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Pharmacognostic studies of an indigenous herbomineral formulation dhattura lavana

Dr. Amrutha OP, Dr. Govinda Sharma K and Dr. Gazala Hussain

Abstract
Introduction: In *Ayurveda*, *lavana kalpana* is a dosage form in which the drugs are added to *lavana* (Salt) and processed with the help of fire to get the final product. There are number of such formulations found scattered in the authoritative books of *Ayurveda* and are indicated in different disease conditions. In general lavana kalpana are manufactured using puta, a unique way of heating the drug in closed container. *Dhattura lavana* is a traditional folklore medicine used as an anti-craving drug in alcohol dependence. The method of preparation adopted in folklore practice is different from the general putapaka.
Materials and Methods: *Dhattura lavana* was prepared in both the methods one which is as per the folklore method named as *Kwathapaka*, and the other by the general method of preparation for *lavana kalpana* named as *Putapaka*. Both the samples of *Dhattura lavana* were analyzed for development of preliminary standards.
Results & Discussion: The yield was more and duration of preparation was less in *kwathapaka* method than the *putapaka* making it more economic. Higher loss on drying value in the analytical study is suggestive of more moisture content in the kwathapaka sample. This indicates of lesser shelf life of *kwathapaka* method than the *putapaka* method. The presence of acid insoluble matter was also noted in *kwathapaka* method which suggests the presence of inorganic substance in the sample. Presence of trace elements like sodium & chloride was noted in both the samples.
Conclusion: *Dhattura lavana kwathapaka* method is better than *putapaka* as it is more economic, less time consuming and more yield. Shelf life might be more in *Dhattura lavana putapaka* method compared to *kwathapaka* method.

Keywords: Dhattura lavana, herbomineral, folklore, alcohol dependence

Introduction
In *Ayurveda*, *lavana kalpana* is a dosage form in which the drugs are added to *lavana* (salt) and processed with the help of fire to get the final product. There are number of such formulations found scattered in the authoritative books of *Ayurveda* and are indicated in different disease conditions. The properties of *lavana* is that, it easily penetrates to the deeper tissues and minute channels of body called *srostas* and does its action. The *samyoga* (Combination with other drugs) and *agni samskara* (processing with fire) helps to imbibe the qualities of all ingredients in the formulation. [1] The heating pattern is different for different *lavana kalpa*, but most of them are prepared by keeping the drug along with the *lavana* in an enclosed vessel and subjecting to fire with the help of *puta*. [2] Arka lavana, [3] Patra lavana, [4] Putikadi lavana, [5] are the few lavana kalpa prepared in this pattern.
Dhattura lavana is a formulation used in the folklore practice in the treatment of alcohol dependence as an anti-craving drug. In folklore, it is prepared by combining *lavana* with the drug *Dhattura* (*Datura metel*), where the prepared *Dhattura kashaya* after filtration will be added with *lavana* and dehydrated with the help of fire till only the *lavana* is left out. [6]
This method of preparation adopted in the folklore is different from the general method of preparation for *lavana kalpana*. Hence this work is carried out to prepare *Dhattura lavana* in both the methods one which is as per the folklore method named as *Kwathapaka*, and the other by the general method of preparation for *lavana kalpana* named as *Putapaka*. The work is aimed to develop a standard operative procedure for the method of preparation and to develop a preliminary standards for the formulation *Dhattura lavana* in two different methods.

Materials and Methods
thorough literature search was done to understand the dosage form *lavana kalpana* and the method of preparation adopted for different types of *lavana* from the authoritative books of

articles. The work was carried out in two steps;

Pharmaceutical study: *Dhattura lavana* was prepared in two different methods.

Analytical study: The prepared samples of *Dhattura lavana* in both the methods is analyzed to develop preliminary standards.

Pharmaceutical study

The pharmaceutical study includes;

- Drug collection & authentication.
- Preparation of *Dhattura lavana*
  i. Method 1 - *Kwathapaka*
  ii. Method 2 – *Putapaka*

A. Drug collection & authentication

Whole plant of *Dhattura* was procured from Sulthan bathery, Wayanad (Dist.) Kerala. *Datura metal* species which has bluish white flowers were selected during collection. Care was taken to follow *Dravya sangaraha niyama* as mentioned in authentic books of Ayurveda. [7,8] Red variety of *Saindhava lavana* was collected from local market Hassan (Dist.) Karnataka.

The authentication of the raw drugs were done at the Department of *Dravyaguna* and Department of *Rasashastra* and *Bhaishajya kalpana*, Sri Dharmasthala Manjunatheshwara College of Ayurveda and Hospital, Hassan.

B. Preparation of *Dhattura lavana*

As the method adopted in folklore for *Dhattura lavana* varies from the general method of preparation, in this work it was planned to prepare *Dhattura lavana* as per the method adopted in folklore practice (*kwathapaka*) and also as per the general method of preparation of *lavana kalpana* (*putapaka*). *Dhattura lavana* was prepared at Teaching Pharmacy, Sri Dharmasthala Manjunatheshwara College of Ayurveda and Hospital, Hassan.

Table 1: Details of the raw drugs used in the drug preparation

Sl no	Common name	Latin name	Part used	Quantity	
				Kwathapaka	putapaka
1	*Dhattura*	*Datura metel*	Whole part except fruit, flower& seed	500 gm	200gm
2	*Saindhava lavana*	Rock salt	-	1litre	200gm

Selection of raw materials

Dhattura plant was properly cleaned for extraneous matter. Removed fruit, flower and seeds from the plant parts. Rinsed in water for separating dust, mud, etc. Procured *Saindhava lavana* was powdered in *khalwa yantra*. For the *putapaka* method, *Dhattura* was wiped after washing the drug. Bigger stems and roots were chopped in to smaller pieces. *Saidhava lavana* was crushed and powdered to fine in *khalwa yantra*.

Method 1- *Kwatha paka*

The preparation of Dhattura lavana in kwathapaka was carried out in 2 steps;

- Preparation of *Dhattura kashaya*
- Preparation of *Dhattura lavana*

a. Preparation of *Dhattura kashaya*: 500gm of washed and cleaned drug *Dhattura* (1 part) was taken after removing fruit, flower and seed. Preparation of *Dhattura kashaya* was carried out by adding 8 litre of water (16 part) and reducing into 1 litre ($1/8^{th}$). The mouth of the vessel kept open during the process. The *kashaya* was filtered using cloth.

b. Preparation of *Dhattura lavana*

To one litre of prepared *kashaya*, equal quantity of *lavana* (1 litre) was added. It is further heated and condensed. Condensation was carried out well that the maximum moisture content was evaporated. Stirring was done at regular intervals during the condensation to avoid charring to the vessel. 968 gm of *Dhattura lavana* was obtained. The drug was stored in airtight glass container.

Method 2- *Putapaka*

The preparation of Dhattura lavana in putapaka method was carried out in following steps;

a. *Sharava samputa* & *Sandhi bandhana*
b. Preparation of *Dhattura lavana* by giving *puta*

a. *Sharava samputa* & *Sandhi bandhana*

Equal quantity of *Dhattura* (100gm) and *lavana* (100gm) was taken and kept in *sharava* in alternative layers. A layer of *sandhibandhana* was done with mud smeared cloth and kept for drying. 2^{nd} layer of *sandhibandhana* was done after complete drying of 1^{st} layer and kept for drying. In total 3 layers of *sandhibandhana* was done. Two set of *sharava samputa* were required to accommodate 400gms of the medicaments in total.

b. Preparation of *Dhattura lavana* by giving *puta*

The *sharava samputa* along with *dravya* were taken. Dried cowdung cakes with average weight of 134gm was selected & used for *puta*. Total 80 cowdung cakes was taken and arranged by keeping 50 cowdung cakes below and 30 above the *sharava* level and *Puta* was given.

Care was taken not to blow the fire and slow burning of cowdung cake was allowed. Temperature was measured using pyrometer. Next day after *swanga sheeta* the *sharava* with drugs were taken out. The drug inside is collected and powdered. 195gm of *Dhattura lavana* was obtained. Stored in airtight glass container.

Analytical study

Both the samples of *Dhattura lavana* were analyzed for development of preliminary standards for the preparation. The analysis of the sample was carried out in S.D.M Centre for Research in Ayurveda and Allied Sciences, Udupi, Karnataka. Following parameters were analysed.

- Organoleptic characters
- Loss on drying
- Total ash
- Water soluble ash
- Acid insoluble ash
- Determination of sodium, potassium and chloride.

Organoleptic characters: Organoleptic characters of the test sample were documented by means of examination using

sensory organs.

Loss on drying at 105 ºC: [9] 10 g of sample was placed in tared evaporating dish. It was dried at 105˚C for 5 hours in hot air oven and weighed. The drying was continued until difference between two successive weights was not more than 0.01 after cooling in desiccator. Percentage of moisture was calculated with reference to weight of the sample.

Total Ash: [10] 2 g of sample was incinerated in a tarred platinum crucible at temperature not exceeding 450˚C until carbon free ash is obtained. Percentage of ash was calculated with reference to weight of the sample.

Acid insoluble Ash: [11] To the crucible containing total ash, 25ml of dilute HCl was added and boiled. Collected the insoluble matter on ash less filter paper (whatmann 41) and washed with hot water until the filtrate is neutral. Transferred the filter paper containing the insoluble matter to the original crucible, dried on a hot plate and ignited to constant weight. Allowed the residue to cool in suitable desiccator for 30 minutes and weighed without delay. Calculated the content of acid insoluble ash with reference to the air dried drug.

Water soluble ash: [12] Boiled the ash for 5 min with 25 ml of water; collected insoluble matter on an ash less filter paper, washed with hot water, and ignited for 15 min at a temperature not exceeding 450˚C. Subtracted the weight of the insoluble matter from the weight of the ash; the difference in weight represents the water soluble ash with reference to the air-dried sample.

Determination of sodium, potassium and chlorides

Solubility in water: Placed one small spatula of the compound in 1 ml of water. If the compound is soluble this amount will dissolve after considerable stirring. If the compound is moderately soluble, some of this amount will dissolve. If the compound is insoluble, even a very small amount will not dissolve.

Flame test**:** Solutions of ions, when mixed with concentrated HCl and heated on a nickel/chromium wire in a flame, it cause the flame to change to a color characteristic of the atom.

Observations and Results

Based on methodology the pharmaceutical and analytical studies were carried out. The results are as follows;

Method 1 - *Kwatha paka* method

a) Observations during preparation of *Dhattura kashaya*

- In the beginning of *kashaya* preparation, drugs were floating in the water. Froth started to appear on surface after 20 minutes of heating. After 35 minutes the boiling started and the drugs completely soaked in the water.
- The color turned to light brown on boiling which got darker on further boiling. And the *Kashaya* became thicker in consistency. At this time, the characteristic odour of *Dhattura* was appreciated.
- Irritation of the eyes & heaviness was experienced during preparation of *kashaya.*
- Total duration for preparation of *Kashaya* is 3.15 hrs. Quantity of drugs was 500g and quantity of *Kashaya* obtained was 1 litre.

b) Observations during preparation of *Dhattura lavana*

- Quantity of S*aindhava lavana* and *Dhattura kashaya* was 1 litre (v/v) and the *lavana* did not dissolve in the *kashaya* and settled in the bottom of the vessel. On continuous stirring the *lavana* partially dissolved in *kashaya*. The color of *lavana* turned greyish resembling colour of *kashaya* on heating.
- On reducing the water content splashing of the preparation was noticed. At this point as there was a tendency to get charred continuous stirring of the content was done.
- Total duration for preparation of *lavana* is 2.30 hrs and 968gm of drug was obtained after complete drying. Characteristic smell of *Dhattura* and greyish white colour of the *lavana* was seen in the final product.

Method 2- *Putapaka* method

- Quantity of *Dhattura* was 200gms and *lavana* was 200 gms (w/w) and to occupy this taken quantity of drug two set of *sharava samputa* were required.
- First & second layer of *sandhibandahana* took 18 hours each for complete drying. 3rd layer of *sandhibandana* took 24 hrs for complete drying.
- Average weight of cowdung cakes used for *puta* was 134g. All cowdung cakes caught fire after 20 minutes and when proper burning started the temperature was 330.4° C. In 10 minutes temperature raised till 462.3 ° C and in another 10 minutes 539.4 ° C. Maximum temperature was 559.6℃ , 50 minutes after the puta given.
- Total cooling of *puta* took 23 hour 20minutes from the time puta was given. After swangasheeta drug was collected, powdered.195gm (48.8%) of final product was obtained.
- Characteristic smell *Dhattura* was appreciated. The color of the product was greyish black in color.

Table 2: Observations of pharmaceutical study

Dhattura lavana	**Method 1 –*kwathapaka***	**Method 2 – *putapaka***
Quantity of raw drugs	*Dhattura* drug – 500 gms *Saindhava lavana* – 1 litre	*Dhattura* drug – 200gm *Saindhava lavana* – 200gm
	Dhattura kashaya – 1 litre *Saindhava lavana* – 1 litre	Not applicable
Paka method	*Kwathapaaka- bahirdhuma*	*Puta paka – antardhuma*
Weight of final product	968 g	195g
Yield	64.53 %	48.75%
Duration of *paka*	*Kashaya* preparation = 3hr.15min Preaparation of *lavana* = 2.30min Total = 5hr 45min	*Sharava samputa* & *Sandhi bandhana* = 60 hours *Puta* = 23hr:20minutes Total = 83 hr 20 min

Analytical study

The observations of organoleptic parameters assessed are as follows;

Table 3: Organoleptic parameters of *Dhattura lavana Kwathapaka* and *Dhattura lavana Putapaka*

Parameters	*Dhattura lavana* Kwathapaka	*Dhattura lavana* Putapaka
Color	Yellow	Black
Odor	Characteristic	Characteristic
Taste	Salty	Salty
Consistency	Salt like consistency	Ash like consistency

The results of standardization parameters assessed such as loss on drying, total ash, acid insoluble ash, water soluble ash are as follows;

Table 4: Results of quality control parameters of *Dhattura lavana* Kwathapaka and *Dhattura lavana* Putapaka

Parameter	Results n = 3 %w/w	
	Dhattura lavana Kwathapaka	***Dhattura lavana Putapaka***
Loss on drying	8.54±0.01	4.29±0.01
Total Ash	87.94±0.49	87.92±2.59
Acid Insoluble Ash	0.19±0.01	0.00±0.00
Water soluble Ash	85.77±0.01	88.12±0.01

The determination of sodium, potassium and chlorides was carried out and the results are as follows;

Table 6: Results of solubility and test for Sodium, Potassium, Chlorides

Parameters	If positive	*Dhattura lavana Kwathapaka*	*Dhattura lavana Putapaka*
Solubility		Soluble	Moderately soluble
Sodium	Bright yellow	+	+
Potassium	Pale violet	-	-
Chlorides	White color	Milky white color	Milky white color

Discussion

Dhattura lavana is a formulation which is practiced in the folklore in alcohol dependence. In this work the trail drug *Dhattura lavana* was prepared by two methods. First method was based on the traditional practice wherein *Dhattura kashaya* and *lavana* were used to get the final product which was termed as *kwathapaka*. In the second method, *putapaka* was followed as per references of other *lavana kalpa*. The data collected and observations made during the preparation are discussed here.

The drug *Dhattura* abundantly grows naturally in polluted areas and marshy land. To get the *Dhattura* in more potent form the roots of the plant should be grown in dry lands/ soil. Thus Sultan batheri was selected as a place of collection even though the drug was available in local area of Hassan. Hence it can be said that the requirements of *Dravya sangraha niyama* were met. *Datura metel* species is selected for the preparation since it is the variety used in folklore practice. As followed in the folklore practice the fruits, flowers and seeds of the plant are not used for the preparation, may be the percentage of toxic alkaloids was given consideration by folklore practitioners while selecting the useful part. Red variety of *Saindhava lavana* was procured from local market, Hassan.

In the *kwathapaka* method, at the beginning of *kashaya* preparation the drugs were floating in the water and on boiling drugs settle at the bottom of vessel shows the absorption of water molecules to the drugs**.** The appearance of froth and the *kashaya* becomes slimy and thicker in consistency & the colour of the *kashaya* changes from light brown to dark brown also can be attributed to transfer of constituents of *Dhattura* to aqueous media may be because of the fractional isolation of active principles in to aqueous media. During the preparation, the *lavana* does not dissolve in *Dhattura kashaya* completely because the quantity of the *kashaya* is taken equal to that of *lavana* added may be due to the higher concentration of *kashaya*. The splashing of preparation & a tendency to get charred to the vessel may be because of the reduction in the moisture content. Irritation of the eyes & heaviness experienced was may be due to the irritant nature of *Dhattura*.

In the *Putapaka* method, the first and second layer of *sandhibandhana* took 18hours each for drying before *putapaka*. The third layer however took 24 hours for drying. Cloudy weather and other environmental factors, thickness of *sandhibandhana* and the amount of water added during the mixing of mud etc can be the factors responsible for the variation in the duration of drying.

80 cowdung cakes were used for *putapaka* and average weight of each cowdung was 134g. In the earlier works it is recorded that the weight of cowdung cakes varies from 100 g to 170g [13, 14]. This suggests that the weight of cowdung cakes used in the present work is in permissible limit. As per a similar work done on *arka lavana*, the number of cowdung cake used was 60 weighting 9.6kg and *lavana* was formed properly [15].Considering the other parts of *Dhattura* than leaf, 80cowdung were used. The pilot study done before the final preparation of study drug also suggests requirement of more heat for the *paka*.

80 cowdug cake of total weight 10.720 kg were used for *puta*. It can be consider equivalent to *kukkuta puta as per Rasa Darpana* [16]. The use of the cow dung cake in *puta* helps to maintain temperature for longer duration. Because of which to attain the *swangasheeta* 23 hour 20 miutes was required.

The final product was greyish black in color because of the *putapaka* method adopted. The characteristic odour of

Dhattura was noticed in the final product shows the proper *paka* of *lavana*. Yield in Method 1 was 64.5 % and was only 48.8% in method 2. This is suggestive that method 1 is better than method 2 as it is more economic, less time consuming and more yield. However, presence of moisture content may be one of the reason for more yield in *kwathapaka* method which may have an influence on Shelf life of the product. *Lavana* was stored in airtight container. Due to hygroscopic nature of *lavana* it may absorb the water and this may results in lesser shelflife. Because of heat the *puta* may render the *lavana* lighter (*laghu*) and easy for digestion and assimilation and also reduces the particle size. [17]

Conclusion

In this work the study drug *Dhattura lavana* was prepared in two different methods, one by *kwathapaka* and the other by *putapaka.* The prepared drug was analysed for the development of preliminary standards, the procedure was repeated thrice and the average value was taken. Based on observations and results of the present study following conclusion can be drawn.

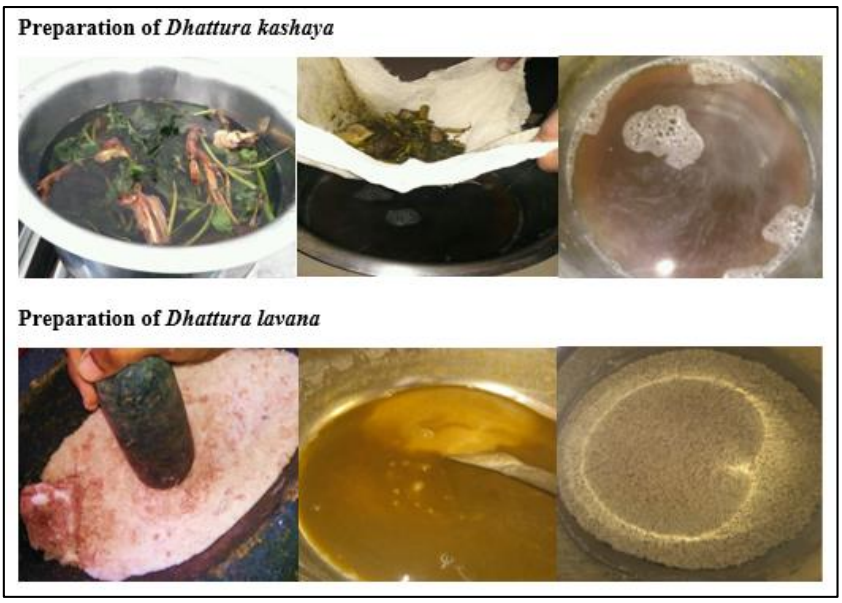
- *Dhattura lavana kwathapaka* method is better than *putapaka* as it is more economic, less time consuming and more yield.
- The loss on drying values of *Dhattura lavana kwathapaka* method was 8.54%w/w and *putapaka* method was 4.29%w/w. Suggestive of excessive water content in the *kwathapaka* method.
- The values of total ash in the both sample was almost similar, 87.94 %w/w in *kwathapaka* and 87.92%w/w in putapaka sample. The acid insoluble as was only present in *putapaka* sample (0.19 %w/w).
- Shelf life might be more in *Dhattura lavana putapaka* method compared to *kwathapaka* method. *Dhattura lavana kwathapaka* method may have lesser shelf life due to the increased value in loss on drying and the presence of acid insoluble ashes.

Monograph

Physico chemical parameter

Parameters	*Dhattura lavana*	
	Kwathapaka	***Putapaka***
Color:	Yellow	Black
Odor:	Characteristic	Characteristic
Taste:	Salty	Salty
Loss on drying	8.54±0.01 %w/w	4.29±0.01 %w/w
Total Ash	87.94±0.49 %w/w	87.92±2.59 %w/w
Acid Insoluble Ash	0.19±0.01 %w/w	0.00±0.00 %w/w
Water soluble Ash	85.77±0.01 %w/w	88.12±0.01 %w/w
Sodium	Present	Present
Potassium	Absent	Absent
Chlorides	Present	Present

Preparation of *Dhattura lavana- kwathapaka*



Preparation of *Dhattura lavana –putapaka*

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