



Research Article

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STANDARD MANUFACTURING PROCEDURE OF CHATUH-SHASHTI-PRAHARI PIPPALI CHURNA PREPARED BY DIFFERENT METHODS

Raju Thomas^{1*}, Hasmukh Jadhav², Prajapati P. K³

¹Reader, Department of Rasa Shastra & Bhaishajya Kalpana, Shree Gulab Kunwerba Ayurved Mahavidyala, Gujarat Ayurveda University, Jamnagar, India

²PG Scholar, Department of Rasa Shastra & Bhaishajya Kalpana, Institute of Post Graduate Teaching and Research in Ayurveda, Jamnagar, India

³Professor, Department of Rasa Shastra & Bhaishajya Kalpana, Institute of Post Graduate Teaching and Research in Ayurveda, Jamnagar, India

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*Corresponding author

Dr. Raju Thomas, Reader, Department of Rasa Shastra, Shree Gulab Kunwerba Ayurveda Mahavidyalaya, Dhanwantri Mandir, Jamnagar, Gujarat 361 008 India E-mail: raju_thomas90@yahoo.com

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ABSTRACT

Pippali is a potent Rasayana drug being mentioned in all the ancient classics of Ayurveda. It is used in many forms like churna, modaka, avleha, ksheera paka etc. Mardana is an important process being mentioned in classics by which even a small dose of a drug may be made to produce a very quick and potent result. Chatuh-Shashti-Prahari Pippali Churna is an herbal formulation that is prepared by various methods and used by physician as per their need. But to have a uniform product, SMP (Standard Manufacturing Procedure) of Chatuh-Shashti-Prahari Pippali churna is essential. The aim of this study was to develop the S.M.P. (Standard Manufacturing Procedure) of Chatuh-Shashti-Prahari Pippali churna. Chatuh-Shashti-Prahari Pippali Churna was prepared by Mardana of Pippali Churna for 64 Prahara i.e. 192 hours by different methods. After Mardana significant changes were found in the finished product.

Keywords: Chatuh-Shashti-Prahari Pippali, Churna (powder), Mardana (Trituration), Standard Manufacturing Process, Prahara (fraction of duration)

INTRODUCTION

There are numerous methods for a drug formulation. In order to get a standardized product, the manufacturing process should be standardized first. Manufacturing process is standardized by noting all the critical stages during preparation of a product. This can be achieved by validation of the process and following standard manufacturing procedure (SMP) for the process of manufacturing. In order to validate a process, initial step is to validate equipment qualifications and process. In Ayurveda there are innumerable pharmaceutical products, single and multi-compound drugs being described for the ailments of diseases. Churna (fine powder) is one such product which is very commonly used in Ayurveda. Chatuh-Shashti-Prahari Pippali churna, commonly known as Chausat Prahari Pippali, is one such Churna Kalpana which contains Pippali (*Piper longum*) as a principle drug¹. In Ayurvedic texts there are many methods of preparing Chatuh-Shashti-Prahari Pippali churna². Grinding plays an important role in inducing new good qualities in a product³; it is of two types – dry and wet, both have some benefits in terms of drug delivery which helps in potentiation of drug activity. Traditionally it is followed in different ways in different formulations. For instance, in Shwaskuthara Rasa, dry grinding of its ingredients is done along with grinding Maricha (*Piper nigrum*) one by one⁴. In many formulations, such as in Ananda Bhairava Rasa (a herbo-mineral formulation)⁵ and in many other formulations, Vatsanabha (*Aconitum ferox*) is grinded with Tankana in dry form to nullify the toxic components present in Vatsanabha. While in the preparation of Iccha-bhedi Rasa, traditionally in the absence of Bhavana Drava, as an Anukta-drava, water is

taken as a base and grinding is done⁶. So all these references indicates that grinding – dry or wet, at all levels certainly has some major role in modifying the efficacy of a drug. In order to get a uniform drug, SMP of Chatuh-Shashti-Prahari Pippali churna is very essential. Till date, there is no reference regarding SMP being designed for the preparation of Chatuh-Shashti-Prahari Pippali churna. Hence, in the present study an attempt has been made for the same.

Aims and Objectives

To develop S.M.P. (Standard Manufacturing Process) of Chatuh-Shashti-Prahari Pippali churna and to assess the effect of Mardana process on Pippali

MATERIALS AND METHODS

Ingredient used: Pippali phala (Fruit of *Piper longum* Linn.) i.e. Choti Pippali. Raw Choti Pippali of about 1 year old sample was procured from Pharmacy, Gujarat Ayurveda University, Jamnagar and India was identified, authenticated in Pharmacognosy department of I.P.G.T and R.A, for the preparation of Chatuh-Shashti-Prahari (CSP) Pippali churna. Pippali was washed, cleaned and dried properly to remove the contamination of chemicals, pesticides and heavy metals, if any remains in the raw drug.

Procedure

Chatuh-Shashti-Prahari Pippali churna, as the name itself indicates that for preparation of this product the powder of Pippali should be triturated for 64 Prahara (1 Prahara = 3 hours), i.e. 192 hours⁷. It was prepared in three steps:

1. Preparation of Pippali Churna
2. Preparation of CSP Pippali Churna
3. Collection and storage

Preparation of Pippali Churna

As per API norms Pippali was washed under running tap water for three times to remove the external impurities, chemicals, pesticides and heavy metals, if any remains in the raw drug.⁸ The washed and properly dried Pippali was then powdered in a mixer-grinder and was sieved through 72 no. mesh⁹ (as shown in Table 1). The obtained powder was divided into five parts to prepare - (i) 3 batches of water media, (ii) 1 batch of Kwatha media (as control), (iii) 1 batch of dry trituration (as control) to evaluate the effect of Mardana process.

Preparation of CSP Pippali Churna

Chatuh-Shashti-Prahari Pippali churna was prepared in the following way:

- With water medium (WP)
- With Kwatha medium (KP)
- Without any medium i.e. dry trituration (DP)

Equipments and their specification

Wet Grinder of Butterfly Matchless Table Top make, with 3 conical Roller Stone having weight: 4.3 Kg, with Stainless Steel Jar having capacity of 2 l, with Dimensions of 7.2 inch deep and Diameter of 10.2 inch. The rpm of Wet grinder was 297 which when reduced to 100; liquid was added to the material.

With water medium (WP)

Instrument used: Butterfly Matchless Table Top Wet Grinder. 1 Kg. Pippali churna was taken in a Wet-grinder and sufficient quantity of water was added to it. Grinding was carried out for 64 Prahara i.e. 192 hours. In between samples were collected during 16 and 32 Prahara, for comparative study with the finished product. After grinding all the samples were taken out and dried under shade. Three such batches were repeated to obtain the standard result (Table 2).

With Kwatha medium (KP)

Instrument used: Butterfly Matchless Table Top Wet Grinder. Pippali Kwatha (decoction of Pippali) was prepared as per the reference of Sharangdhara Samhita.¹⁰ To 1 Kg Pippali churna sufficient quantity of Pippali kwatha was added and grinding was carried out in wet grinder for 64 prahara. Each day fresh Pippali kwatha was prepared and added for grinding. Samples at 16 prahara, 32 prahara and 64 prahara were collected and dried. This batch of KP was prepared as a control.

Without any medium i.e. dry trituration (DP)

Equipments used and its specification: Stone Mortar and pestle

Dimensions of Mortar: Long – 53.5 cm, Broad – 30.5 cm, Depth – 10 cm

Pestle: Long – 17 cm, Base – 7 cm; Weight: 2.5 Kg

Average rpm: 60 rpm

Mardana of 500 g Pippali churna was carried out manually in a stone mortar for 64 prahara operated by a

single person to avoid any error in Mardana pattern. Samples at 16 prahara, 32 prahara and 64 prahara were collected. This batch of DP was prepared as a control.

Collection and storage

All the batches of prepared drugs were properly dried and packed in an air-tight container to prevent the contamination.

RESULTS

In preparation of Pippali Churna the following parameters were observed:

Average size of Pippali – 17.93 mm

Average wt. of Pippali – 0.243 g

Organoleptic evaluation of Pippali Churna

Rasa (Taste): Very Pungent

Rupa (Colour): Light Green

Gandha (Smell): Strong typical pungent

Sparsh (Touch): Fine

Preparation of CSP Pippali Churna

With water medium (WB)

About an average of 7260 ml of water was required for complete mardana. For completion of 64 prahara mardana it took 19 – 20 days (an average 10 hours mardana per day). The observations are tabulated in Table 2.

With Kwatha medium (KB)

For KB media, 9600 ml of Pippali kwatha was required for complete mardana. For completion of 64 prahara mardana it took 19 – 20 days (an average 10 hours mardana per day). The observations are tabulated in Table 2

Without any medium i.e. dry trituration (DB)

For completion of 64 prahara mardana it took 48 working days (an average 4 hours mardana per day). The observations are tabulated in Table 2.

DISCUSSION

In the present study, Choti Pippali of 1 year old was taken for the preparation of CSP Pippali Churna because earlier studies have proved that more active principles are present in a mature fruit of Pippali.¹¹ Properly dried Pippali was washed and cleaned thoroughly to remove the contamination of chemicals, pesticides and heavy metals, if any remains in the raw material which might have come during cultivation, storage or transportation of the raw drug. After proper cleaning, dry Pippali was powdered in a mixer-grinder. There was an average loss of 14.08 % in Pippali Churna because the whole Pippali was not able to be powdered, as after certain extent, the coarse material became so hard that further powdering of Pippali was not possible (Table 1). Therefore, here practically difficulty was observed, however our classics says that there should be no residue or wastage in a Churna Kalpana.¹² For preparing CSP Pippali, 64 Prahara Mardana is required, which is quite a laborious task to do manually and is not possible in industries for large scale production. So, in the present study, Mardana was carried out in mechanized way in a grinder machine.

Table 1: Loss in Pippali churna, Quantity of raw Pippali procured from G.A.U. Pharmacy: 6 Kg

Quantity of raw Pippali taken	Quantity of Pippali churna obtained	Residue	% Loss
1 Kg	884	116	11.6 %
1 Kg	826	174	17.4 %
1 Kg	890	110	11.0 %
1 Kg	850	150	15.0 %
1 Kg	873	127	12.7 %
1 Kg	832	168	16.8 %

Table 2: Observations for preparation of CSP Pippali Churna

Type of CSP Pippali	Batch	Prahara	Qty of liquid used	Total Qty of Liquid used	Qty of Pippali Churna taken	Material obtained	After drying	Gain/ Loss in %
Water media (WP)	(1)	16	3350	6520	1 Kg	2018 g	737.4 g	26.26 %
		32	840					
		64	2330					
Water media (WP)	(2)	16	3400	7100	1 Kg	2034 g	774 g	22.6 %
		32	950					
		64	2850					
Water media (WP)	(3)	16	4250	8000	1 Kg	2350 g	810 g	19 %
		32	1700					
		64	2050					
Kwatha media (KP)	(1)	16	4900	9600	1Kg	2630 g	1628 g	62.8 %
		32	2200					
		64	2500					
Dry Trituration (DP)	(1)	16	-	-	500 g	480 g	480 g	4.0 %
		32	-	-				
		64	-	-				

Table 3: Organoleptic Evaluation of CSP Pippali Churna

Type of CSP	Prahara	Appearance	Colour	Smell	Taste
With Water media (WP)-1	0	Powder	Green	Strong Pungent	Pungent +++
	16	Frothy	Yellowish Brown	Strong Pungent	Pungent +++
	32	semi-solid	Brown	Pungent	Pungent ++
	64	Thick shiny paste	Dark Brown	Mild Pungent	Pungent +
With Water media (WP)-2	0	Powder	Green	Strong Pungent	Pungent +++
	16	frothy	Yellowish Brown	Strong Pungent	Pungent +++
	32	semi-solid	Brown	Pungent	Pungent ++
	64	Thick shiny paste	Dark Brown	Mild Pungent	Pungent +
With Water media (WP)-3	0	Powder	Green	Strong Pungent	Pungent +++
	16	frothy	Yellowish Brown	Strong Pungent	Pungent +++
	32	semi-solid	Brown	Pungent	Pungent ++
	64	Thick shiny paste	Dark Brown	Mild Pungent	Pungent +
With Kwatha media (KP)	0	Powder	Green	Strong Pungent	Pungent +++
	16	frothy	Light Brown	Strong Pungent	Pungent +++
	32	semi-solid	Brown	Mild Pungent	Pungent ++
	64	Shiny waxy paste	Dark Chocolate Brown	Mild Pungent	Pungent +
Dry Trituration (DP)	0	Powder	Green	Strong Pungent	Pungent +++
	16	Powder	Brown	Strong Pungent	Pungent +++
	32	Powder	Light Brown	Strong Pungent	Pungent ++
	64	Powder	Yellowish Brownish	Mild Pungent	Pungent +

Table 4: Particle consistency

Sample	% of Moderately Coarse Powder	% of Moderately Fine Powder	% of Fine Powder	% of Very Fine Powder
Pippali Churna	90.48	8.54	0	0
WB(1)-16 Prahara	28.30	62.74	0.33	0.17
WB(1)-32 Prahara	1.44	95.41	0.50	0.10
WB(1)-64 Prahara	0.61	94.26	2.40	0.30
WB(2)-16 Prahara	0.06	70.42	21.88	2.41
WB(2)-32 Prahara	0.40	69.30	24.09	1.60
WB(2)-64 Prahara	1.16	67.21	27.44	2.87
WB(3)-16 Prahara	0.35	72.25	21.12	1.38
WB(3)-32 Prahara	1.02	75.44	17.59	2.65
WB(3)-64 Prahara	0.71	88.13	5.51	1.64
KB - 16 Prahara	8.69	57.65	29.11	6.53
KB - 32 Prahara	0.40	60.35	29.25	6.85
KB - 64 Prahara	0.76	64.81	26.42	7.01
DB - 16 Prahara	0.43	65.13	27.90	4.42
DB - 32 Prahara	1.52	77.28	14.60	2.10
DB - 64 Prahara	2.86	70.17	19.90	2.59

But it had practical difficulty in operating the machine, as it could not grind the drug in dry form. So water was taken as a base for grinding, as water is considered as a universal inert solvent¹³. In order to standardize the Mardana process, three batches of CSP Pippali with water base (WP) were prepared in wet grinder and as a control for Mardana process, one batch with Kwatha base (KP) was prepared in wet grinder and one batch was prepared with dry trituration method (DP) in traditional way, manually in a Khalva Yantra operated by a single person to avoid any error in Mardana pattern. For preparation of WP about 6520 to 8000 ml of water was required for complete grinding depending on the variation of the season. In summer, quantity of water was utilized more as compared to winter season, as in summer evaporation was fast during Mardana. KP batch required around 9600 ml of Kwatha for complete trituration which was comparatively more than the WP batch (Table 2). The reason was that with Kwatha the product was becoming more thick and sticky on trituration and it was difficult to run the machine. It may be possible that the saponins and alkaloids present in Pippali Kwatha may be playing some role in making the product more thick and sticky. In DP batch, it was noted that trituration was easy in Khalva Yantra provided it was done continuously. During resting phase, especially during night, the Churna used to turn in to lump form which might be due to the moisture present in the atmosphere. In WP, there was an average loss of 22.62 % and in DP batch 4 % loss was observed, whereas in KP batch, 62.8 % increase was noted (Table 2). In WP batch, loss was due to evaporation of watery part during drying and some part remained stick to the blade and roller of the grinder, which was not possible to collect. DP batch had loss due to spilling during trituration. In KP batch, gain was seen which may be due to the addition of solid content part from the Pippali Kwatha. After completion of trituration, WP and KP batches required complete drying for which these products were dried in sunlight for two days and then powdered and stored in airtight glass containers. One batch of WP, which was prepared during rainy season, spoiled due to fungal contamination as it could not be dried properly. Therefore, it can be inferred that this product should not be prepared during rainy season. As shown in Table 3, the change in colour of CSP Pippali Churna noted in all the batches of WP, KP and DP. Gradually with increase in Mardana period, the product became darker. This may be due to breakage of cellular content of Pippali which gets dispersed on prolonged trituration. Strong smell and taste reduced in all the batches of WP, KP and DP (Table 3). This may be due to the prolonged Mardana the Tikshanata in Pippali might have been reduced. In all batches, after Mardana of 64 Prahara, the pungent taste in final product decreased and tingling sensation was felt delayed but was lasting for longer duration. The reason may be due to prolonged trituration wherein the heat generated due to friction might have evaporated the volatile part from the product and caused breakage of cellular contents of Pippali respectively. In previous study, it was found that Piperine content got reduced in CSP Pippali Churna on prolonged trituration which may be causing the decrease

in pungent taste in Pippali.¹⁴ Therapeutic dose of Pippali Churna is 3 Masha (3 g) where as dose of CSP Pippali Churna is 2 to 12 Ratti,¹⁵ which is much less than the ordinary dose of any Churna. This reduction in dose is possible due to the Mardana process. It can be evident with the fact that Mardana process converts the particle size of a substance. As shown in Table 4, it can be seen that particle consistency of Churna reduced remarkably in all the batches. Reduction in particle size increases the surface area of the drug which helps in easy digestion and assimilation. That is how the dose reduction in Pippali is possible by Mardana process.

CONCLUSION

SMP of CSP Pippali Churna through Butterfly Matchless Table Top Wet-grinder for 1 Kg powder of Pippali was prepared. The quantity of liquid media ranges between 6.5 to 9.6 litres, depending upon the season for 192 hours of trituration. The final product i.e. CSP Pippali acquired definite qualities in terms of reducing the particle size which increases the surface area and gets absorbed quickly and effectively in lesser dose. Strong pungent taste of Pippali kept on reducing in 16 Prahara, 32 Prahara and 64 Prahara. Thus it can be concluded Mardana process reduces the pungent taste in Pippali.

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