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Critical Review on *Swarasa Kalpana* and its Quality Control Methods

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ABSTRACT

In Bhaishajya kalpana (Ayurvedic pharmaceutics) *swarasa* (extracted juice) is expressed as primary and most potent dosage form. In present circumstances, only two or three methods are known and used for extraction of In Ayurvedic epitome, there are many innovative methods of extraction which is needed to be explored and to be disseminated for better pharmaceutical and therapeutic development of Ayurveda. Possible testimonial regarding methods of were composed from basic Ayurvedic text books and their available commentaries. More than twelve different methods were get in classics for according to the nature of material, different parts and form (dry or wet) of the herbs. These methods remarkably differ from each other in pharmaceutical processing thus may have different expected biological effects. Hence, juice extracted from same drug with different methods may significantly differ in term of its composition, properties and ultimately pharmaco-therapeutic utility. Present work reflects a great need of scientific inquiry into poorly explored area of Ayurvedic pharmaceutico-therapeutics.

Key Words *Swarasa, Methods, Analytical Process, Stability*

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INTRODUCTION

Swarasa is liquid dosage form of medicament predominately used for internal administration as well as to prepare different secondary *kalpanas* like *Avaleha, Arista* and *Sneha* etc. The use of this *kalpana* is in practice since *vedic* period for e.g. *soma rasa.* Almost every Acharya has described Swarasa Kalpana in his classics, which are described below-

यंत्र निष्पीडिताद द्रव्यात रसः स्वरस उच्यते| ***(Ch. Su. 4/16)***

Swarasa (juice) extracted from a green & fresh drug pressed by a machine is known as *swarasa*. While commenting on this *shloka, acharya Chakarapani* has said that the juice obtained from particular drug is known as *Swarasa*[1].

The juice which is obtained by compressing the *Draksha, Ikshu, Amlaki* etc. is called as *swarasa*. This *swarasa* with the combination of other *samshmana Yoga* can be used in different disease[2]. Instantaneously after collection of drug, it is washed, crushed and by applying pressure the *sawarasa (niryasa)* can be obtained[3]. Shortly

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after the collection of fresh drug it is crushed and by squeezing through cloth the *swarasa* is obtained. According to *Hemadri swarasa* should be prepared on the same day when it is collected[4].

The juice extracted from a fresh drug by pounding and squeezing through cloth is known as *swarasa*. So it can be concluded that for the *swarasa* preparation a green drug is first made into paste from then with the help of cloth *pottali* is made and by

applying pressure to this *pottali swarasa* can be obtained[5].

Methods of preparation[6] :

Following 3 methods are commonly used preparation of *swarasa*

1. By the application of *yantra*.
2. *Putapaka* method.
3. *Swedan* method.

1. By the application of yantra :

Firstly, the fresh drug is crushed and made into paste form then with the help of cotton cloth *pottali* is made and by applying pressure *swarasa* is obtained.

2. Puta paka method:

A few drugs in wet and fresh form can not found *swarasa* by general method then this method is applied. In this method fresh leaves etc are taken and made into paste then paste is made into bolus form. Then it is wrapped by leaves of *Kashmari, Vata jambu patra* etc. and tied with thread and it is covered with paste of *godhuma* (wet cow dung) the thickness should be two *angulis*. After drying it is subjected to fire till it becomes red then the bolous is taken out. After removing the paste of *godhuma* and leaves the paste of drug is collected and kept ever cloth and squeezed for obtaining *swarasa*.

3. Swedana method :

Fruits of *Bhallataka* should be slightly compressed and kept in *pista swedana*. This should be kept inside a strong earthen vessel which is smeared inside with *sneha*. This earthen vessel should be kept inside a hole dug in the earth. The mouth of the vessel should be covered with another wooden plate, and the joint should be sealed by smearing with the mud of black coloured earth. Over this vessel fire of cow dung cake should be ignited for heating. By this heat the *swarasa* of these fruits will percolate and get accumulated at the bottom of the earthen vessel.

Alternative methods for swarasa preparation :

These procedure are described to get *swarasa* from fresh drug but when fresh drugs are not available then for the preparation of *swarasa* the succeeding methods are also explained. The coarse powder of the plant should be taken in the quantity of one *aadhaka* (256 *tola*) and to this one *aadhaka* of water must be added and kept for one day and night. Thereafter it should be squeezed and filtered. The liquid that comes out after filtration should be used like *swarasa*[7].

Aacharya Sharangdhar has given two alternative methods for the *swarasa* preparation. one *kudava churna* of drug is immerse into two times of water and left for 24hrs then swarasa can be obtained through filtering[8]. In case of dry drug which does not provide out any juice, the coarse

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powder of drug is boiled in eight times of water and reducing to a quarter can be also used as *swarasa*[9].

In modern juice extraction and filtration[10]

Drugs that are moist can have their juice extracted using size reduction techniques like crushing, chopping, and comminuting. This is typically used for fully ripened fruits and herbs like aloe vera that are too delicate for whole, diced, or sliced packs.

Under such circumstances, the following things must be kept in mind.

• Crushing of products by chopping them into small pieces prior to heating speeds enzyme activity. Hence it is required to remove the air at the time of crushing and immediately after comminuting.

• A partial vacuum is created with the help of superheated steam. So, superheated steam, preferably under a vacuum, will eliminate the air and aid immensely in creating a better consistency in the final product. A device used to separate pulp is known as a pulper, which mainly uses compressive force. A basket press is common piece of equipment for juicing berry fruits such as oranges.

Filtration[11]

Filtration is the deduction of solid particles from a fluid by transient the fluid through a filtering medium (or septum) on which the solids are put down. The fluid might either be a gas or a liquid. Commonly, the feed is modified to increase the filtration rate (by heating, recrystallizing, or adding a filter aid). Many types of filters are utilised due to the huge diversity of materials that need to be filtered and the vastly different process conditions. Cake filters, clarifying filters, and cross flow filters are three broad categories of filters.

Large volumes of cake, crystals, or sludge are separated using cake filters. To create clean gas or sparkling clear liquids like beverages, clarifying filters small amounts of particulates. They are sometimes referred to as "deep bed filters" since no solid layer is typically visible on the medium's surface and solid particles are confined inside the filter medium. In cross flow filters, the feed suspension moves over the filter media at a relatively high velocity while under pressure.

Prakshepa[12] :

According to different *Aacharyas*, the quantity of different types of *prakshepa* added to *Swarasa* is as follows-

Table 1 Quantity of Prakshepa dravyas

Dravya	***Sharangdhar***	***Yadav ji***
Honey, Sugar, Ghee, Jageery	1 *Kola*	1 *Kola*
Lavan, Kshara, Churna	1 *Kola*	Q.S.
Taila, Jeera	1 *Kola*	-

Dose[13] :

Following dose schedule are mentioned in the classics.

Table 2 Swarasa dosa by different acharyas

Text	**Dose**
Ashtang Sangrah	4 *Pala*
Ashtang Hridyam	4 *Pala*
Sushruta Samhita	½ *Pala*

Shelf life :

Fresh use of medicament is indicated.

Uses of swarasa :

1. Therapeutically.

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2. Pharmaceutically.

Therapeutically *Swarasa* is used to cure different diseases (as a medicine & *anupana*) as well as a *Rasayana*.

In the diseases :

1. *Vasa Swarasa*: To cure *Rakta pitta, kasa* etc.
2. *Jambuvadi Swarasa* in Raktatisara
3. *Kantakari putapakva Swarasa* to cure the *Kasa*

As a rasayana :

1. Use of *Mandukparni swarasa* as *Medhya rasayana*
2. *Droni Praveshika Rasayana*.

Pharmaceutical uses of swarasa :

As *Bhawana dravya* :

e.g. *Bhawana* of *Amalaki swarasa* to *Amalaki churna* for 21 times to prepare *Amalkayas Brahma rasayana.*

As *Shodhana* media :

e.g. *Shodhana* of *Somal* in *Karvellaka swarasa*

Examples of Swarasa Kalpna

a. Adraka swaras

Method of preparation – Desired quantity of freshly collected *adraka* is washed properly and wiped. It is pounded to fine paste form in a clean *khalva yantra.* The paste obtained is squeezed into another clean vessel through through a clean cotton cloth. The juice obtained is *adraka swaras*. Half pala of the medicine is taken with one kola of honey. It is found beneficial in case of *Swasha, Kasa, Aruchi* and *Pratishyaya*[14].

b. Tulsi swarasa

Desired quantity of freshly collected *tulsi* are washed properly and wiped. They are pounded to fine paste form in clean *Khalva yantra*. The paste obtained is squeezed into another clean vessel through a clean cotton cloth. The juice obtained will be *Tulsi swaras*. *Half pala* of this medicine is given with one *kola* of *maricha churna*. It is useful in *visham jwara*[14].

c. Shatavari – Ghritkumari swaras

Method of preparation – To make *shatavari swarasa,* the desired quantity of freshly *shatavari mula* is cleansed, wiped, crushed, and pressed through a clean cloth. Desired quantity of freshly collected *Kumari patra* are washed and wiped. *Kumari swarasa* is made by collecting their pulp and pressing it through a clean cloth. One *kola* of honey and *half pala* of *shatavari swarasa* are administered. It is found beneficial in case of *Pittaja shoola.* One kola of Haridra churna and half a pala of *Kumari swarasa* are given. It is found beneficial in case of *Pleeha vriddhi* and Apachi[14].

d. Vasa putpaka swarasa

Ingredients – *Vasa patra kalka*, Leaves of *Palasha, Vata, Gambhari, Jambu* etc., Cotton thread, Mud.

Method of preparation – The *kalka* of drug is prepared. It is wrapped with larger non poisonous leaves and tied on all sides with cotton thread. Over this ball of *kalka* and covered leaves, an *angula* thick mud is smeared. This mud ball is dried in shade and baked over burning charcoal until red-hot. Later it is rolled out of fire and allowed to cool. Before it is completely cool, the layers are removed one by one and the *kalka* is strained through a clean cloth to get *putpaka*

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swarasa. One *pala* of the medicine is administered along with one *kola* of honey. It is found beneficial in cases of *Raktapitta, Kasa, Swasha, Vishamjwara* and *Kshaya*[14].

Analytical Parameters of Swarasa kalpana[15]

A. Organoleptic character – Colour, Taste, Odour, Texture

B. Modern Meyhods – Juice percent, Specific gravity, pH, Viscosity, Physical test, TLC (Thin layer chromatography), Stability testing

Specific gravity – The previously weighted specific gravity bottle was taken and first filled with Solution and weighed. Then wash it with distilled water and dried it and again filled with distilled water and weighed, both at room temperature. Specific gravity was calculated.

Specific gravity – Density of the substance / Density of water

This is carried out especially in Swarasa, Kwath, Asava, Arishta, Ghrita and another liquid preparation.

pH – pH denotes the potential or power of the H+ ion. It is used to determine the acidity of an aqueous solution. A pH indicator is a chemical compound that is added to a solution in small amounts to visually determine the pH of the solution. Normally, the indicator changes the colour of the solution based on the pH. Indicators can also show changes in other physical properties, for example, olfactory indicators show changes in odour. Some pH indicators include phenopthalein, methyl orange, and litmus, as well as pH paper.

Viscosity – Viscosity is the quantity that describes a fluids resistance to flow**.**The viscosity of a liquid is a measure of its resistance to being deformed by shear or extensional stress. Fluid viscosity varies with temperature and pressure. The viscosity of simple liquids decreases as temperature rises and increases as pressure rises. When heated, honey and syrups, for example, can flow more easily. When worked or agitated, some gels and pastes behave like a fluid and then settle into a nearly solid state when at rest.

Thin Layer Chromatography (TLC)

TLC is a easy, rapid, and cheap method to know how many constituents are in a *swarasa* mixture. Rf value is the ratio of the distance moved by a compound and a stated reference substance. When the Rf of a compound is compared to the Rf of a known compound, TLC is used to support the identity of a compound in a mixture (preferably both run on the same TLC plate). The retention factor, or how far up a plate the compound travels, is represented by the Rf value.[15]

Loss on Drying :

A 5 gram sample of the *swarasa* was taken in a plate that had already been dried and weighed, and it was dried first on a water bath and then, lastly, in an oven at 110°C temperature until a steady weight was obtained. From the weights noted, the loss on drying of the sample was calculated and expressed as percentage w/w.[15]

Preservation of herbal juices: Chemical preservatives are used to preserve *swarasa*

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(herbal juices). Chemical preservatives like sodium benzoate or potassium metabisulphite are added to preserve *swarasa*[16].

1. Pasteurization: Preservation of fresh juices (*swarasa*) by application of heat is the most common procedure. *Swarasa* can be pasteurised by heating it to 100 ˚C for a sufficient amount of time to inactivate or destroy the bacteria and microorganisms that cause juice deterioration. Usually herbal juices are pasteurized between 75 and 88 ^{0} C with times ranging from 30 second to 30 min depending on the type of heating system, the nature of the herbal juice and the size of the container. Pasteurization process can be performed either by heating at low temperature for a long time or heating at high temperature for short time. Generally followed methods are:**a. Holding pasteurization:**

In this method, the prepared herbal juice is poured into glass bottles with the appropriate headspace before the bottles are airtightly sealed. After sealing the bottles are pasteurised[17].

b. Pasteurization by overflow method: The herbal juice is heated to approximately 2.5^{0} C above the pasteurization temperature and then poured to the brim in hot, sterile bottles. When filling and sealing, care should be made to maintain the temperature. The sealed bottles are heated in a pot of water for a predetermined amount of time. The bottles are chilled after being processed. After cooling, the juice condenses to leave a tiny, airless headspace in the bottle. All varieties of juices are commercially preserved using this technology in the food sector[17].

2. Aseptic processing and packaging of fruit juices: Aseptic processing and packaging refers to the process of packing a commercially sterile product into a pre-sterile container in a sterile environment. The system employs high temperature short time (HTST) sterilisation at temperatures ranging from 90 to 110 ^{0}C for acid products (pH4.6) and ultra high temperature (UHT) sterilisation at temperatures ranging from 121 ^{0}C and above for low acid foods (pH>4.6). The commercial aseptic sterilisation process is carried out in a closed, continuous system. Aseptic processing may result in products with higher nutrient retention and superior sensory quality. Apple, mango, litchi, and pineapple drinks, among others, are processed commercially in tetra packs using an aseptic processing and packaging system[17].

3. Preservation with chemical: Chemical preservatives are used to preserve fruit juices, pulps, squash, cordial, syrup, RTS drinks, and other foods. Chemical preservatives are used to preserve bulk fruit juice and pulp. The two most common chemical preservatives used in the preservation of fruit and vegetable products are I benzoic acid (benzoates) and (ii) sulphur dioxide (Sulphites)[17].

i) Benzoic acid: Because benzoic acid is an effective agent but is only sparingly soluble in water, its sodium salt, which is water soluble, is commonly used. Benzoic acid is more effective against yeast than mould. It does not, however,

prevent lactic acid and acetic acid fermentation. The amount of sodium benzoate required is determined by the type of juice, its acidity, and the type of microbial infection[17].

ii) Sulphur dioxide: Potassium meta-bi-sulphite ($K_2O_2SO_2$ or $K_2S_2O_2$) is a common sulphur dioxide source. When added to herbal juice, it reacts with the acid to form potassium salt and sulphur dioxide, which is liberated and forms sulphurous acid with the juice's water. Sulphur dioxide is more effective than yeast against mould spores and bacteria, and it also inhibits enzymes and other processes.

- It should also not be used in juices packed in tin containers because it can react with the tin, causing pinholes and the formation of hydrogen sulphide and black compounds.
- The potassium meta-bi-sulphite should be dissolved in a small amount of water before being added to the preserved juice[17].

DISCUSSION

In *bhaishajya kalpana*, *Achrayas* mentioned five basic *kalpanas*, the first and most important of which is *swarasa kalpana*. The simplest way to make a *swarasa* is to take a fresh drug, pound it, and then filter it through a cloth to get fresh juice. As for *swarasa*, the *saveeryata awadhi* (shelf life) of all *Panchavidha kashaya kalpana* is one day. Aside from this, there are other ways to obtain a *swarasa* from a drug based on its availability, nature, and constitution. If a fresh drug is not available at the time, its dry form can be used to prepare *swarasa*; similarly, plants whose *swarasa* cannot be obtained by any of the above methods can be subjected to heating by making a bolus of it and then providing heat with cow dung cakes.

Basic idea behind such process can be morphologically the cellular structure of these plants may not allow losing its contents by normal squeezing process, so heat is provided so that it causes little change in the cell structure and *swarasa* can be found. The dosage of *swarasa* varies depending on how it is obtained; for instance, *swarasa* extracted by direct squeezing of the drug has a *half-pala* dose, whereas *swarasa* obtained by other methods has a one-pala dose. One explanation for this might be that the first process makes *swarasa* more potent so that even people with *samanaya agni* (digestive power) may not be.

Acharya provided numerous examples of *swarasa* as well as its indications in terms of sickness. All of the *swarasa kalpanas*' medicine recommendations are readily available and simple to provide to patients. The yogas are described in accordance with the *Vyadhi Viprita Chikitsa* theme (having effect against sickness), for example, the combination of *Haridara Churna*, another *agreya* medicine for *Prameha* (diabetes) and *Aamalaki*, a regularly used drug for *Prameha*. Since *madhu* (honey) is created by combining numerous *dravyas*, according to *acharya Charaka*, it is the finest of the *yogavahi dravyas*, honey is the most frequently cited vehicle in all of the aforementioned *yogas*

(formulations). All of the aforementioned *yogas* also work to combat specific diseases.

CONCLUSION

The first and strongest of the *panchavidha kashaya kalpanas* is *swarasa kalpana*. Each chapter of *Acharya Sarangadhara's* book *Sharangadhara Samhita* contains a specific mention of each of these *kalpanas*. The entire first chapter of *Madhyama khanda* explains *swarasa kalpana*, including its definition, numerous methods of preparation, dosages, and varied formulations based on diseases. *Swarasa* has *guru* (efficacy) in each of the five *kalpanas*, making each *roga* (diseases) where it is most useful. Our challenge in the modern day is to use diverse manufacturing processes and preservatives to extend the shelf life of *Swarasa* goods.

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