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PHARMACEUTICAL STANDARDIZATION OF BALADI MANDURAM

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ABSTRACT

Objective: *Baladi Manduram* (*BM*) is one of the most important and potent herbo-mineral formulation described in Ayurvedic classics *viz.*, *Rasa Kamadhenu* and *Rasayoga sagara* specified for the management of the disease *Amlapitta*. *BM* contains *Mandura Bhasma, Balamula, Satavarimula, Erandamula, Yava, Pippali, Jiraka, Twak, Ela, Patra, Nagakesara* and *Guda*. Till now no research work has been carried out to standardize the preparation of *BM*. The main objective of the present study is to standardize the method of preparation of *BM* according to the conventional method mentioned in classical literatures.

Methods: *Shodhana, Bhavana, Marana, Churna nirmana* and *Paka* are the main pharmaceutical procedures involved in the preparation of *BM*. *Mandura* was subjected to *Shodhana* by *Nirvapa* in *Gomutra Triphala Kashaya* for 7 times. *Shodhita Mandura* thus obtained was triturated with *Kumari Swarasa* and subjected to *Gaja puta* for 7 times. *Mandura Bhasma* thus otained was added to the *guda paka* along with the fine powders of herbal ingredients. Then the homogenous mixture of *BM* was made in the form of capsules of 500mg.

Results: 1380 g of *BM* was prepared from 1264g of *Mandura Bhasma*, 100g each of *Balamula*, *Satavarimula*, *Erandamula* and *Yava*, *50g* each of *Pippali* and *Jiraka* and 8g each of *Twak, Ela, Patra* and Nagakesara.

Conclusion: All these procedures can be considered ideal in the standardization of the preparation of *Baladi Manduram*.

Keywords: *Baladi Manduram, Shodhana, Bhavana, Marana, Churna nirmana, Paka, Standardization.*

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INTRODUCTION

Rasa Shastra and *Bhaishajya Kalpana* are considered as the pharmaceutical branch of *Ayurveda*. Most of the preparations of *Rasa Shastra* are Herbo-mineral-metallic in nature, as they contain minerals and metals as an integral part of their formulations along with the specified herbs.

The use of metals and minerals were found since Vedic period. Their use in therapeutics was limited probably due to their non-conversion into suitable pharmaceutical form *viz.*, *Bhasma*. But after the development of *Rasa Shastra* with the well-defined pharmaceutical processes like *Shodhana, Jarana, Marana, Bhavana* etc. their use in therapeutics occupied highest place and is called as *Rasa chikitsa.*

Various therapeutic effects of *Mandura* have been elucidated in different texts of *Rasa Shastra. Baladi Manduram* is a unique formulation mentioned in classics like *Rasa Kamadhenu Amlapitta rogadikara*[1] and *Rasa yoga sagara*- II *Pakaradi Rasa*[2]. It contains *Mandura Bhasma* as the chief ingredient along with the herbal drugs like *Balamula, Satavarimula, Erandamula, Yava, Pippali, Jiraka, Twak, Ela, Patra, Nagakesara* and *Guda*.

Pharmaceutical processes involved in the preparation of *Baladi Manduram* are *Shodhana, Bhavana* and *Marana* of *Mandura, Churna nirmana* of herbal ingredients and preparation of *Baladi Manduram.* Hence an effort has been made in the present study to standardize the method of preparation of *Baladi Manduram.*

MATERIALS AND METHODS

Procurement of Raw material

Mandura and *Triphala* were obtained from local market of Chennai, Tamil Nadu. *Balamula, Satavarimula, Erandamula, Yava, Pippali, Jiraka, Twak, Ela, Patra, Nagakesara, Guda* and *Kumari* were obtained from TTD's Sri Srinivasa Ayurveda Pharmacy, Tirupati. Gomutra was collected from the Goshala of ISCKON temple, Tirupati.

Methods

Entire preparation of *Baladi Manduram* was carried out in TTD's Sri Srinivasa Ayurveda Pharmacy and Department of Rasa Shastra and Bhaishajya Kalpana, S.V.Ayurvedic College, Tirupati.

Total pharmaceutical study was carried out in the following stages

Stage - I

- *Triphala Kwatha nirmana* with *gomutra*.
- *Mandura Shodhana*.

Stage - II

- *Kumari Swarasa nirmana.*
- *Mandura Marana*.

Stage - III

- Preparation of *Balamula Churna.*
- Preparation of *Satavarimula Churna*.
- Preparation of *Yava Churna.*
- Preparation of *Erandamula Churna.*
- Preparation of *Pippali Churna.*
- Preparation of *Jiraka Churna*.
- Prepatation of *Twak Churna*.
- Preparation of *Ela Churna*.
- Preparation of *Patra Churna*.
- Preparation of *Nagakesara Churna*.

Stage - IV

- *Paka* of all Herbal drugs along with *Guda* and double quantity of *Mandura Bhasma*.

Stage -V

- Semi solid paste of drug dried in sun light and made into powder (*Baladi Mandura*m)
- Preparation of capsules of *Baladi Mandura*m.

Procedure

I. ***Gomutra Triphala Kashaya Nirmana:*** *Gomutra* was taken in a stainless steel vessel and coarse powder of *Triphala* was added to it. It was subjected to moderate fire till the liquid part was reduced to 1/4th quantity. Then it was filtered through a clean cloth and *Gomutra Triphala Kashaya* was collected.

Observations: Brown coloured *Gomutra Triphala Kashaya* emitting peculiar smell of *Gomutra* was obtained.

II. ***Mandura Shodhana:*** *Mandura* pieces were heated to red hot in an iron pan and quenched in sufficient quantity of *Gomutra Triphala Kashaya*. The same procedure was repeated for six more times by changing the *Kashaya* each time.

Observations: During every *nirvapa*, time taken for the *Mandura* to become red hot was gradually decreased. Hissing sound was produced during quenching of red hot *Mandura* in *Gomutra Triphala Kashaya.* Brownish grey coloured coarse powder of *Shodhitha Mandura* was obtained after seven *nirvapa.* Boiling of *Gomutra Triphala Kashaya* was observed while quenching red hot *Mandura* in the *Kashaya*.

III. ***Mandura Marana:*** *Shuddha Mandura* was taken and pounded in a *khalwa yantra* to fine powder. It was subjected to *Bhavana* with sufficient quantity of *Kumari Swarasa* till it attains semisolid consistency. *Chakrika*s of uniform size and shape were prepared and dried. They were placed in a *Sharava* and *sandhibhandhana* was done using *Multani mitti. Sharava samputa* was dried and subjected to *Gajaputa*. This procedure was repeated for six more times. The temperature was recorded by pyrometer and reading was taken for every thirty minute.

Observations: Maximum temperature attained in *Gaja puta* was 1003^{0}C after 210 minutes. Consistency of the pellets was very soft after *puta.* While giving first *Bhavana,* it took seven hours to attain *subhavita lakshanas*. On subsequent *putas* however the grinding became easier due its powdery nature and *Bhavana* completed within three hours. Gradual change in the colour of the *Mandura* was noticed after every *puta*. *Mandura* turned from Blackish grey to greyish brown, dark brown, and then to brownish red by the end of 6th *puta.* Red coloured *Mandura Bhasma* was obtained after 7th *puta. Slakshnatwa* was obtained after 3rd *puta,*

Rekhapurnatwa after 6th *puta* and *Varitarwatva* after 7th *puta.*

IV. ***Churna Nirmana:*** Raw materials of *Balamula, Satavarimula, Erandamula, Yava, Pippali, Jiraka, Twak, Ela, Patra* and *Nagakesara* were collected and cleaned to remove external impurities if any and completely dried. They were pounded in a *khalwa yantra* separately and sieved through a clean cloth to obtain fine powder.

Observations: Very fine churna of individual drugs have been obtained.

V. ***Paka* of all *churna*s along with *Guda* and *Mandura Bhasma*:** 2 *pala* of *Guda* was taken in a stainless steel vessel and sufficient quantity of water was added to it and heated on mandagni. After 20 minutes of heating, *Paka lakshana*s appeared. Fine powders of herbal drugs (2 *Pala* of *Balamula, Satavarimula, Erandamula, Yava;* 1 *pala of Pippali, Jiraka;* 1 *masha of Twak, Ela, Patra, Nagakesara)* and double the quantity of *Mandura Bhasma* was added one by one to it and mixed properly. The mixture was heated on *Mandagni* for 15 minutes with continuous stirring to avoid charring of powders. After self-cooling, it was taken out from the stove carefully and dried under sunlight in a tray. (Note: 1 *pala*=50g, 1 *masha*= 8g)

Observations: Red coloured semisolid paste of *Baladi Manduram* was obtained after paka.

VI. **Preparation of capsules of *Baladi Manduram*:** Homogenous mixture of *Baladi Manduram* was filled in capsules of 500mg. Capsule filling was done with capsule filling machine.

Figure: 1A: 1- *Triphala Gomutra Kashaya;* 2- Heating of *Mandura;* 3- Red hot *Mandura;* 4- *Nirvapa* in *Gomutra Triphala Kashaya;* 5- *Shuddha Mandura* after seven *Nirvapa;* 6- *Bhavana* of *Mandura* with *Kumari Swarasa;* 7- *Chakrikas* after *Bhavana;* 8- *Sharava Samputa;* 9- *Gaja Puta;* 10- *Mandura Bhasma;* 11- *Rekhapurnatwa;* 12- *Varitaratwa;* 13- *Bala moola;*14- *Bala moola Churna*; 15- *Shatavari;*

Figure: 1B: 16- *Shatavari Churna*; 17- *Eranda moola;*18-*Eranda moola Churna;* 19- *Yava;* 20- *Yava Churna*; 21- *Pippali* 22- *Pippali Churna;* 23- *Jeeraka;* 24- *Jeeraka Churna;* 25- *Twak;* 26- *Twak Churna;* 27- *Patra;* 28- *Patra Churna;* 29- *Ela;* 30- *Ela Churna;* 31- *Nagakesara;* 32- *Nagakesara Churna;* 33- *Guda;* 34- Boiling of *Guda* to obtain *paka;* 35- Fine powders of herbal drugs added to the *paka;* 36- *Mandura Bhasma* added to the mixture; 37- Drying of whole mixture; 38- Homogenous Mixture (Baladi Manduram); 39- Capsules of *Baladi Manduram.*

RESULTS

Table 1: Showing the result of preparation of *Gomutra Triphala Kashaya:*

Weight of *Triphala*	Weight of *Gomutra*	Weight of *Gomutra Triphala Kashaya*
Haritaki- 2 kgs *Vibhitaki*- 2 kgs *Amlaki* – 2 kgs	42 L	10.5 L

Table 2: Showing the result of *Mandura Shodhana:*

Initial Weight of *Mandura*	Final Weight of *Mandura*	Loss in Weight
2000g	1800g	200g

Table 3: Showing the result of *Mandura Marana:*

Initial Weight before *Marana*	Final Weight after *Marana*	Loss in Weight
1800g	1575g	225g

Table 4: Showing the Temperature pattern of *Gajaputa*

Time in minutes	Temparature (degree celsius)
0	24
30	125
60	300
90	540
120	775
150	945
180	975
210	1003
240	930
270	820
300	770
330	740
360	650
390	547
420	450
450	343
480	241
510	215
540	151
570	120
600	80
630	50
660	42
690	37
720	27

Graph 1: Showing the Temperature pattern of *Gaja puta* of *Mandura*

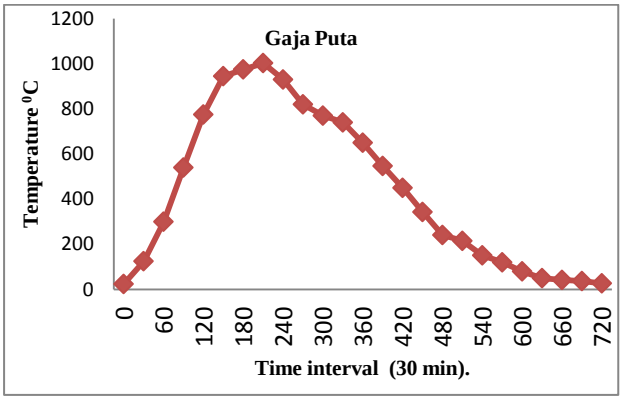

Table 5: Showing the *Bhasma* pareeksha of *Mandura* at different stages of *Marana.*

Puta	Colour	*Rekapuranata*	*Varitaratva*	*Slakshnata*
1	Black grey	-	-	-
2	Dark grey	-	-	-
3	Greyish brown	-	-	+
4	Dark brown	-	-	++
5	Dark brown	-	-	++
6	Brownish red	+	-	+++
7	Red	++	+	+++

Table 6: Showing the result of *Churna Nirmana*

Name	Initial Weight	Final Weight	Loss in Weight
Balamula churna	200g	190g	10g
Satavarimula churna	200g	185g	15g
Erandamula churna	200g	195 g	5g
Yava churna	200g	180 g	20g
Pippali churna	200g	182 g	18g
Jiraka churna	200g	175 g	25g
Twak churna	100g	90 g	10g
Patra churna	100g	92 g	8g
Ela churna	100g	96 g	4g
Nagakesara churna	100g	90 g	10g

Table 7: Showing the result of *Paka* of all *churna*s along with *Guda* and *Mandura Bhasma*:

Initial Weight of ingredients before *paka*	Final Weight after *paka*	Weight loss
Balamula - 100g *Satavarimula* - 100g *Erandamula* - 100g *Yava* - 100g *Guda* - 100g *Pippali* - 50g *Jiraka* - 50g *Twak* - 8g *Ela* - 8g *Patra* - 8g *Naga Kesara* - 8g *Mandura Bhasma* - 1264 g	1380g	2g
Total - 1382 g		

Table 8: Showing the result of preparation of capsules of *Baladi Manduram*

Weight of homogenous mixture	Number of capsules prepared
1380g	2670

DISCUSSION

The principle procedures involved in the present study are *Nirvapa, Bhavana, Marana* of *Mandura, churna nirmana* and preparation of *Baladi Manduram.*

Mandura Shodhana: *Shodhana* of *Mandura* was done to remove the visible and invisible impurities, to reduce the toxicity and to enhance the therapeutic properties. There are various methods mentioned for *Shodhana* of *Mandura* in *Rasa Shastra* texts. These procedures can be categorized as *Nirvapa, Pachana, Abhiseka*[3] etc.

But in the present study, *Nirvapa* with *Gomutra Triphala Kashaya* has been selected for *Shodhana* procedure according to *Rasa ratna samucchaya*[4]. Nirvapa is the process of heating the material to red hot and quenching it into a liquid substance[5]. It makes the material more brittle by increasing the grain size. *Gomutra Triphala Kashaya* has been selected because *Gomutra* is having *Tikshna, Laghu guna, Ushna virya* and *Lekhana* properties[6]. Because of these properties it helps in breaking up of particles of *Mandura* and eliminates the undesired substances from the material. Secondly, the acidic impurities like chlorides, sulphides and nitrates present in *Mandura* might get neutralised by the alkaline *Gomutra* and get washed away. Due to hardness of *Mandura* (6 to 6.5) repeated heating and quenching *(Nirvapa)* in specific media disrupts the compression-tension equilibrium in the internal structure of *Mandura.*

In this *Nirvapa* method, during the process of heating weakening of electrostatic forces and crystal lattice of

Mandura takes place. Because of the high temperature, more collision between the particles occurs (Collision theory)[7]. Due to this weakening of bonds takes place which causes structural weakness that may develop into crack (Griffith theory)[8]. Immediate quenching in liquid media after heating causes disruption in compression tension equilibrium. This leads to increased brittleness and reduction in hardness of the material. As results of this, some part is converted to coarse powder and some in fine powder. After each quenching, powder was found as sediment in media.

Mandura Marana: Procedure of *Marana* is selected according to the reference mentioned in *Rasamritam*[9]. According to the textual reference 7 *putas* have been mentioned for *Mandura Marana. Mandura Marana* includes four steps- *Bhavana, Chakrika nirmana, Sharava samputikarana* and *Puta paka.*

- **Step I-*Bhavana*- Levigation:** In the present study *Mandura* was subjected to *Bhavana* with *Kumari Swarasa*. *Acharya Charaka* has described *Bhavana* as one of the *samskaras*[10]. It is described that *Bhavana* with *swarasa* of specific *dravya* enhances the *bala* (potency) of *aushadhi dravya*. *Bhavana* helps in breaking down of the material by rubbing action between two surfaces i.e. surface phenomena, it is also called as attrition. When the stress in the form of attrition is applied, the particle surfaces chip and produce small particles. The particle size also gets reduced by this procedure. Moreover *Kumari Swarasa* used for *Bhavana* also acts as a binding agent, helps for disintegration of particles of the drug and adds some organic qualities and trace elements to the inorganic drug.
- **Step II – *Chakrika nirmana*-Pellet formation:** In this phase *Bhavita dravya* was converted in to small *Chakrikas* of uniform size and shape. This helps to achieve homogenous heat pattern to whole of the mass with increased surface area.
- **Step III - *Sharava samputikarana*- placing the pellets in *Sharava samputa*:** Earthen *Sharava samputa* are used for incineration because of their inert nature, easy availability and uniform distribution of heat to the substance.
- **Step IV - *Puta paka:*** In this phase, the *Sharava samputa* was subjected for *puta paka*. According to classics, *Gaja puta* is generally advised for *Mandura Marana*. *Puta* is the heating system which indicates the quantum of heat required by *Rasadi dravyas* for their conversion into suitable form *(Bhasma)*[11]. In *puta* system of heating there is gradual rise and fall of temperature which helps in making the material more *agnisthayi* (heat stable). It cannot regain its form back after complete procedure. The maximum temperature attained during the *puta* was 1003^0C. After that gradual fall in temperature was noted over a period of eight and half hours before reaching room temperature. The material turned to soft powder without any lustre after complete process, which indicates that the temperature was sufficient for the formation of the desired compound.
- There was a gradual change in the colour of the *Mandura* during putapaka. This indicates that the process of Marana and media have got direct influence and are responsible for change in "Varna, *Nishchandratva* and *Shlakshanatva"*of the *Bhasma.* It is evident from the analytical tests that increase in the percentage of iron oxide is contributing factor for the change in colour and loss of lustre.
- ***Bhasma pareeksha:*** *Rekhapurnata* was obtained at the end of 6^{th} *puta.* This indicates the *Sukshmata* of the *Bhasma.* After 7^{th} *puta Varitaratwa* was positive indicating the lightness of *Bhasma*. *Mandura bhasma* has achieved *Gata rasatva* property after 7^{th} *puta*.
- **Preparation of capsules of *Baladi Manduram*:** *Baladi Manduram* was prepared in the capsule form due to the presence of Volatile principles in Chaturjataka, which may get evaporated when exposed to environment.

CONCLUSIONS

Pharmaceutical standardization of medicines is an essential requirement to establish the safety and efficacy, as well as to ensure the quality and the yield of final product. *Shodhana* by *Nirvapa* in *Gomutra Triphala Kashaya* procedure helps in increasing the brittleness and reducing the hardness of the *Mandura*. *Bhavana* procedure plays a vital role in reducing the particle size and exposing maximum surface area of *Mandura* in *Marana*. *Marana* makes *Mandura* more adaptable, absorbable and assimilable in the body without producing any toxic effects. Hence all these procedures can be considered ideal in the standardization of the preparation of *Baladi Manduram*.

CONFLICT OF INTEREST

No conflict of interest.

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