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ORIGINAL RESEARCH ARTICLE

Pharmaceutical Profile and Importance of Ashtasamskaras of Parada (Eight Specific Processes of Purification and Potenciation of Mercury) In Rasashastra

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ABSTRACT

Parada contain many blemishes, which should be removed in order to make it nontoxic. Samanya Sodhana is one such process, which removes Naisargika and Kancuki Doshas of Parada. But can be utilized only to treat common ailments. To cure obstinate and chronic diseases, some specific pharmaceutical purification techniques are needed. This aim is achieved by performing Parada Ashtasamskaras. The pH of Kanji required was pH observed as 7.0 however after completion of the fermentation process it went to 3.6 i.e. highly acidic. In total 30 days were required for preparation of Kanji in each batch overall 80 lit of water was taken initially and average 76.4 lit Kanji was procured. Total 11.3% loss of Tamra was found in Tamra Shodhana required for Patana Samskara. Aftder Samanya Shodhana in three batches, the Shuddha Parada was carried forward for Ashtasamskaras. 2 kg of Parada was subjected to 8 Samskaras following the method of Rasa Hridaya Tantra. At the end of Samskaras, 1.766 kg of Parada was obtained with 12.19 % of procedural loss in a total number of 67 days.

Key words: Kanji Nirmana, Tamra Shaodhana, Parada Samanya Shodhana, Ashtasamskaras of Parada.

INTRODUCTION

Samskara i.e. qualitative alteration done for improvement, enhancement, modification, lowering bad effect or any such procedure, pharmaceutical treatment etc. have been denoted by a single term Samskara. According to Acharya Charaka, Samskara is the process that may bring out some radical changes in the substance by replacing their natural properties totally or partially into a new one or by intensifying or moderating their qualities [1]. The alteration in the qualities of a substance can be done with the help of following factors mentioned in Charaka Samhita [2].Toya Samskara: With the help of water. Agni: With the help of heating the qualities like Sheeta, Mridu Drava, Masrna. Toyagni – Sannikarsha: combination of both above Samskaras. Shaucha: To clean or to remove impurities by water is known as Saucha. Manthana: It means to stir, to churn, to mix or to shake well. Desha: Desha stands for site or place. According to the place where the drug is cultivated or from where the drug is collected, there may be variations in the qualities. Kala: Kala plays an important role in each aspect of treatment. Here in Samskara, Kala factor stands for time of collection of Dravyas, its storage, shelf life period and Aushadha Sevana Kala. Vasana: It means flavouring of drugs. Flavouring makes the formulations more elegant, palatable and acceptable for the patients. Moreover, the additives act as bio-enhancers and thereby enhancing the potency of drug by mediating a chain of enzyme processes in body. Bhavana: The achievements, which are obtained by Bhavana Samskara, are to make the drug easy for assimilation, to make the drug capable for further procedure and to increase the potency etc. Kala Prakarsha: It means duration of length of time. It is useful in deciding the time required for drug preparation procedures. Time makes alteration in the drug properties mainly in its potency. Bhajana: It means container, pot, the material of receptacle etc. Whatever procedure is carried out during drug collection, preparation, storage and administration, each and everything influence or impression on the drug, can be included under Samskara.

Thus, it is clear that each procedure is capable in producing some type of impact on raw material by altering their qualities which ultimately will give rise to various formulations and thus can produce different effects. Samskara is the mean of these alterations of qualities in a desired direction.

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Therefore, Samskaras becomes the basic important factor among drug formulation principles.

Modern pharmaceutics also mentions qualitative alteration. The qualities of a drug may be [3]: Physical - Form, Particle size, bulk etc, Chemical - Interaction with other drugs / Solvents / environment, Physio-chemical - Ionization, changes in pH / Liquid solubility / dissolution rates / Viscosity / stability etc, Biological - Absorption / assimilation / Distribution / Transformation / Elimination.

So as rightly told by Acharya Charaka, by Samyoga, (Combination), Vishlesha (Elimination), Kala (Proper time), Samskara (qualitative alteration procedures), one can increase the potency of a drug and can reduce the untoward action [4].

Thus for making Gandhaka free from its impurities and to make it more suitable for body, ancient Acharyas have mentioned different types of Shodhana Samskaras for Gandhaka. These procedures not only eliminate the blemishes of Gandhaka but also enhance its pharmacological and therapeutical properties too.

Thus, for making Parada free from its impurities and to make it more suitable for body, ancient Acaryas have mentioned different types of Samskaras for Parada.These Samskaras of Parada not only eliminates the blemishes of Parada but also enhances its pharmacological and therapeutical properties too. Regarding Samskaras Tamra Shodana (**Table 4 & 5**), Parada Samanya Shodhana in three atches (**Table 6**), profile and results of Swedana Dravyas (**Table 7, 8 & Fig 1**), ingredients, amount of Kanji required and results of Mardana Samskara (**Table 9,10,11 & Fig 2**), ingredients, observation and brief profile of Murcchana and Utthapana Samskara (**Table 12,13,14 & Fig 3**), profile of Trividha Patana (**Table 15**), Silent features of Tamra Pishti Niormana(**Table 16**), Urdhwa Patana (**Table 17 & Fig 5.1**), Adhah Patana (**Table 18 & Fig 5.2**), Dhanyabraka Pishti Nirmana (**Table 19**), Tiryaka Patana (**Table 20 & Fig 5.3**), Brief profile of % loss of Parada during Trividha Patanas (**Table 21**).

Ingredients and results of Rodhana Samskara (**Table 22, 23 & Fig 6**), ingredients of Niyamana (**Table 24**), ingredients and results of Dipana (**Table 25, 26 & Fig 7, 8**), detailed profile of Ashtasamskaras (**Table 27 & 28**), Urdhva Patanartha Dhatumishrita Pranali (**Table 29**), Quantity of Heat to be given in Adhah Patana of Parada there are differences of opinion among the ancient Rasacaryas. Some Acaryas have considered only eight types of Samskara, whereas as some considers eighteen types of Samskara of Parada. This difference of opinion may be due to the utilization of Parada for different purposes. For Dhatuvada purpose Acaryas have recommend eighteen types of Samskara whereas for Dehavada purpose Asta Samkara have been indicated.

Astasamskaras of Parada: Parada contain many blemishes, which should be removed in order to make it nontoxic. Samanya Sodhana is one such process, which removes Naisargika and Kancuki doshas of Parada. But can be utilized only to treat common ailments [5]. To cure obstinate and chronic diseases, some specific pharmaceutical purification techniques are needed. This aim is achieved by performing Parada Ashtasamskaras. Such Parada is considered the best Rasayana and is generally used for Dehavada purpose [6,7]. But for Lohavada purpose, some Acharyas have mentioned 18 types of purification methods, which have been named as Ashtadasa Samskaras and for therapeutic purpose too Ashtasamskaras are considered to be sufficient [8].

MATERIALS AND METHODS

Kanji [9] preparation:, Tamra Shodhana [10], Parada Samanya Shodhana [11], Ashtasamskaras of Parada [12].

OBSERVATIONS AND RESULTS:

The Kanji preparation in three batches. (**Table 1,2 & 3**), (**Table 30**), Quantity of Heat to be given in Tiryaka Patana (**Table 31**).

DISCUSSION

Kanji was prepared for the purpose of Ashtasamskaras of Parada as the main media for washing the Parada was appreciated in the form of Amla Kanji, even though Ushna Jala and Amla Drava Dravyas are also named for the similar purpose. The tests like effervescence and burning candle extinguishing tests were found positive during fermentation process in Kanji, due to formation of $C0_2$. Initially when all the materials were kept in China clay jar, pH was observed as 7.0 however after completion of the fermentation process it went to 3.6 i.e. highly acidic. In total 30 days were required for preparation of Kanji in each batch overall 80 lit of water was taken initially and average 76.4 lit Kanji was procured after accomplishment of fermentation and filtration processes. The initial neutral nature of solution was finally got converted into highly acidic, due to acidic fermentation i.e. the

characteristic feature of 'Suktta Kalpana.' As the qualities of Amla Dravyas are defined as, "Amllaha Sarve Prabodhakaha" hence it can be said that Kanji must be helping in stimulating the therapeutic properties of Parada. Kanji is the alliance of weak organic acids and crude vinegar. Due to the combined interaction of both weak acid and alcohol the blemishes of Parada gets somewhat separated from its surface and Murccha, Vidaha, Swedotpatti, Keldana.Vamana, Aruchi and Cittasantapa. Therefore it is necessary to carry out the Shodhana process before using it. It is carried out by Nirvapa process (heating and quenching). It was done in water to remove their outer coating i.e. insulation, then other liquid medias viz. Til taila, Takra, Gomutra, Kanji and Kulattha Kwatha each for 7 times. The average temperature was recorded for complete heating i.e. up to red hot stages in each liquid media - 598ºC, 587ºC, 569ºC, 571ºC, 562ºC was recorded before quenching i.e. in Taila, Takra, Gomutra, Kanji and Kulattha Kwatha respectively and the weight loss of Tamra in the same liquid media was 15, 18, 22, 28 and 30 g. noticed.(Chart 2)

During the Shodhana procedure two stages are involved i.e. heating and cooling. When Tamra was heated up to red hot stage, then atomic energy may increase, which may lead to increase in intra-atomic distances and due to this electrostatic forces get weakened. By continuous heating particles gets enough energy to break forces holding them together. When materials are in red hot stage, quenched in different liquid media, then the acidic or alkaline liquid media penetrates inside the materials. The soluble impurities get dissolved in it due to breakage of remaining bonds. Here after completion of the process, copper strips were converted into comparatively brittle form. Total 11.3% loss of Tamra was found, because during quenching lot of Tamra strips were dissolved in liquid media. Highest loss was found at Kulattha Kwatha i.e. 30g. It may be due to more alkaline nature of the Kwatha in comparison to other liquid medias, where Tamra strips largely got converted in to powder form.

Before present study B. J. Patgiri *et al* had done the Tamra Shodhana for Ashtasamskaras and the % loss of Tamra was found to be 5.88% [13] it might be because the form of cupper was wires where as in present study cupper strips were taken in use and as surface area of the substance is directly proportional to quantum of reaction taking place which is evident directly from the increase in loss of percentage of cupper during its Shodhana process.

Samanya Shodhana of Tamra was also carried out for the purpose of its use in Pishti Nirmana (amalgamation) in Urdwa Patana Samskara. Ashuddha Tamara contains Ashtamahadoshas viz. Bhrama

Samanya Shodhana of Parada, grinding the Parada with equal proportion of Shudha Churna was carried out for consecutive 3 days and then filtered through double folded muslin cloth. But, by mere filtration through the cloth total amount of Parada procurement is impossible. So, remaining Parada was collected after washing the mixture with ample amount of hot water. Later this procured Parada was triturated with equal proportion of peeled garlic and half part Saindhava Lavana. Garlic contains organic sulphur. As per modern chemistry sulphur is only element which detoxifies the mercury due to its higher affinity for active sulfhydryl groups. Secondly the role of garlic in the Shodhana of Parada can be explained by using HPLC technique, which showed that zinc as an impurity is being effectively removed from the Parada by triturating it with garlic [14], which coats that zinc concentration of commercial mercury is generally around 150 ppm. The concentration of zinc in the impure mercury was found to be 212 ppm. Table list the zinc concentration of mercury obtained from atomic absorption analysis at various stages of the time during reaction with garlic juice. The substances having *Ushna*, *Teekshna*, *Kshara*, *Amla* and *Lavana* properties are considered as purities (*Sarve Malaharah Ksharah*). Lime is an alkaline substance; it may be helpful in removing external & internal impurities of *Parada*. Lastly procured *Parada* was filtered through double folded cloth to remove the remaining particle of garlic paste and salt. Majority of *Parada* loss was observed in second batch i.e. 156.72 g i.e. 15.69 %, it may be due to removal of physical & chemical impurities also loss was due to *Malagati*, *Jalagati* and *Hamsagati* during washing process. Major loss of *Parada* was found during the trituration with lime powder, due to formation of compound of *Sudha* (Chart 3).

The minor impurities may be eliminated by Samanya Shodhana of Parada and others major doshas say Saptakanchuka Doshas may be ultimately helping the Parada getting free from the inherent impurities. Hence the used of Amla Kanji can be very well advocated in the Parada Ashtasamskaras.

eliminated by Ashtasamskaras along with enhancement of therapeutic value of the Parada. Therefore it is necessary to carry out the Vishesh Shodhana i.e. Ashtasamskaras of Parada. Out of eight Samskaras, first five Samskaras are being carried out for making Parada free from contamination & blemishes and remaining three Samskaras are responsible for increasing the potency of Parada (Table 27).

In these eight procedures the Kalka Dravyas were taken $^{1}/_{16}$ part [15, 16] of Parada each separately and for Swedana process, Kanji was used as liquid media in respective Samskara also for subsequent washing Ushna Kanji and Ushna Jala were used.

In the process of Swedana Samskara, Parada was kept in the contact of Kalka Dravyas and Swedana process was carried out in Dolayantra, which contain Kanji as liquid media for 3 consecutive days (Total 72hrs). As per classical literature heating process should be done by Mruduagni. So temperature was maintained between 96°C-98°C (liquid media) i.e. boiling stages of liquid. The purpose of this process is "Mala Saithilyakarna". It may be due to contact of Parada with Kalka Dravyas used in process and also Swedana through acidic media. During this process total Parada loss was recorded (7g) 0.35%. The loss of Parada might be due to removal of the impurities and also during washing processed minute particles of Parada went off with hot water as Malagati, Jalagati and Hamsagati. In the Swedana Samskara of Parada, the Kalka Dravyas taken for Pottali preparation were mostly having Amla and Ksariya rasa predominance. In Swedaniya dravas also Kanji which was used was having Amla rasa prevalence. Thus by Ksariya and Amaliya nature of Swedaniya dravyas and on mild heating the impurities of Parada may be loosened, due to Ksarana, Dahana, Pacana and Bhedana properties of Ksariya dravya and Usna, Tiksna guna of Amla Dravyas. And the loosened impurities were removed by washing with Kanji [17].

In Mardana Samskara process, Parada was ground with herbal and mineral drugs with continuous addition of Kanji on Tapta Khalva Yantra for 3 days (total 72 hrs) and when Kalka Dravyas became dried then extra Kanji was added during trituration. In Ancient time scholars used Ajamala, Jute bag, Hush beg paddy, etc. as fuel to provide the constant heat for the Tapta Khalva. But now a day's sophisticated instruments are available to providing the heat. In this samskara hot plate especially designed for Ashtasamskaras was used to provide heat for in the form of Tapta Khalva Yantra. During this trituration process the temperature was maintained at 45°C-50°C of hot plate. A purpose of this Samskara is "Bahirmala vinashanam''. It may be due to trituration of the Parada with Kalka Dravyas in the presence of acidic media, as during trituration process Parada got completely divided in very minute particles and got mixed with paste which was indication of proper exposure of maximum surface area of Parada with Kalka Dravyas having Ksara and Amla drugs, leading to removal of the impurities of it. Also providing the heat during trituration process with pressure being initial stimulating agent, heat might also be a cause for stimulating the reaction of Parada and Kalka Dravyas. In this process trituration is done with carbonic drugs like Grhadhuma, Dagdhorna, Guda and silica drugs like Ishtika Curna, on hot plate. Carbon acts as reducing agent and silica acts as adsorbent agent, thereby making Parada pure from its blemishes. Total Parada loss was recorded as (10g) i.e. 0.7%.

The ingredients used in the process of Murcchana Samskara [18] are mentioned for removing the specific doshas e.g. Kumari, Triphala and Citraka are indicated for removing the Mala, Agni and Visa doshas respectively. All the three Dravyas used in this Samskara are having Katu and Kasaya Rasa. Due to Bhedana, Sosana, Ksalana, Lekhana properties of Katu and Kasaya Rasa present in these three Dravyas may be removing Visa, Vahni and Mala Doshas of Parada. Here, trituration process of Parada with Kalka Dravya was done till the Nashtapishtatva (Swooning) stage of Parada was achieved. It means Parada got completely converted into very fine indivisible particles. As per different texts, it should be repeated for seven times but Ayurveda Prakash [19] explains that 7 times of Murcchana is required for Dhatuvada purpose and not for Rasaushadhi Nirmana. Here the trituration process had been done for three times with Kumari Swarasa [20]. It was observed during Ashtasamskaras that on using Kumari Swarasa as Bhavana Dravya, Parada immediately dissociates into small molecules. i.e. comparing with other drugs, Bhavana with Kumari Swarasa achieved "Nastapista" of Parada easily and quickly. The time limit for this Samskara is given up to the achievement of "Nastapishta Parada" i.e. the physical state of Parada is completely changed.36 hrs for Nashtapishtatva (Mona Mam).The loss of Parada was 5g, 6g, 9g i.e. 0.26%, 0.30% and 0.46% respectively.

After Murcchana Samskara the Parada should be procured by either washing with hot Kanji or hot

water and should be kept in Atapa (sunlight) for drying or Parada should be collected by Patana/ Utthapana Samskara. But, in the present study the Utthapana Samskara had been carried out directly by washing the Murcchita Parada with Ushna Kanji and Ushna Jala many times. The total percentage loss of Parada was observed-5g, 6g, 9g i.e. 0.26%, 0.30% and 0.46% respectively. Majority of Parada was lost in this process was due to 'Panchavida Gaties' of Parada. This Samskara should be performed carefully as it is the main Samskara where Parada loss could not be prevented and there is maximum chance of loss of Parada. As per opinion of some experts, loss of Parada could be prevented by performing just drying in sunlight followed by Patana.

In process of Urdhwa Patana, for the preparation of Tamra Pishti, Parada and Tamra were taken in the ratio of 3:1 [21] and triturated with Nimbu Swarasa [22]. For the preparation of Tamra Pishti weight of Parada 1929 g + weight of Tamra 643g and continuous 36 hrs of vigorous trituration was required. The average 3.2 (l) of lemon juice was absorbed during the process and the final weight of Pishti thus obtained was 2619.08g. It was observed that during Amalgamation, use of Nimbu Swarasa accelerates the formation of Amalgam. After the Urdhwa Patana when procured Parada was washed properly with Ushna Kanji, a very specific and interesting feature was observed, Parada was turned 'Golden' probably due to high affinity of cupper to get react with the Parada and this phenomenon is very rightly explained in Parada Vignyaniyam by respected Dr. V. M. Dwivedi sir as 'Ranjana of Parada' due to Ranjaka Guna of Tamra.

This is for the first time, that Tamra a Metallic substance is used in Ashtasamskaras, the reason for using Tamra metal only in this Samskara could be that being higher in place in electro-chemical series, it is highly reactive and this combines with Parada forming amlagum. Tamra is said to be removing Naga and Vanga impurities found in Parada. Both the impurities react with Tamra leaving behind Shuddha Parada. This property of Tamra is mentioned as Vishaghna in our Shastra.

The obtained Pishti was subjected for Urdhwapatana for 9 hrs and with average range of temp. of gas burner being 378 to 438°C, residue obtained at the bottom was 724.8 g and 98 g of Parada was lost during the process i.e. 5.08% (Table 29).

In Adhah Patana [23] process, initially Urrdhwapatita Parada was triturated with all Kalka Dravyas and the paste thus formed was applied on the inner side of one of earthen pot and another earthen pot half filled with cold water was taken, first pot was kept inverted and Sandhi Bandhana was done. This Adhah Patana yantra was subjected to Puta in open atmosphere with around 385 Upalas subsequently added and with the temperature ranging between 399 to 736°C, total time taken by the process was 9 hrs. 73 g of Parada loss was observed in this process i.e. 3.898% (Table 30).

In Tiryaka Patana [24] process, first of all Pishti was prepared of Adhahpatita Parada i.e. 1738 g and Dhanyabhraka i.e. 108.63 g ($1/16^{th}$ of Parada) was prepared, total 1.8 (l) of Nimbu Swarasa and 26 hrs of Vigorous trituration was required, the weight of Pishti thus obtained was 1937.36 g. This Pishti was further placed in Tiryaka Patana Yantra and temp ranging between 340-702°C was given for the period of 9 hrs [25]. Residue collected in the bottom of Yantra was 128.26 g. Total 9 g of Parada was lost in this process i.e. 0.51% (Table 31& 32).

According to the textual references available Patana Samskara should include Urdhava, Adhah and Tiryaka Patana. But since all these three process are time consuming and the loss of Parada is much more in these processes as here it is evident from above chart that out of 12.19% of total loss of Parada observed in entire Ashtasamskaras 9.49% of loss was observed only in this 5^{th} Samskara only, obviously because the porous nature of earthen pots used for initial two processes. Hence before present study even in Jamnagar school of thoughts two of the earlier scholars who had accomplished the Ashtasamskaras (viz. Dr. Mona Mashru *et al* and secondly Dr. B. J. Patgiri *et al*) had been done the Tiryaka Patana 3 times unlike present study where according to classical references Trividha Patanas had been carried out.

In Rodhana Samskara [26], Parada was kept in saturated rock salt solution which was prepared from Saindhava Lavana and distillated water in the ratio of 1:3 [27] (Rasa Prakasha Sudhakara-10 Palas Saindhava: 3 Prastha Jalam.- 465g: 2.250g w/w) the saturation state was obtained in the above ratio. Glass Jar was kept undisturbed; use of Lavanjala destroys 'Saindhava' of Parada as per the textual references found. Lavana thus used increases Virya of Parada which has been destroyed in previous Samskaras. In total 1717 g Trividha Patita Parada and 465 g of Saindhava Lavana was taken then the Parada was kept in

saturated salt water for continuous 72 hours and then properly washed with Ushna Kanji. Lavana Jala was prepared in the ratio of 1:3 by B. J. Patgiri *et al* and in 1:5 by Mona Mashru *et al.*

Niyamana & Dipana Samskaras [28], were carried out like Swedana Samskara. But, the ingredients are different for each step. In Niyamana Samskara Rodhita Parada 1706g with Kalka Dravyas 106.625 g / head was taken and in Dipana Samskara, Niyamita Parada 1691g with Kalka Dravyas 105.69 g/head was taken. The loss in Niyamana and Dipana was 0.29 % for each respectively. Total loss of % of Parada after Ashtasamskaras was 12.19%.

In Niyamana Samskara Dravyas used for Kalka were having 'Ushna' 'Tikshna' properties e.g. Tambula patra, Lasuna, Lavana, Bhrungaraja and Chincha. Due to these properties they are said to be controlling the Chapala Guna / Chanchalatva of Parada which was increased due to the increased Virya of Parada during Rodhana Samskara.

From the eight Samskara it is clear that majority of the Samskaras advocate the use of Lavana as ingredient. In last two Samskaras i.e. in Niyamana and Dipana Samskaras and especially in 8th Samskara more minerals drugs viz. Sphatika, Khaga (Kasis), Tankana and Saindhava Lavana (Rock salt) were used as Kalka Dravyas in comparison to previous six. . All the Dravyas used in this Samskara are having 'Dipana', 'Pachana' properties due to which they are said to be increasing appetite ('Bubhukhsa') of Parada for either consuming metals for Dehavada or Lohavada purpose. It may be the reason for increment in the potency of Parada as rightly coated by texts. According to texts only $^{1}/_{8}^{th}$ (Ashtamanshavashishyate) part of Parada should be left after the Ashtasamskaras. But, now days due to advancement in various techniques, apparatus & sealing materials we had been successes in prevention of the major loss of Parada during Ashtasamskaras in present study hence the total loss of Parada recorded was 12.19 % i.e. even less than 1/8th of Parada use (Chart 4).

Table 1: Final profile of 3 batches of Kanji preparation

Batch No	Water in Lit (l)	Total Kanji Obtained (l)	pH on 0 day	pH of Kanji after completion	Total Days Taken
1	80	75.5	7.00	3.6	30
2	80	76.3	7.00	3.4	32
3	80	77.4	7.00	3.8	28
Average	**80**	**76.4**	**7.00**	**3.6**	**30**

Table 2: Ingredients and quantity required for Kanji preparation in individual batch

S. No	Ingredients	Quantity Required (Kg)
1	Rajika (*Brassica juncea* Linn.)	4
2	Saindhava lavana (Rock Salt)	8
3	Kulattha kwatha[29] (Decoction of *Dolichos biflorus* Linn.)	16
4	Rice[30] (*Oryza sativa* Linn.)	8
5	Haridra (*Curcuma longa* Linn.)	2
6	Vamsapatra (*Bambusa arundinacea* Willd.)	2
7	Jeeraka (*Cuminum cyminum* Linn.)	1
8	Sunthi (*Zingiber officinale* Roscoe.)	1
9	Suddha Hingu *(Ferula narthex* Boiss.)	500
10	Sarsapa Taila (*Brassica campestris* Prain.-oil)	1.116 (*l*)
11	Masa (*Phaseolus mungo* Linn.)	2
12	Water	80 (*l*)

Observations:

Table 3: Showing the observation during preparation of Kanji

S. No	Observations	Before onset of fermentation	During fermentation	After fermentation
1	Rupa	Yellow+	Yellow++	Yellow+++
2	Rasa	Salty	Salty + Acidic	Strong salty+ Scidic
3	Gandha	Hingu, Jiraka Predominant, Tikshna.	Slightly acidic typical Kanji smell.	Strong acidic typical Kanji smell.
4	Temp	36-38 (Room temp)	42-46 (More than room temp)	32 (Less than room temp)
5	Sound	-ve	+ve	-ve
6	Prakshepa Dravyas	Floating	Partial Immersed	Completely immersed
7	Effervescence	-ve	+ve	-ve
8	Burning Candle Extinguishing test	-ve	+ve	-ve
9	pH (by pH meter)	7.8-7.4	5.5-5.1	3.4-3.8

Table 4: Profile of Tamra Shodhana

S. No	Ingredients	Quantity (for 7 times)-(*l*)
1	Ashuddha Tamra (Unpurified copper strips of 5X1cm)	1 (kg)
2	Til Taila (Sesame oil)	10.5
3	Takra (Butter milk)	10.5
4	Gomutra (Cow's urine)	10.5
5	Kanji (Sour gruel)	10.5
6	Kulattha kwatha (Decoction of *Dolichos biflorus* Linn.)	10.5

Table 5: Showing the observation during preparation of Samanya Sodhana of Tamra

Liquid Media	Time to turn Tamra strips red hot (min)	Temp at red hot stage (°C)	Colour of Tamra		Wt of Tamra		Loss of weight of Tamra (g)
			Before process	After process	Before process (g)	After process (g)	
Tila Taila	12.5	598	Reddish	Reddish Black	1000	985	15
Takra	11.7	587	Reddish Black	Blackish Green	985	967	18
Gomutra	11.3	569	Reddish Green	Blackish Red	967	945	22
Kanji	11.1	571	Blackish Red	Reddish Black	945	939	28
Kulattha Kwatha	10.8	562	Reddish Black	Blackish Red	939	909	30
Total weight loss and % loss of Tamra					**113 g**		**11.3%**

Table 6: Final profile of Parada Samanya Shodhana (Total 3 Batches)

S. No	Ashuddha Hg (Kg)	Sudha Churna(Kg)	Nistusha Lashuna(g)	Saindhava Lavana(g)	Hot water	Total Time Taken(hr)	Shuddha Hg obtined(g)	Loss of wt of Parada(g)	% loss of Hg
1	1	1	879.18	439.59	QS	24	848.12	151.88	15.18
2	1	1	901.12	450.56	QS	24	843.28	156.72	15.69
3	1	1	878.14	439.07	QS	24	846.24	153.76	15.38

Table 7: Profile of Swedana Dravyas

S. No	Ingredients	Quantity
1	Samanya Shodhita Parada	2 kg
2	Kanji (Sour gruel)	24.35 (*l*)
3	**Kalka Dravyas (Each $^{1}/_{16}$ part of Parada)**[31]	
3.1	Asuri (*Brassica juncea* Linn.)	125 g
3.2	Patu-Saindhava Lavana (Rock salt)	125 g
3.3	Sunthi (*Zingiber officinale* Roscoe.)	125 g
3.4	Pippali (*Piper longum* Linn.)	125 g
3.5	Marica (*Piper nigrum* Linn.)	125 g
3.6	Citraka Mool (*Plumbago zeylanica* Linn.)	125 g
3.7	Ardraka (*Zingiber officinale* Roscoe.)	125 g
3.8	Mulaka (*Raphanas sativus* Linn.)	125 g

Table 8: Results of Swedana Samskara

S. No	Brief profile of Swedana	Results
1	Total time taken for Swedana Samskara	72[32] hrs
2	Weight of Swedita Parada	1993 g
3	Sample Kept for Analysis	10 g
4	Loss of weight of Parada	7 g
5	Final weight of Parada	1983 g
6	Percent of loss of Parada	0.35 %

Table 9: Ingredients of Mardana Samskara

S. No	Ingredients	Quantity (g)
1	Swedita Parada	1983
2	Kanji (Sour gruel)	3.475 (*l*)
3	**Kalka Dravyas (Each 1/16 part of Parada)**	
3.1	Guda (Jaggery)	123.94
3.2	Dagdha Urna (Ash of wool)	123.94
3.3	Saindhava Lavana (Rock salt)	123.94
3.4	Grhadhuma (Carbon of Kitchen chimney)	123.94
3.5	Istika curna (Powder of brick)	123.94
3.6	Asuri (*Brassica juncea* Linn.)	123.94

Table 101: Quantity of Kanji required and temperature chart

S. No	Day of Mardana	Hours of Mardana	Quantity of Kanji required (ml)	Temp of Slurry in °C
1	1st	9.45	650	44
2	2nd	10	575	50
3	3rd	10	625	48
4	4th	11	300	50
5	5th	10	350	48
6	6th	10	475	46
7	7th	12.25	500	48

Table 11: Results of Mardana Samskara

S. No	Brief profile of Mardana	Results
1	Total time taken for Mardana Samskara	72 hrs
2	Weight of Mardana Samskarita Parada	1969 g
3	Loss of weight of Parada	14 g
4	Parada Left after Mardana	1959 g
5	Sample kept for Analysis	10 g
6	Percent of loss of Parada	0.7%

Table 12: Ingredients of Murcchana and Utthapana (Plate 4.3)

S. No	Ingredients	Quantity (g)
1	Mardita Parada in 1st M + U	1959 g
	Parada in 2nd M + U	1954 g
	Parada in 3rd M + U	1948 g

2	Kanji (Sour gruel) (*l*)		1^{st} M + U	1.8
			2^{nd} M + U	1.75
			3^{rd} M + U	1.9
3	**Kalka Dravyas (Each $^{1}/_{16}$ part of Parada)**			
3.1	Chitraka (*Plumbago zelanica* Linn.)		1^{st} M + U	122.44
			2^{nd} M + U	122.13
			3^{rd} M + U	121.75
3.2	Triphala	*Terminalia chebula* Retz.	1^{st} M + U	40.81 g
			2^{nd} M + U	40.7 g
			3^{rd} M + U	40.58 g
		Emblica officinalis Gaerth.	1^{st} M + U	40.81 g
			2^{nd} M + U	40.7 g
			3^{rd} M + U	40.58 g
		Terminalia bellirica Roxb.	1^{st} M + U	40.81 g
			2^{nd} M + U	40.7 g
			3^{rd} M + U	40.58 g
3.3	Kumari (*Aloevera indica* Linn.) Swarasa		1^{st} M + U	475 ml
			2^{nd} M + U	465 ml
			3^{rd} M + U	470 ml

Table 13: Observations during procedure for Murcchana & Utthapana [33-36]:

S. No	3 Consequent Times [37- 39]	Time taken to obtain Nashtapishtatva (min)	Nashtapishtatva Lasts up to (min)	Total 3 Days [40] of Trituration (8 hrs/day)
1	1^{st} M + U	4.3	7.30	8
2	2^{nd} M + U	3.30	8	8
3	3^{rd} M + U	4	7.30	8

Table 14: Brief Profile of Murcchana and Utthapana Samskara

S. No	3 Consequent Times	Initial Parada taken (g)	Final Parada obtained (g)	Loss of Parada (g)	Loss of Parada (%)
1	1^{st} Murcchana + Utthapana	1959	1954	5	0.255
2	2^{nd} Murcchana + Utthapana	1954	1948	6	0.3
3	3^{rd} Murcchana + Utthapana	1948	1939	9	0.46
	Sample kept for analysis	**10**	**1929**		
Average loss of Parada in %					**0.318**

Table 15: Brief profile of Trividha Patana

S. No	Patana	Days taken	Yantra Used	Kanji for washing after Patana(l)
1	Urdhava	Pre operation process-21	Urdhava Patana Yantra	3.8
		Pishti – 3		
		Patana- 1		
		Washing -1		
2	Adhah	Patana + Washing-1	Adhah Patana Yantra	4.2
3	Tiryaka	Pishti- 1	Tiryaka Patana Yantra	3.9
		Patana- 1		
		Washing- 1		

Table 16: Silent features of Tamra Pishti Nirmana

S. No	Postulates of Tamra Pishti Nirmana		Results
1	Average liquid media (Lemon juice) required for preparation of Tamra Pishti.		3.2 (***l***)
2	Average time required for preparation of Tamra Pishti.	Day 1- 12 hrs	36 hrs.
		Day 2- 12.45 hrs	
		Day 3- 11.25 hrs	
3	**Wt. of Tamra Pishti**		2619.08 g

Table 17: Urdhwa Patana Samskara

S. No	Ingredients	Quantity
1	Utthapita Parada	1929 g
2	Shuddha Tamra Pieces (1/3rd part of Parada)	643 g
3	Saindhawa Lavana41-1/20th	96.45 g
4	Nimbu Swarasa	3.2 lit
5	Actual time taken by Urdhwa Patana Process	9 hrs
6	Temp of flame of gas burner	378-438 °C
7	Wt of residue found at the bottom of Patana Yantra	724.8 g
	Result to Urdhwa Patana:	
8	Loss of Parada	98 g
	Parada obtained after Urdhwa Patana	1831 g
9	% Loss of Parada after Urdhwa Patana	5.08 %
9	Sample kept for analysis	10 g
10	Parada after sample kept	1821 g

Procedure [42, 43]

Table 18: Adhah Patana Samskara [44]:

S. No	Ingredients	Quantity
1	Urdhwapatita Parada	1821 g
2	Triphala	113.81 g
3	Chitrakamoola Tvaka Churna	113.81 g
4	Shigru Tvaka[45] Churna	113.81 g

5	Rajika	113.81 g
6	Panchalavana	113.81 g
	Result to Adhah Patana:	
7	Actual time taken by Urdhwa Patana Process	9.00 hrs
8	No. of Upalas used	382-385
9	Temp range during Puta	399-736 °C
10	Total Kanji required for washing Parada	5.2 lit
11	Loss of Parada	73 g
12	Parada obtained after Adhah Patana	1748
13	% Loss of Parada after Urdhwa Patana	3.898 %
14	Sample kept for analysis	10 g
15	Parada left after sample keeping	**1738 g**

Procedure

Table 19: Silent features of Dhanyabhraka Pishti Nirmana

S. No	Postulates of Pishti Nirmana		Observations
1	Average liquid media (Lemon juice) required for preparation of Pishti. (Parada and Dhanyabhraka)		1.8 (***l***)
2	Average time required for preparation of Tamra Pishti.	Day 1- 10 (hrs.)	26 (hrs.)
		Day 2- 10.25 (hrs.)	
		Day 3- 5.45 (hrs.)	
3	**Wt of Pishti**		1937.36 g

Table 20: Tiryaka Patana Samskara: (12/10/2009-14/10/2010)

S. No	Ingredients	Quantity (g)
1	Adhah Patita Parada	1738
2	Dhanyabhraka	108.63
3	Total Period of Tiryaka Patana	9 hrs[46]
4	Temp of gas burner[47]	340- 702 °C(Sequentially)
5	Residue Collected at the bottom of Patana Yantra	128.26
	Result to Tiryaka Patana:	
6	Loss of Parada	9
7	Total amount of Kanji required for washing	6.2 (*l*)
8	% Loss of Parada after Urdhwa Patana	0.51
9	Parada Obtained after Tiryaka Patana	1727
10	Sample Kept for Analysis	10
11	Parada left after sample keeping	1717

Table 21: Brief profile of % loss of Parada during Trividha Patanas:

S. No	Patana	Parada Loss in %
1	Urdhwa Patana	5.08
2	Adhah Patana	3.898
3	Tiryaka Patana	0.51
	Total % Loss in Trividha Patana	**9.49**

Table 22: Ingredients of Rodhana Samskara

S. No	Ingredients	Quantity
1	Trividha Patita Parada	1717 g
2	Saindhava Lavana[48] (Rock Salt)	465 g
3	Portable water[49]	2 *l* (2.250 g)
4	Saturated Salt water/Lavana Jala (1:5)[50] w/w	

Table 23: Results of Rodhana

S. No	Observations	Results
1	Total time taken for Niyamana Samskara of Parada	72 hrs
2	Weight of Niyamita Parada obtained	1701g
3	Weight loss of Parada	5 g
4	Sample kept for analysis	10 g
5	Parada left after sample for analysis	1691 g
6	Percent of loss of Parada	0.29%

Table 242: Ingredients of Niyamana

S. No	Ingredients	Quantity(g)
1	Rodhita Parada	1706
2	Kanji (Sour gruel)	32.875(***l***)
3	**Kalka Dravyas (Each $^{1}/_{16}$ part of Parada)**	
3.1	Phani - Tambula Patra (*Piper betel* Linn.)	106.625
3.2	Nayana - Lasuna (*Allium sativum* Linn.)	106.625
3.3	Markava - Bhringaraja (*Eclipta alba* Hassk.)	106.625
3.4	Cinca (*Tamarindus indica* Linn.)	106.625
3.5	Vandhya Karkoti (*Momordica dioica* Roxb.)	106.625

Table 25: Ingredients of Dipana Samskara

S. No	Ingredients	Quantity (g)
1	Niyamita Parada	1691
2	Kanji (Sour gruel)	
3	**Kalka Dravyas (Each $^{1}/_{16}$ part of Parada)**	
3.1	Bhu - Suddha Sphatika (Alum)	105.69
3.2	Khaga - Suddha Kasis (Green Vitriol)	105. 69

3.3	Shuddha Tankana (Borax)	105. 69
3.4	Saindhava Lavana (Rock salt)	105. 69
3.5	Asuri - Rajika (*Brassica juncca* Linn.)	105. 69
3.6	Sigru twaka (*Moringa oleifera* Gaerth.)	105. 69

Table 26: Results of Dipana Samskara

S. No	Observations of Dipana	Results
1	Total time taken for Dipana Samskara	72 hrs
2	Weight of Dipita Parada	1686g
3	Sample kept for analysis	10 g
4	Weight loss of Parada	5 g
5	Percent of loss of Parada	0.29 %
6	Parada obtained after Ashtasamskaras	1676 g

Table 27: Showing the final detailed profile of Astasamskarita Parada

S. No	Name of Samskara		Day	Initial wt of Hg	Final wt of Hg	Wt loss of Hg	Sample kept (g)	% Loss of Hg
1	Swedana		3	2000	1993	7	10	0.35
2	Mardana		3	1983	1969	14	10	0.7
3+ 4	Murcchana	1	1	1959	1954	5	--	0.255
	+	2	1	1954	1948	6	--	0.3
	Utthapana	3	1	1948	1939	9	10	0.46
5	Patana	Urdwa	5	1929	1831	98	10	5.08
		Adhah	1	1821	1748	73	10	3.898
		Tiryaka	3	1738	1727	11	10	0.51
6	Rodhana		3	1717	1716	1	10	0.06
7	Niyamana		3	1706	1701	5	10	0.29
8	Dipana		3	1691	1686	5	10	0.29
				Total loss	**1676**	**234**	**90**	**12.19**
Total Parada after Ashtasamskaras					**1676 g**			
Total Parada with samples kept after Ashtasamskaras					**1766g**			

Table 28: Table showing final profile of Ashtasamskaras after accomplishment

S. No	Author	Year	Hg(g) before Ashtasams	Hg(g) after Ashtasams	Wt loss (g)	Total Days	% loss
1	Scholar	2011	2000	1766	234	67	12.19

Table 29: Urdhva Patanartha Dhatumishrita Pranali Profile [51]

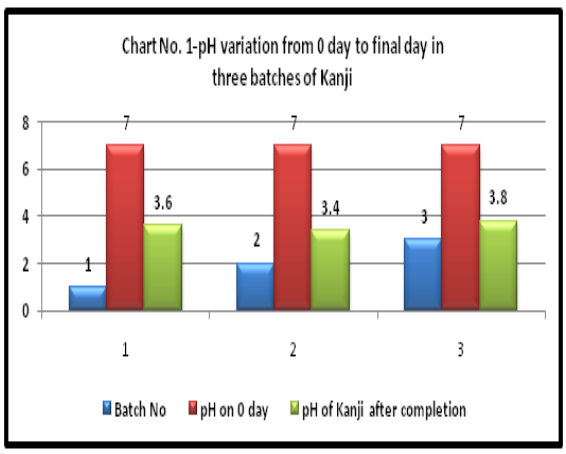
S. No	Name of text	Quantity of Hg	Quantity of Cu	No. of times
1	Rasaratnakara	1	¼	7
2	Aanandakanda	1	¼	7
3	Rasahridayatantram Commentory	1	1/3	2-7-21
4	Rasarnavam	1	Pishtiyoga	1
5	**Rasendrachintamani**	**1**	**1/3**	-
6	Rasaratnasamucchaya	1	Pishtiyoga	7-3
7	Ayurvedaprakash	1	¼	-

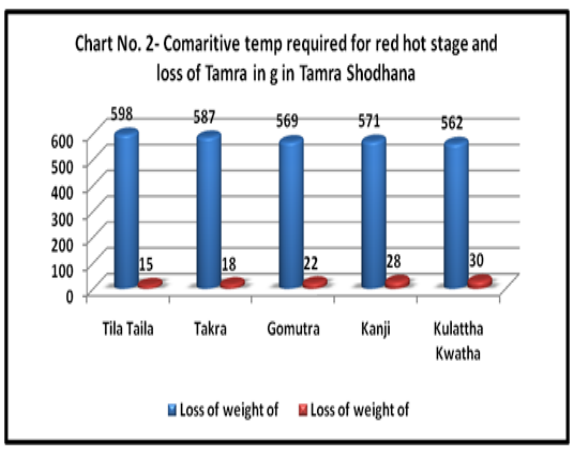
Table 30: Quantity of Heat to be given in Adhah Patana [52]

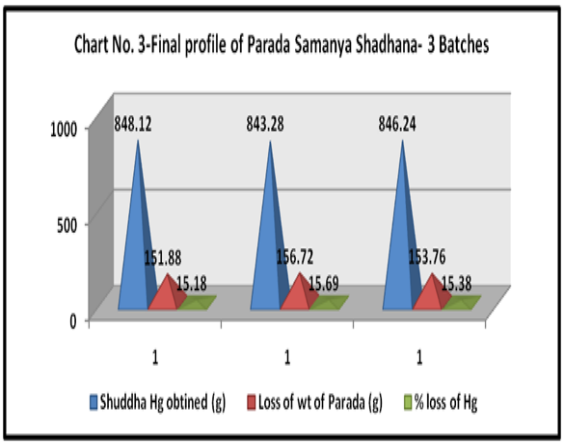
S. No	Quantum of heat	Reference
1	Laghuputa	Anandakanda
2	Laghuputa	Rasaratnakara
3	Uparishtat Puta	Rasendrachintamani
4	Diptarvanopalahi	Rasaratnasamucchaya
5	Jwalayet Murdhni Pawakam	Rasendrachudamani

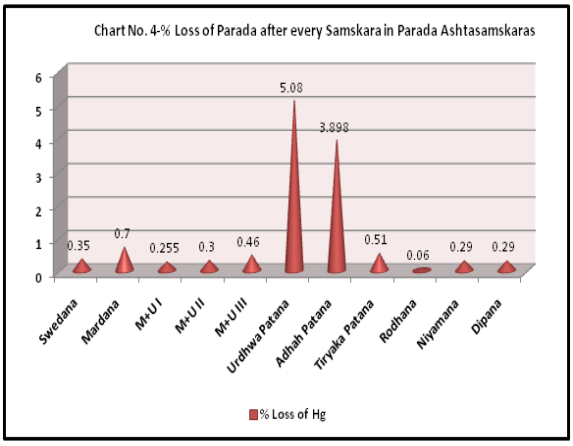
Table 31: Quantity of Heat to be given in Tiryaka Patana [53]

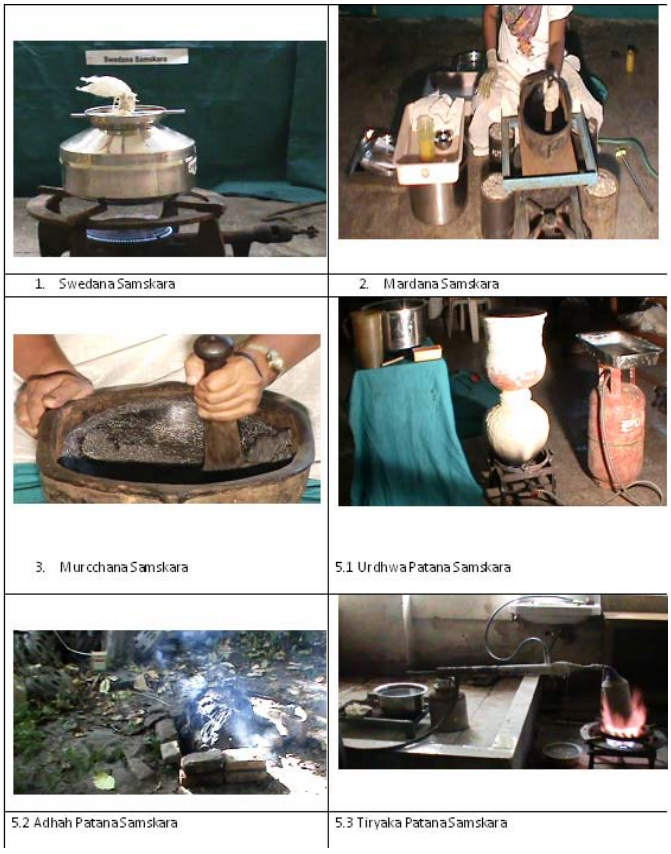
S. No	Quantum Of Heat	Reference
1	Chandagni	Anandakanda
2	Drudha Agni	Rasaratnakara
3	Kramen Drudha Vanhi	Rasaratnasamucchaya
4	Tivra Agni	Rasaprakashsudhakara
5	Upto Parada drops down in lower vessel containing water.	Rasendrachintamani











CONCLUSION

The Shuddha Parada was carried forward for Ashtasamskaras. 2 kg of Parada was subjected to 8 Samskaras following the method of Rasa Hridaya Tantra. At the end of Samskaras, 1.766 kg of Parada was obtained with 12.19 % of procedural loss in a total number of 67 days.

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