure 965gm of *Vanga* was obtained from 1000gms with a loss of 35 gms and total yield was 96.5%.

Step II: *Jarana* of *Vanga*

On adding of *Apamarga* to the pan, it turned into blackish colour. At the end of procedure 935gm of *Jarita Vanga* was obtained from 960 gm of *Shodhita Vanga*. The obtained mixture was grayish white in colour. This procedure required 20 hours to get accomplished.

Step III: *Marana* of the drugs

Vanga Marana: At the end of *Marana* we obtained 901gm of *Vanga Bhasma* from 930 gms of *Jarita Vanga* with a loss of 29 gms.

Mukta Bhasma: At the end of *Marana*, 870gm of *Mukta* was gained from 960gms of *Shodhita Mukta* with a gain of 90.62%.

Step IV: *Kajjali Nirmana:* At the end of trituration for 80 hours, we obtained 770 gm of *Kajjali* from 800gm of *Parada* and *Gandhaka* (400 gms each), with a loss of 30gms. The colour gradually changed from yellow to black in colour as we went on triturating.

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Step V: *Trailokyamohana Rasa* kajjali nirmana: At the end of procedure we got 2110 gms of bhavita kajjali from 2000 gms of Kajjali with a gain of 110 gms.

Step VI: *Trailokyamohana Rasa Nirmana*

In this procedure we got 4gm of *Kantastha* product and 246gms of *Talastha* compound. The *Talastha* compound was amorphous in nature, black colored and amorphous in nature.

Analytical Results

Organoleptic examination

Results as received from the respective analytical centres, The given sample was brownish black in colour with smooth in nature and smell was disagreeable (ammonical).

The other analysis of *Trailokyamohana Rasa* showed 8.4pH, 1.36% loss on drying, 68.94% of total ash and 38.56% of acid insoluble ash.

X-Ray Diffraction

X-RAY Diffraction Study of the sample revealed crystal structures as - The diffraction showed the peak of mercury which was in HgS form. Peaks also showed traces of Calcium, Tin and sulphur which was crystalline in nature. The given sample was polycrystalline in nature. The average particle size was of 19nm. The humps in the diffractogram and absence of sharp peaks suggest that the original compound has been transformed into some low crystalline or amorphous like substance probably due to heat treatment.

SEM-EDAX

Peaks at intervals showed the traces of Hg (Mercury), S (Sulphur) and Pt (Platinum). Here Hg and S are from *Kajjali* which was used as base for preparing of *Trailokyamohana Rasa*. Second peaks showed the traces of Ca (Calcium) and Sn (Tin). Some other components were found such as C (Carbon), O (Oxide), Na (Sodium), Al (Aluminium), Si (Silicon), P (Phosphorus), Cl (Chlorine), K (Potassium), Fe (Iron), Cu (Copper).

AAS analysis

AAS analysis was done which revealed the traces of Calcium 16%, Tin as 7.56%, Sulphur as 3.8%, carbonate as 40.25% and loss on ignition was 49.30% and Hg level showed below 1ppm.

Discussion

Step I: Gradual change in the colour of *Sudha Choorna* on subjecting to trituration with mercury was observed. This was due to the contact of all the particles of the *Sudha Choorna* with that of *Parada* which was attained due to continuous trituration. During the washing process the *Parada* was found to get seperated from *Sudha Choorna* and got settled at the bottom of the *Khalwa Yantra*. This could be because of the physical property of the mercury being able to break the surface tension of water and settling down. During trituration of the *Parada* with *Lashuna Kalka* and *Saindhava Lavana*, the *Kalka* colour turned to dark grayish to black colour. This could be due to the contact of the mercury with the suplhur content present in *Lashuna*.

Loss may be due to the spilling of *Parada* from *Khalva* and minute loss during *Prakshalana*.

Gandhaka Shodhana: *Mandagni* was given to avoid burning of Sulphur. Cloth was smeared with Ghee to avoid sticking of *Gandhaka* to the cloth. Here the use of finely powdered *Gandhaka* facilitates its easy dissolution in *Goghrita* under *Mandagni* intensity in quicker time duration due to the its minute particle size. This uniform dissolving of the *Gandhaka* helps for its easy filtering through the cloth. Few blackish substances were found remaining over the cloth which is considered as physical impurities present in sulphur. After filtration, there was a layer of fatty medium found over the *Godugdha* which was some what brownish in colour. This can be considered as the seperation of the *Visha Guna* of *Gandhaka* from it and coming out into the *Goghrita* remaining at the surface of *Godugdha*.

Loss may be due to the adhering of *Gandhaka* to the cloth and due to the impurities present in it.

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Shilajatu Shodhana: The loss of weight may be due to the physical impurities and the adulterants present in the *Shilajatu*. The *Gomutra Gandha* is due to presence of hippuric acid in *Shilajatu*.

Vanga Shodhana: Quick melting of *Vanga* was due to low melting point. The yellowish tinge of *Vanga* was due to *Haridra Mishrita Nirgundi Swarasa*. The loss may be due to the impurities and adulterants present in the *Vanga*.

Mukta Shodhana: Greenish tinge may be due to process of *Swedana* in *Jayanti Swarasa.*

Step II: *Jaarana* of *Vanga*: The colour of *Vanga* turned into grey colour due to the process of *Jarana* with *Apamarga*. The loss may be due to the breakdown of *Vanga* into powder form.

Step III: *Marana* of drugs

At the end of *Mukta Marana*, 870 gm of *Mukta* was gained from 960gms of *Shodhita Mukta* with a gain of 90.62%.

This loss may be due to the addherance of *Bhavita Mukta* to *Khalva* and due to the spillage from the *Khalva*.

At the end of *Vanga Marana* we obtained 901 gm of *Vanga Bhasma* from 930 gms of *Jarita Vanga* with a loss of 29 gms.

This loss may be due to the addherance of *Bhavita Vanga* to *Khalva* and due to the spillage from the *Khalva*.

Step IV: *Kajjali Nirmana*

30 gm of loss may be due to the spillage of *Kajjali* from *Khalva* during *Mardana*.

Step V: *Trailokyamohana Rasa Kajjali Nirmana*

The weight gain in *Kajjali* after *Bhavana* may be due to the imbibing of the *Bhavana Dravya* in the *Kajjali*.

Step VI: *Trailokyamohana Rasa Nirmana*

The reduction in weight of final product may be due to the compactness gained by the product due to continuous agni for 12 hours.

Analytical discussion

X-Ray Diffraction : The humps in the diffractogram and absence of sharp peaks suggest that the original compound has been transformed into some low crystalline or amorphous like substance probably due to heat treatment.

SEM-EDAX: The analysis showed the traces of all the elements which are the components of my drug *Trailokyamohana Rasa*. The traces of other elements may be due to the components of *Shilajatu* which is known as mineral pitch and also may be due to the use of various vessels during preparation.

AAS: Analysis assured that all the elements are within the standard limits and can be used for the therapeutic uses.

CONCLUSION

Trailokyamohana Rasa is one of the *Antardhuma Kupipakwa* method explained in classics. *Trailokyamohana Rasa* has negligible values of loss on drying and ash values. *Trailokyamohana Rasa* has pH of 8.4. XRD of *Trailokyamohana Rasa* showed highest peak of Hg which was in HgS form and the shape was polycrystalline with average size of 19nm. SEM revealed the presence of all the elements added to the formulation. AAS revealed that all the elements were in the limits and can be used for therapeutic purpose.

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