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STANDARD MANUFACTURING PROCEDURE (SMP) OF ABHRAKA SHODHANA

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ABSTRACT

Abhraka Bhasma is widely used in Ayurvedic field by many Ayurvedic physicians, commonly used in *Jwara* (Fever), *Pandu* (Anaemia), *Amavata* (Rheumatoid Arthritis), *Shwasa* (Asthma) and *Kamala* (Jaundice). Ingestion of *Ashodhit Abhraka* causes *Mandagni* (Loss of appetite), Hridroga (Heart diseases) etc. It is a most important step before processing in to *Bhasma* (incinerated powder). So *Shodhita Abhraka* should be used for preparation of *Abhraka Bhasma*. For the proper *shodhana* of *Abhraka Bhasma*, there is need to develop Standard Manufacturing Procedure. Thus an attempt has been made to introduce SMPs for *Abhraka shodhana*. **Aim and Objective:** To develop standard manufacturing procedure for *Abhraka shodhana*. **Materials and Methods:** Total three batches of *Abhraka shodhana* of 1000 g were prepared by adopting classical guidelines. **Results and Discussion:** Average 1000 grams of *Abhraka* was taken and yield of 918.67 g of *Shodhita Abhraka* was obtained. The average loss in final product was 8.13%. Average total time required for each nirvapa procedure was 54.29 min. Average *Shodhana* time required for one batch of 1000 g of *Abhraka* was 378.33 min **Conclusion:** SMP of *Abhraka Shodhana* is prime requirement for preparation of *Bhasma*. The average yield of Shodhita Abhraka was 91.86 %. Loss is due to flow of brittle and fine particles of *Abhraka* particles in the air.

Keyword: *Abhraka, Bhasma, Biotite, Shodhana,* Standard Manufacturing Procedure

INTRODUCTION

In Indian system of medicine, metal and minerals are frequently used in therapeutics without any untoward effects. In the Medieval period many pharmaceutical processing like *shodhana* (purification), *marana* (incineration), *sattvapatana* (extraction) etc. are developed in Ayurvedic pharmaceutics for metallic and mineral preparations.[1] Historically *shodhana* concept was in existence since the time of *Charaka Samhita* as while enumerating the fundamentals necessary of *Gunantaradhana*.[2] The concept has further developed after the development of *Rasashastra* in the field of Ayurvedic medicine. Ayurvedic drugs are achieved from natural sources such as plants, animal and minerals. Therapeutically metals and minerals used since Vedic period, due to their additional advantages like smaller dose, quick action etc. which became an important part of Ayurvedic medicine.[3] As in *Rasashastra*, the metals, minerals and few drugs of poisonous nature are found used which likely to contain some toxic effects. Hence with a view to remove or

minimize their toxicity and to make them suitable for further processes, a number of pharmaceutical procedures have been found evolved which are considered helpful in reducing the toxic effect of such drugs.[4] The frequently used metals and minerals in Ayurveda includes *Parada* (mercury), *Swarna* (gold), *Rajata* (silver), *Tamra* (copper), *Loha* (iron), *Abhraka* (Biotite), and *Swarna Makshika* (Copper pyrite). The metallic preparations are used in the form of *bhasma* (incinerated powder) and *shodhana* is first and primary step before proceeding in to *Bhasma*. Process of *Shodhana* is divided in *Samanya shodhana* (general purification) and *Vishesha shodhana* (special purification). *Samanya Shodhana* includes heating the drug up to red hot stage or up to complete melting then quenching for either three or seven times in each liquid media that include *Tila taila* (sesame oil), *Takra* (clarified butter), *Gomutra* (cow's urine), *Kanji* (sour gruel) and *Kulattha kwatha* (decoction of *Dolichos biflorus* Linn).[5] *Vishesha Shodhana* involves the same process of heating or quenching but the liquid media is specific for different metals and minerals; such as *Naga* is purified quenching it in *Churnodaka*[6], *Gandhaka* purified in *Godugdha*[7], *Loha* is purified in *Triphala Kwatha*[8] etc. *Abhraka Bhasma* is more commonly used by various Vaidya in Ayurvedic practice. In classics *Abhraka Bhasma* is used in various diseases like *Amavata, Kshaya, Shwasa, Kasa*[9] *Arsha, Jwara, Raktapitta, Pandu, Mutraghata, Vataroga,*[10] *Kamala, Udararoga.*[11] In classics, it is mentioned that utility of *Ashodhit Abhraka* causes *Mandagni*, *Hridroga,*[12] *Parshwashool*, *Shotha*, *Pandu* and *Kushtha*.[13] So *shodhita Abhraka* should be used for preparation of *Abhraka Bhasma*. Various processes are mentioned classics for *Abhraka shodhana* with different liquid media. Various *Acharyas* have mentioned more than 38 drugs for *Abhraka Shodhana*. In *Rasaratna Samuchhaya*, Milk was mentioned for the *Abhraka Shodhana*.[14] Milk is available throughout year at any session in market and low cost. Therefore in present study, we used milk for *Abhraka Shodhana* by *Nirvapa* method for seven times.

Aim and Objective: Considering all these points in view, present work has been planned to develop SMP of *Abhraka Shodhana*.

Material and Methods

Collection of raw materials: Raw *Abhraka* was procured from Pharmacy, Gujarat Ayurved University, Jamnagar and authenticated as per classical texts. Cow's milk was procured from local market of Jamnagar. Raw *Abhraka* was tested for Ayurvedic *grahya lakshana* (acceptable parameters) like *Snigdha, Pruthudala, Varnasanyukta*, *Bharatoadhikam*[15], *Kajjalasannibha*[16,17] , *Anjjannibha*[18], *Abhraka shodhana* was done in three batches with one kg of *Abhraka* in each batch. Necessary equipment's like Charcoal burner, electric blower, Pyrometer, metal tongs, steel vessel, Cow dung cakes, Iron pan, Measuring cylinder, Weighing balance, cotton cloth, etc. were arranged prior to begin the process.

Abhraka Shodhana

Ingredients: Raw *Abhraka* – 1000 Gms, Cow Milk (*Godugdha*) – 7 Litres.

Procedure: 1000 g of raw *Abhraka* was weighed and heated in an iron pan. Required amount of milk (1 lit.) was taken in a steel vessel with the help measuring jar. The temperature of charcoal was maintained with the help of Electric blower to get uniform heat. The chips of raw *Abhraka* were turned up and down with the help of metal tongs to give equal exposure of heat to both the surfaces. It took 45-60

minutes to achieve the red hot stage. When the *Abhraka* pieces became completely red hot, they were quenched in the milk. After 4 to 5 minutes, the milk was separated by filtering it through cotton cloth and soft pieces of *Abhraka* were collected in an iron pan to subject it for next *Nirvapa*. Remaining quantity of milk was measured. Temperature of coal and *Abhraka* were noted by using pyrometer. The similar method was followed for further six times for all the three batches. Before every *Nirvapa*, fresh milk was taken. After 7th *Nirvapa*, *Shodhita Abhraka* was taken in S.S. tray and spread it well. Tray was kept in an oven at 50^{0}C for 8 hrs to evaporate the milk which is absorbed by *Abhraka* during *Shodhana* process. After complete drying, trays was removed from oven and weighed. This *Shodhita Abhraka* was used for further procedure.

General Observations

- When the red hot raw *Abhraka* is quenched in milk, 'Hissing' sound was produced and fumes were evaporated having milky smell.
- Before quenching of red hot *Abhraka* in milk, the milk temperature was 28^{0}C, after quenching the temperature of milk was suddenly raised up to 78^{0}C.
- Colour of milk was changed from white to whitish brown.
- Some pieces of *Abhraka* were flooded over milk.
- *Abhraka* became softer and separated easily.
- After 4th *Nirvapa*, the fine particles of *Abhraka* were floating in air.
- Colour of *Abhraka* changed to golden brown.
- During *Abhraka* heating, fumes and typical milky smell was observed.
- *Abhraka* changed into coarse powder after 7thNirvapa.
- After each *Nirvapa*, the weight of *Abhraka* was increases due to adhesion of milk over the surface of *Abhraka*.

DISCUSSION

For *Shodhana*, Average 1000 g of Abhraka taken and yield of *Shodhita Abhraka* was 918.67 grams. Average loss of 8.13% was occurred during the *Shodhana* process. Average time required for each *nirvapa* procedure 54.29 min. Average time required for *shodhana* for one batch was 378.33 min. Average one litre of milk was required for *Shodhana* of 1000 g of *Abhraka*. After the quenching of red hot *Abhraka*, the almost 40% of milk was evaporated. Before the quenching of *Abhraka* in milk the average temperature of milk is 28.57^{0}C, which was suddenly raised to 77^{0}C. After each *nirvapa*, 5 to 10 min was required for next red hot stage of *Abhraka* for further *shodhana*, which was might due to presence of milk which was absorbed by *Abhraka* in previous *nirvapa*. *Shodhana* is a process which removes the physical as well as chemical impurities of the raw drug. Chemically 99.9 % pure is not taken as *shodhita* until and unless it gone through *Ayurvedic* purification. During *Shodhana* procedure, raw *Abhraka* was heated to red hot stage and quenched into liquid media and repeated the same procedure. Successive heating and quenching process lead to sudden variations in temperature of the *Abhraka.* After heating the material, the intermolecular space is increased and molecular arrangements deforms. After application of heat, inter atomic tension is increased and also increasing inter atomic distance. After quenching, sudden change in temperature disturbs inter atomic tension and weakens the electro-static bond in between two atoms leading to change in the molecular arrangements. This change causes the brittleness of the drug leading to breaking and

size reduction which is one of the desired characteristic of *shodhana*. Repeated quenching causes disruption in equilibrium, increased brittleness, reduction in hardness and finally reduction in particle size. To flow the particles in air due to their lightness causing weight loss of the raw drug. After quenching in milk, it gave hissing sound due to sudden cooling of the red hot *Abhraka patra*. After quenching, sudden rise in temperature of the milk causes evaporation with white fumes. During *nirvapa* process cracks are seen on the surface and broken in to coarse powder. Due to brittleness, some particles of *Abhraka* are observed floating over the surface of milk. After successive *nirvapa* of *Abhraka* in liquid media, it leads softer and easily separable *Abhraka.* Reduction in particle size helps in absorption, smoothness leads to non-irritability and changes make the material body friendly. Colour change from white to whitish brown is due to fine particles of *Abhraka* that derived from *Abhraka patra*. Colour of *Abhraka* became golden brown colour due to removal of impurities. Temperature of the milk is increased after quenching is due to contact with red hot *Abhraka patra.* Weight gain observed after each quenching is due to adherence of milk to the *Abhraka patra.* Loss in the milk volume after quenching is due to evaporation and adherence to *Abhraka patra.* Weight loss is observed after complete drying of the *Abhraka patra* than the initial weight of raw *Abhraka patra.* It is due to flow of the particles of the *Abhraka* which became brittle after each quenching in milk. It was also observed that *Abhraka* takes comparatively more time to get complete red hot during *shodhana* procedure. After the each *Nirvapa* surface area of the *Abhraka* was increased. After the *shodhana Abhraka* colour became golden brown. *Abhraka* become soft, light in weight and coarse powdered.

CONCLUSION

Shodhana is a prime procedure of Ayurvedic pharmaceutics which is utilized for further pharmaceutical procedure or used in formulation. *Shodhana* detoxifies the drug and increases the safety and efficacy of the drug. Quenching of red hot *Abhraka* in to milk cause sudden rise of temperature causing evaporation of milk and resulting 40 % loss. Average 54.29 min time was required for red hot stage of *Abhraka*. Sudden cooling of red hot *Abhraka* gave brittleness which is desired character of *Abhraka*. The average yield of *Shodhita Abhraka* was 91.86 %. The brittleness of *Abhraka* causes the flow of *Abhraka* particles in to the air. After *Shodhana*, the raw *Abhraka* was turned in to soft, brittle and shiny particles. The results of present ensure the uniformity of the operative procedures. Thus the SMP of *Abhraka shodhana* can be utilized for the pharmaceutical procedures and for formulations. The present study can be considered as standards for further researches.

Table No: 1 Showing the observation during the *Abhraka Shodhana*

Nirvapa no.	Wt of Raw Abhraka (gms)	Milk (ml)	Duration of heat for Abhraka getting red hot stage (min)	Initial temp of Milk	Milk remaining after quenching of Abhraka	Final temp of milk	Avg.gain* of Abhraka (Gms)	Total duration required for complete nirvapa process (Min)

					(ml)			
1st	1000	1000	45	28^{0}C	590	78^{0}C	1210	65
2nd	1210	1000	50	29^{0}C	570	78^{0}C	1198	75
3rd	1198	1000	50	28^{0}C	610	76^{0}C	1203	75
4th	1203	1000	55	29^{0}C	570	76^{0}C	1220	75
5th	1220	1000	60	29^{0}C	620	76^{0}C	1208	80
6th	1208	1000	60	29^{0}C	600	78^{0}C	1217	85
7th	1217	1000	60	28^{0}C	630	77^{0}C	1213	85
Avg.	**1179.42**	**1000**	**54.29**	**28.57^0 C**	**598.57**	**77^{0}C**	**1209.85**	**77.14**

*Abhraka weight was increases due to absorption of milk.

Table No. 2 Showing the temperature during *Abhraka Shodhana*

Nirvapa	Coal (^{0}C)	Iron pan/Kadhai (^{0}C)	Abhraka(^{0}C)	Initial temp of Milk	After quenching temp of milk
1	1012	946	810	28^{0}C	78^{0}C
2	1018	940	816	29^{0}C	78^{0}C
3	1009	938	808	28^{0}C	76^{0}C
4	1024	940	813	29^{0}C	76^{0}C
5	1028	935	809	29^{0}C	76^{0}C
6	1010	935	814	29^{0}C	78^{0}C
7	1018	940	810	28^{0}C	77^{0}C
Avg.	**1017**	**939.14**	**811.42**	**28.57^{0}C**	**77^{0}C**

Table No. 3 Showing the results after *Abhraka Shodhan*

Shodhan Batch no.	Date of starting	Date of finish	Quantity of Raw Abhraka (gms)	Quantity of Shuddha Abhraka (gms)	Loss/Gain (after drying of Abhraka) (gms)	% Loss	Avg time each pro-cedure (Min)
1	23/12/2014	24/12/2014	1000	937	63 (L)	6.30	380
2	17/01/2015	18/01/2015	1000	908	92 (L)	9.20	385
3	20/05/2015	21/05/2015	1000	911	89 (L)	8.90	370
Avg.			**1000**	**918.67**	**81.33**	**8.13**	**378.33**

Table 4: Equipment and their specifications used for *Abhraka Shodhana*

Sr. No.	Equipment's	Parameter	Specification
1.	Iron pan/Kadhai	Depth Diameter Circumference	30 cm 110 cm 270 cm
2.	Measuring jar	Maximum Capacity	2.0 L
3.	Cotton cloth	Length	90 x 90 cm

4.	Iron ladle	Length	119 cm
5..	Stainless steel vessel	Depth Diameter Circumference	21 cm 17.5 cm 58 cm
6.	Pyrometer	Temperature range	Max. 1200^0C
7.	Stainless steel tray	Length Breadth Depth	45 cm 30 cm 7.5 cm

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