



Research Article

PHARMACEUTICAL AND ANALYTICAL STUDY OF TWO TYPES OF SHATIYADI KASHAYA GHANVATI

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ABSTRACT

Among the *Panchvidha kashaya kalpana*, *Kwatha kalpana* is the most significant dosage form in Ayurvedic pharmaceutics which is used worldwide. However it has some disadvantages like shorter shelf life, bitter taste and inconvenience in preparation, transportation and storage. To overcome these difficulties the *Kwatha kalpana* is being modified into *Ghanvati* without compromising the therapeutic efficacy. *Shatiyadi kashaya ghanvati* is a modified tablet form of the classical polyherbal formulation *Shatiyadi kashaya*. In this study, efforts have been made to establish analytical standards for two types of *Shatiyadi kashaya ghanvati* which were not available till date. **Aims and objectives:** To prepare two types of *Shatiyadi kashaya ghanvati* as mentioned in classical texts and do the comparative analysis of their physico-chemical properties. **Materials And Methods:** The study involves the preparation of *Shatiyadi kashaya* as per Ayurvedic texts (type I acc. to *Bhaishajya Ratnavali* and type II acc. to *Bharat Bhaishajya Ratnakar*) which was then modified into *Ghanvati*. Thereafter samples of *Shatiyadi kashaya ghanvati* type I and type II were taken for the comparative pharmaceutical and physicochemical study. **Result and Conclusion:** The physico-chemical analysis of two types of *Shatiyadi kashaya ghanvati* revealed that all test parameters were within API limits which ensure the safety and purity of the drug.

INTRODUCTION

The concept of *Panchvidha kashaya kalpana* has been described as one of the basic fundamental principles of *Bhaishajya kalpana* or Ayurvedic pharmaceutics.^[1] All the other *Upkalpanas* or secondary formulations stem out from these five basic *Kalpanas*.

Kwatha kalpana is one of the most significant and extensively used among the *Panchvidha kashaya kalpana*. While formulating *Kwatha kalpana* some factors like water media and intervention of heat play a major role in developing the effectiveness of the preparation. *Acharya charak* has named such pharmaceutical processing as "*Samskara*"^[2].

He further describes that *Samskara* brings *Gunantaradhana* i.e., it renders newer properties and enhances the therapeutic efficacy of the drug.

“संस्कारो हि नाम गुणान्तराधानमुच्यते।” (च०वि०१/२२)

The traditional method of preparing decoction with *Agni samskar* enhances the *Laghuta*, *Deepan*, *Pachan* properties of *Kwatha* resulting in better absorption and assimilation in body. It also helps to extract out all the active ingredients and water soluble phytochemicals present in herbs. However *Kwatha kalpana* has some drawbacks such as shorter shelf life, unpalatability, more amount of dose^[3]. In present scenario due to fast paced lifestyle it is not always possible for everyone to prepare decoctions because of longer time duration and inconvenience. The shelf life of *Kwatha kalpana* is one *Yama* (3 hours)^[4] due to which its storage dispensing and transportation becomes difficult. This paves way for the development of consumer friendly dosage forms of *Kwatha*. One of these is *Ghanvati kalpana*. *Ghan* (an *Upkalpana* of

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kwatha) is a dried aqueous extract prepared by evaporating the entire aqueous portion from the *kwatha* [5]. Its advantages over *Kwatha kalpana* are more palatable and potent, longer shelf life, high therapeutic efficacy, accepted by all age groups [6]. *Shatiyadi kashaya ghanvati* is a modified tablet form of the classical polyherbal formulation *Shatiyadi kashaya*[7]. It is first explained in *Charak samhita chikitsa sthana* Ch.3. versus 211-212 thereafter it has been described in several other Ayurvedic classics [8-12].

However the composition and therapeutic indication varies. *Acharaya charak* has indicated its use

Table I: Composition of Shatiyadi Kashaya Ghanvati Type I as per Bh. R.

S. No.	Drug	Family	Parts used	Quantity
1.	<i>Kachur (Curcuma zedoaria)</i>	Zingiberaceae	Rhizome	1 part (2.5Kg.)
2.	<i>Pushkarmool (Inula racemosa)</i>	Compositae	Root	1 part (2.5Kg.)
3.	<i>Vyaghrimool (Solanum xanthocarpum)</i>	Solanaceae	Whole plant	1 part (2.5Kg.)
4.	<i>Karkatshringi (Pistacia chinensis)</i>	Anacardiaceae	Galls	1 part (2.5Kg.)
5.	<i>Duralabha (Fagonia arabica)</i>	Zygophyllaceae	Whole plant	1 part (2.5Kg.)
6.	<i>Giloy (Tinospora cordifolia)</i>	Menispermaceae	Stem	1 part (2.5Kg.)
7.	<i>Nagar (Zingiber officinale)</i>	Zingiberaceae	Rhizome	1 part (2.5Kg.)
8.	<i>Patha (Cycler peltata)</i>	Menispermaceae	Root	1 part (2.5Kg.)
9.	<i>Kirat (Swertia chirayita)</i>	Gentianaceae	Whole plant	1 part (2.5Kg.)
10.	<i>Katurohini (Picrorhiza kurroa)</i>	Scrophulariaceae	Root	1 part (2.5Kg.)

Table II: Composition of Shatiyadi Kashaya Ghanvati Type II as per B.B. R

S.No.	Name	Family	Part used	Proportion
1	<i>Kachur (Curcuma zedoaria)</i>	Zingiberaceae	Rhizome	1 part (1.8 Kg.)
2	<i>Kirat (Swertia chirayita)</i>	Gentianaceae	Whole plant	1 part (1.8 Kg.)
3	<i>Katuka (Picrorhiza kurroa)</i>	Scrophulariaceae	Root	1 part (1.8 Kg.)
4	<i>Vishala (Citrullus colocynthis)</i>	Cucurbitaceae	Root	1 part (1.8 Kg.)
5	<i>Guduchi (Tinospora cordifolia)</i>	Menispermaceae	Stem	1 part (1.8 Kg.)
6	<i>Karkatshringi (Pistacia chinensis)</i>	Anacardiaceae	Galls	1 part (1.8 Kg.)
7	<i>Brihati (Solanum indicum)</i>	Solanaceae	Root	1 part (1.8 Kg.)
8	<i>Kantakari (Solanum xanthocarpum)</i>	Solanaceae	Whole plant	1 part (1.8 Kg.)
9	<i>Mahaushadh (Zingiber officinale)</i>	Zingiberaceae	Rhizome	1 part (1.8 Kg.)
10	<i>Pushkarmool (Inula racemosa)</i>	Compositae	Root	1 part (1.8 Kg.)
11	<i>Dhanvyas (Fagonia Arabica)</i>	Zygophyllaceae	Whole plant	1 part (1.8 Kg.)
12	<i>Rasna (Pluchea lanceolata)</i>	Compositae	Leaves	1 part (1.8 Kg.)
13	<i>Devdaru (Cedrus deodara)</i>	Pinaceae	Inner bark	1 part (1.8 Kg.)
14	<i>Gajapippali (Scindapsus officinalis)</i>	Piperaceae	Root	1 part (1.8 Kg.)

Pharmaceutical Processing

The whole process of preparation of *Shatiyadi kashaya ghanvati* was done at GMP certified Government Central Ayurvedic Pharmacy, Patiala. In this phase of study following pharmaceutical processes were carried out.

Practical 1: Preparation of *Shatiyadi kashaya yavkut churna* type 1

Practical 2: Preparation of *Shatiyadi kashaya* type I

Practical 3: Preparation of *Shatiyadi ghan* type I

in *Jwara, Shwasa, Kasa, Hrudgraha, Parshvaarti, Tandra*. In the present study the effort has been made to prepare two types of *Shatiyadi kashaya ghanvati* (type I acc. to *Bh. R.* & type II acc. to *B.B.R*) and do its physicochemical analysis.

MATERIALS AND METHODS

Procurement of Raw Material: All the raw drugs/dry samples (standardized and authenticated with certificate of analysis) were procured from Herbal Health Research Consortium, Amritsar.

Practical 4: Preparation of *Shatiyadi kashaya ghanvati* type I

Practical 5: Preparation of *Shatiyadi kashaya yavkut churna* type II

Practical 6: Preparation of *Shatiyadi kashaya* type II

Practical 7: Preparation of *Shatiyadi ghan* type II

Practical 8: Preparation of *Shatiyadi kashaya ghanvati* type II

Practical 1: Preparation of *Shatiyadi kashaya yavkut churna* Type I

Equipments Used

1. Weighing Machine
2. Disintegrator
3. Trays
4. Vessels etc

Procedure

Dried sample of each raw drug (table1) was taken separately and powdered in disintegrator and passed through mesh no. 08 size for maximum extraction to form coarse powder (*Yavkut churna* or the size of barley grains). *Yavkut churna* of all the raw drugs was mixed thoroughly to form a homogenous mixture. *Yavkut churna* was collected and stored in air tight container for further use.

Precautions Taken

1. Each ingredient was weighed separately in its raw form.
2. Each ingredient was properly dried and separately powdered.
3. Grinding and filtering was done carefully to decrease percentage loss of *Churna*.
4. After preparation, *Yavkut churna* was kept in air tight container to avoid moisture.

Practical 2: Preparation of *Shatiyadi kashaya* type I

Reference: *Bh. R. 5/251-252*^[13]

Equipments used

1. Gas stove
2. Stainless steel vessel
3. Big spatula
4. Thermometer
5. Clean cotton cloth
6. Measuring jar

Principle used: *Toyagni sannikarsha* (Open Pan Boiling)

Procedure

- Prepared *Yavkut churna* was taken in a big stainless steel vessel and kept soaked in 16 times = 400lt. water approx. (as per principle *Shodash gunam jalam* for *Kathin dravya*)^[14] overnight.
- The next morning *Kwatha* material was heated on *Mridu agni* ^[14] with continuous stirring without covering the vessel.
- The temperature was checked with the help of thermometer and was maintained between 85-90°C.
- Constant mild heat was applied to facilitate evaporation until it was reduced to 1/8th of initial quantity.
- When the water soluble phytochemicals of the *Kwatha dravyas* were extracted completely in water (*Gatarasa*) ^[15] and the *Kwatha dravya* became *Neerasa* then it was filtered through a fourfold clean cotton cloth.

- Filtered *Kwatha* was then collected in a vessel for further procedure.

Precautions

- Wash all equipments properly before use.
- *Yavkut churna* or coarse powder of the ingredients was taken for the preparation of *Kwatha* (size below mesh no. 8).
- Boiling was done on *Manda agni* so that water evaporates slowly and this enables the complete extraction of phytochemicals and active pharmacological ingredients present in crude drugs. Also high temperature can disintegrate some of the thermolabile active constituents.
- Temperature was maintained below 100°C.
- During boiling process liquid was frequently stirred to check frothing and liquid out of the vessel.
- Continuous stirring was done to prevent sticking of the material at the bottom of the vessel. It also facilitates proper homogenous treatment to substances.
- During preparation of the *Kwatha* the vessel was not covered with lid otherwise *Kwatha* becomes *Durjara*^[16] (i.e. difficult to digest) and there is possibility of settling down of the contents.

Practical 3: Preparation of *Shatiyadi ghana* type I

Ref: *Sh. S/Ma. Kh. 8/1*^[17]

Equipments used:

1. Stainless steel vessel
2. Stainless steel ladle
3. Gas stove
4. Thermometer
5. Steel tray

Principle: *Toyagni sannikarsha* (Open Pan Boiling)

Procedure

1. Previously prepared *Shatiyadi kwatha* was taken in steel vessel and heated again (*Punaha paka*) with continuous stirring on mild heat till the complete evaporation of water content was achieved.
2. When materials got concentrated and changed into semisolid consistency i.e., *Asanna Paka Lakshana-Tantumavam, Apsu majjati, Kharatvam, Peedite Mudra, Gandha, Varna, Rasodbhava*,^[18] appeared then heating process was stopped.
3. The semi-solid matter (*Ghana*) was carefully transferred into steel trays smeared with *Ghruta* and kept in sunlight for drying completely till the suitable elasticity was obtained for pounding.

Precautions

1. All the equipments were washed properly before use.
2. Continuous stirring of *Kwatha* was done to avoid sticking of the material at the bottom of vessel.
3. Temperature was maintained between 70-75°C to avoid burning of *Kwatha*.

- During final stage mild heat was given and continuous stirring was done to avoid adhesiveness to the vessel.
- The *Ghana* was properly and carefully shifted in tray.

Practical 4: Preparation of *Shatiyadi kshaya ghanvati* type I (Ref: *Siddha yog sangraha*) [19]

Equipments used

- Weighing machine
- Electric pounding machine
- Pill making machine
- Steel trays

Procedure

- After drying when the mixture attains elasticity then it was pounded in an electric pounding machine.
- At the end of smooth pounding dark brown coloured smooth mass was formed.
- Then with the help of pill making machine 500mg sized *Vatis* were made.
- First of all the dye was configured to make wicks for making 500mg sized *Vatis* with the help of extruder.
- Then wicks were taken one by one and subjected to pill cutting machine and 500mg *Vatis* were made.
- Then prepared *Vati* were dried in shade.

Precautions

- Pill making machine was properly cleaned.
- Size and uniformity of the pills was checked and malformed pills were again subjected to the process.
- The *Vati* was properly dried in shade.

Practical 5: Preparation of *Shatiyadi kashaya yavkut churna* Type II

Procedure

Dried sample of each raw drug (table 2) was taken separately and powdered in disintegrator and passed through mesh no. 08 size for maximum extraction to form coarse powder (*Yavkut churna* or the size of barley grains). *Yavkut churna* of all the raw drugs was mixed thoroughly to form a homogenous

OBSERVATIONS AND RESULTS

General observations & Results during preparation of *Shatiyadi kwatha churna* Type I & Type II

Table III: General observations & Results during preparation of *Shatiyadi kwatha churna* Type I & Type II

Sr.no.		Type I	Type II
1.	Weight of each raw ingredient in kg	2.5 kg	1.8 kg
2.	Total ingredients:	10	14
3.	Total weight of raw drugs in kg	25 kg	25.2 kg
4.	Total weight of <i>Churna</i> collected in kg	24.640 kg	24.820 kg
5.	Loss (gm)	360 gm.	380 gm
6.	Loss in %	1.44%	1.5%

II. General observations during preparation of *Shatiyadi kwatha* Type 1 & Type 2

- Shatiyadi kashaya yavkut churna* became soft and swollen when kept soaked overnight (12hrs)
- During boiling of *Kwatha* little frothing was observed.
- Evaporation started at 70°C which aggravated on stirring.

mixture. *Yavakuta churna* was collected and stored in air tight container for further use.

Precautions same as type I

Practical 6: Preparation of *Shatiyadi kashaya* type II (Ref: *Bha. Bh. R.*) [20]

Equipments, principle, procedure, precautions: same as type 1

Practical 7: Preparation of *Shatiyadi ghana* type 2 (Ref: *Sh.S/Ma.Kh.* 8/1)

Equipments, principle, procedure, precautions: same as type 1

Practical 8: Preparation of *Shatiyadi kashaya ghanvati* type 2 (Ref: Indian Pharmacopoeia, Vol. I, API, Part II, Vol. IV page no. 106) [21]

Equipments

- Sieve no. 20,
- Weighing machine
- 16 station rotary tablet press machine
- Hot air oven
- Stainless Steel tray.

Principle: Compression

Procedure

- Previously prepared *Ghana* was dried naturally under the sun for a few days then it was converted in the form of small round mass.
- After that granules (size 20) were prepared from it with the help of sieve no. 20, taken into S.S tray and it was kept in the oven at 50°C till completely dried.
- Granules were then compressed to form tablets each of 500mg with the help of 16 station rotary tablet press machine.
- Tablets were collected, weighed kept in air- tight glass bottle and stored in cool dry place.

Precautions

- Tablet making machine was properly cleaned.
- Size of granules was in between 14-20 mesh size and not much difference.
- To remove the water content from the granules, drying process was done in oven in between 45-50°C temperature.

4. The maximum temperature during boiling stage was found between 90-95°C.
5. The menstruum was light brown in colour during initial stage which gradually turned to dark brown
6. The colour of prepared *Kwatha* was dark brown.
7. The taste of the *Kwatha* became bitter at the end and had the characteristic smell.
8. It was observed that *Kwatha* gradually became thicker in consistency and the material became softer.

Results

Table IV: Results of *Shatiyadi kwatha* Type I & Type II

Sr.no.		Type I	Type II
1.	Initial quantity of <i>Kwatha churna</i> taken (kg)	24.640	24.820
2.	Total quantity of water taken (Lt.)	400	400
3.	Total time for soaking	12 hrs	12 hrs
4.	Temp. during preparation of <i>Kwatha</i> (after 1 h)	80-90°C	80-90°C
5.	Total time taken for <i>Kwatha</i> (hrs)	10	9
6.	Final quantity of <i>Kwatha</i> obtained (Lt.)	49.30	49.60
7.	Colour	dark brown	dark brown
8.	Final quantity of residue obtained (kg)	32	32.27
9.	Percentage of <i>Kwatha</i> obtained	12.32%,	12.4%

II. General Observations during preparation of *Shatiyadi ghana* type I & type II

1. After 4-4.5 hrs of boiling the consistency of the liquid started becoming thicker and mild sticky nature was observed when rubbed between two fingers.
2. After 6 hrs of heating the viscosity of the liquid and adhesiveness to the vessel was further increased.
3. There was a gradual increase in thickness of liquid and its adhesiveness to vessel with time.
4. After the completion of process dark brown coloured *Ghana* of semi-solid (pouring) consistency was obtained.
5. The *Ghana* was sticky in nature.

RESULTS

Table V: Results of *Shatiyadi ghana* type I & type II

Sr. No.		Type I	Type II
1	Total time taken for preparation of <i>Ghana</i> (h)	11 hrs	9hrs
2	Final quantity of <i>Ghana</i> obtained before drying (kg)	12	12.200
3	Total time taken for drying	8 days	8 days
4	Final quantity of dried <i>Ghana</i> obtained (kg)	5.2	5.460
5	Percentage of dried <i>Ghana</i> obtained	21.1%	22%

III. General observations during preparation of *Shatiyadi kashaya ghanvati* type I & II

Shatiyadi ghana was quite sticky during handling.

Type I. After pounding dark brown coloured dough mass was formed which was converted into blackish brown coloured circular shaped tablets with smooth margins.

Type II. Dark brown coloured granules were converted into greyish black coloured oval shaped tablets.

Results

Table VI: Results of *Shatiyadi kashaya ghanvati* type I & II

Sr.No.		Type I	Type II
1	Total time taken	13 days	10 days
2	Final quantity of tablet obtained (kg)	4.88 kg	5.18 kg
3	Final quantity of tablet obtained (%)	94%	95%
4	Quantity of residue after making tablet (g)	0.312g	0.273 g

Physico-chemical Analysis

The primary goal of analysis of pharmaceutical preparations is to examine their purity, quality and safety for obtaining desired therapeutic efficacy. With the globalization of Ayurveda there has been a rising trend of modification of classical dosage forms. With the newer innovations coming in the therapeutic efficacy of the ancient dosage forms should not be compromised. This is possible through standardization of protocols. For standardizing a formulation it is necessary to standardize 1. Raw material 2. Processes involved 3. Finished

product. In this study, efforts have been made to establish analytical standards for two types of *Shatiyadi kashaya ghanvati* which were not available till date.

Analysis of *Shatiyadi kashaya ghanvati* type I and II ⁽²²⁾

A. Organoleptic characteristic

Table VII: Organoleptic characteristic of type I & II

S.No.	Parameter	Type 1	Type 2
1.	Colour	Blackish brown	Greyish black
2.	Shape	Round shaped uncoated	Oval shaped uncoated
3.	Smell	Characteristic	Characteristic
4.	Touch	Hard, Smooth	Hard, Smooth
5.	Taste	Bitter	Bitter

B. Physico-chemical analysis

Table VIII: Analytical Tests of *Shatiyadi kashaya ghanvati* type I & type II

S.No.	Tests/Analysis Parameters	Results of <i>Shatiyadi kashaya ghanvati</i> type I	Results of <i>Shatiyadi kashaya ghanvati</i> type II
1.	Composition	Ingredients found present	Ingredients found present
2.	Friability	Nil	0.6%
3.	Hardness	3	1
4.	Uniformity of weight	2.7%	1.9%
5.	Total Ash Value	14.5%	13.65%
6.	Acid Insoluble Ash	1.88%	1.77%
7.	Loss on Drying	2.53%	1.96%
8.	Water Soluble Extract	11.8%	26.8%
9.	PH Value	5.7	5.03
10.	Tablet Disintegration Test	47 minutes	11 minutes

DISCUSSION

Although *Kwatha kalpana* is the most ancient and widely popular among the *Panchavidha kashaya kalpana* but it is being evolved into newer dosage forms due to shorter shelf life, unpalatability and more amount of dose etc. *Ghanavati kalpana* is a modified dosage form of *Kwatha kalpana* and has its roots in *Brihatrayee*. *Acharya charaka* has mentioned *Ghana kalpana* according to its method of preparation and consistency. (Ref *ch.chi.* 26/202). *Sharangdhara samhita* stands the first book in *Laghutrayi* which holds elaborative description of *Ghana kalpana*. Here, the principle of *Ghana kalpana* is mentioned that *Kwathadi* are boiled until they attain thicker consistency. Ayurvedic compound formulation *Shatiyadi kashaya* from two references type 1 acc. to Bh. R. and type 2 acc to B.B.R were selected for this study and modified into *Ghanvati*. Standardization of protocols is mandatory to ensure that modification of dosage forms does not harm its therapeutic efficacy.

CONCLUSION

The physico-chemical analysis of two types of *Shatiyadi kashaya ghanvati* showed that all the test parameters were within API limits. In the present study an attempt has been made to fix quality standards for the analysis of *Shatiyadi kashaya*

ghanvati type 1 & type 2, which can serve as a basis for the standardization of *Ghanvati* in general and *Shatiyadi kashaya ghanvati* in particular. Standard Operative Procedures developed in this particular study can be implemented on pharmacy scale.

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Raw drugs for Shatiyadi Kashaya Ghanvati Type I & Type II.

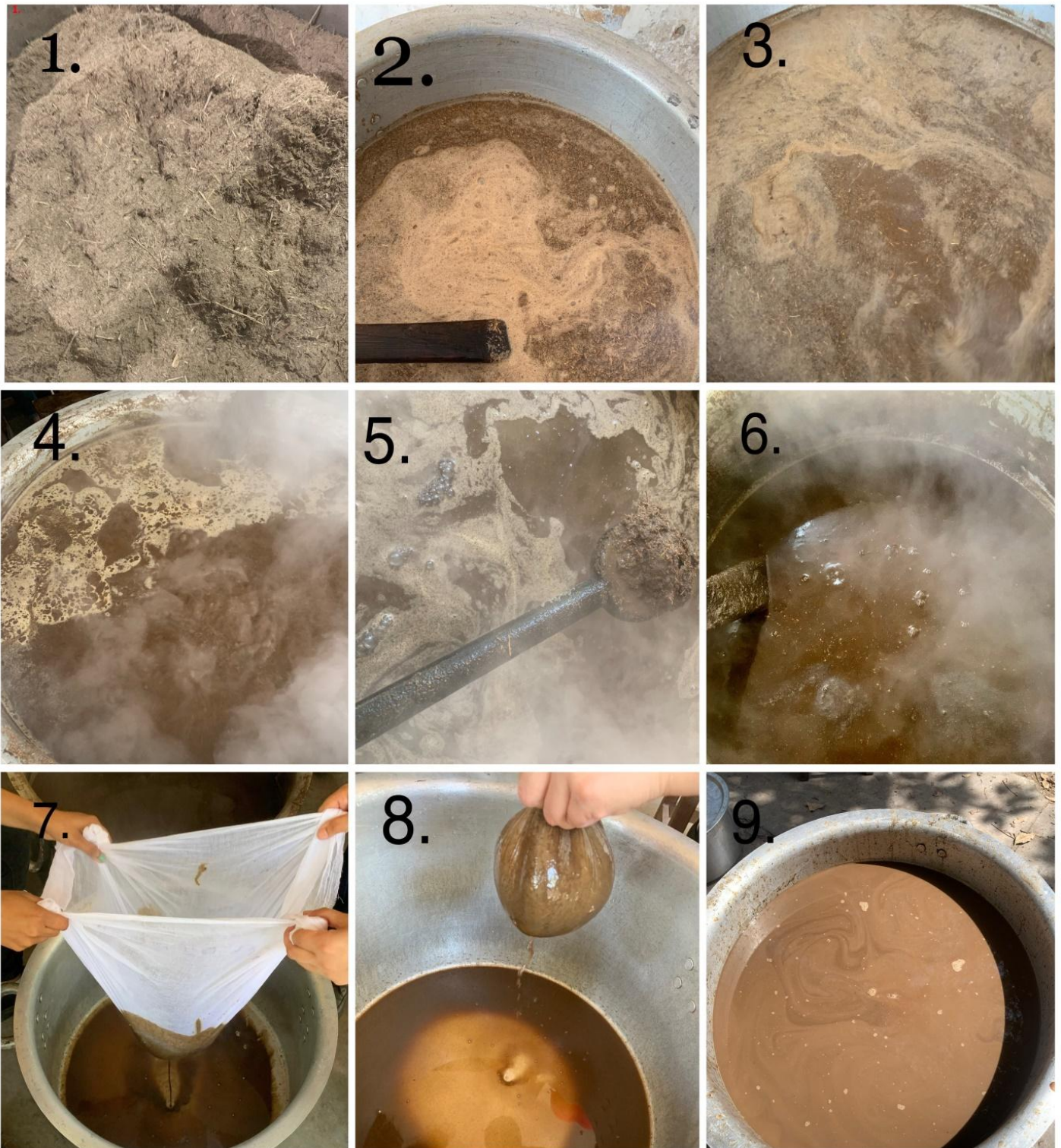
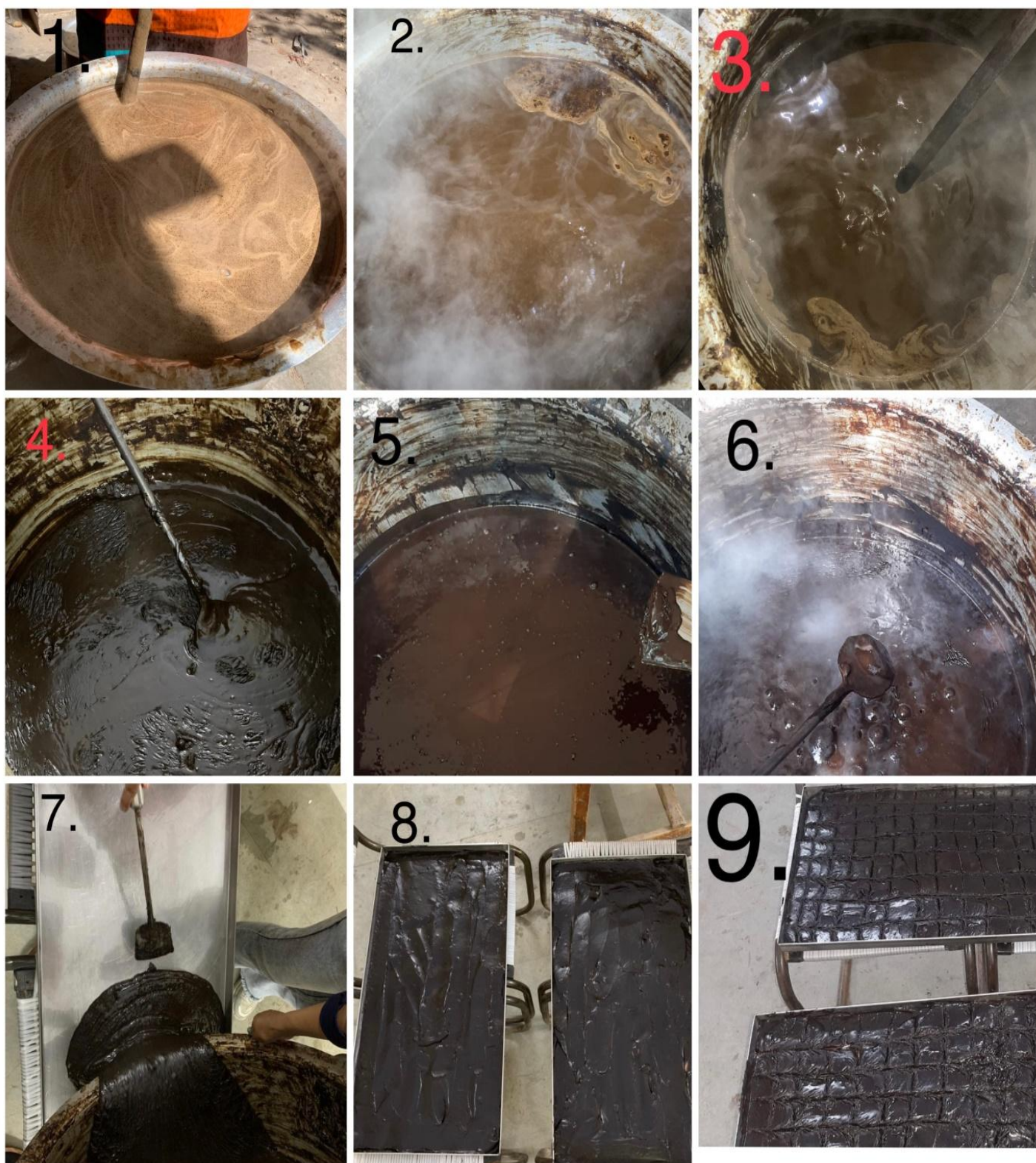


Fig 1. Yavkut Churna, 2. Soaked Yavkut Churna, 3. After 2 hrs of heating 4. After 4 hrs of heating 5. After 6 hrs of heating 6. After 10 hrs of heating 7&8. Filtration of Kwatha 9. Final kwatha obtained



1. *Punaha paka* of *kwatha* started, 2. After 2 hrs of heating, 3. After 4 hrs of heating , 4. After 6 hrs of heating, 5. After 8 hrs of heating, 6. After 10 hrs of heating, 7. Pouring *ghana* in trays, 8 & 9. Final *ghana* obtained.



1&2. Dried *ghana*, 3&4. After pounding of *ghana*, 5. Making wicks in extruder, 6. *Vati* made in pill making machine.



Fig 1. *Yavkut Churna*, 2. *Soaked Yavkut Churna*, 3. After 2 hrs of heating, 4. After 5 hrs of heating, 5. After 7 hrs of heating, 6. After 9 hrs of heating, 7&8. Filtration of Kwatha, 9. Final *kwatha* obtained.



Fig.1. Punaha Paka of Kwatha started, 2. After 2 hrs of heating, 3. After 4 hrs of heating , 4. After 6 hrs of heating, 5. After 7 hrs of heating, 6. After 8 hrs of heating, 7. Pouring Ghana in trays, 8 & 9. Final Ghana obtained



Fig. 1. Dried *ghan*, 2 & 3. Granule formation, 4 &5. Making tablet in tablet punching machine, 6. Final tablet