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TITLE

**Pharmaceutico Analytical Study of *Kamdudha Rasa* -
An Ayurveda Formulation**

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Pharmaceutico Analytical Study of *Kamdudha Rasa* - An Ayurveda Formulation

ABSTRACT

BACKGROUND: *Kamdudha Rasa* is an Ayurvedic herbo-mineral preparation mentioned in classical text *Rasaamritam*. *Kamdudha Rasa* (KM) comes under the category of *Kharliya Rasayana*. *Bhavana* (levigation) is enumerated as one of the *Samskaras* (processes) which is helpful for the purpose of bringing about the desired alteration in mentioned drugs. **AIM:** To prepare *Kamdudha Rasa* and to analyze it by relevant analytical parameter. **METHODOLOGY:** Pharmaceutical processes were done in five phases, Preparation of *Guduchi Sattva* (powder of *Tinospora cordifolia*), Extraction of *Amalaki Swarasa* (fresh juice of *Embllica officinalis*), *Shodhan* (purification) of *Swarna Gairik* (SG) (Orche) with *Go-Ghrta* (cow ghee), *Bhavana* to *Shodhit Swarna Gairik* by fresh *Amalaki Swarasa* for 21 times and finally addition of *Shodhit* and *Bhavit* SG and *Guduchi Sattva* in mentioned quantity along with *Mishri* (sugar). This was followed by Physico-chemical Analysis of the finished product which included loss on drying, water soluble extractive value, alcohol soluble extractive value, pH, Particle size, bulk density, tap density and microbial load. **RESULTS:** *Kamdudha Rasa*, had analytical specifications such as 0.01% w/w loss on drying, 37.5% w/w water soluble extractive, 5.5% w/w alcohol soluble extractive, with pH 5.14. The trituration period was 6-7 hours a day for each *Bhavana*. At the end of *Bhavana*, the product showed all the features of *Subhavita Lakshana* (well levigated features). The final product yielded 38.88 % weight gain. HPTLC of *Guduchi Sattva* matched with the standards at 254 and 366 nm. **CONCLUSION:** *Bhavana* plays an important role in increasing the quality of the product and therapeutic efficacy of the drugs. It is recommended to store KM in dry, sterile and airtight container as it is hygroscopic in nature.

Keywords: *Bhavana*, *Kamdudha Rasa*, *Physico-chemical Analysis*

Introduction

Rasashastra and *Bhaisjya Kalpana* is a branch of *Ayurveda* which deals the herbo-mineral formulations.^[1] *Ayurveda*, the ancient health science includes formulations of plant, mineral or animal origin. The medicinal formulations prepared in mortar and pestle are known as *Kharliya Rasayana*. Most of the *Rasa Kalpa* require homogenous mixing of herbal and metalo-mineral ingredients for which, *Khaluca Yantra* (mortar & pestle) is mostly utilized. Hence nearly 80% of *Rasaushadhis* can be categorised under *Kharliya Rasayana* and *Kamdudha Rasa* (KM) too comes under the category of *Kharliya Rasayana*.^[2]

Bhavana (levigation) enumerated as one of the *Samskaras* (process) is helpful for the purpose of bringing about the desired alteration in mentioned drugs. Application of *Bhavana* process is not confined to *Shodhana* (purification) and *Marana* (incineration) or *Pishtikarana* (powdering) of *Rasashastryeya Dravyas*, but it is one of the important pharmaceutical processes used in preparing herbal formulations as well as in preparing various herbal and herbo-mineral formulations. The selection of particular *Bhavana Dravya* is important in the process of *Bhavana* as it enhances the qualities responsible for the same. For reduction in undesirable pharmacological actions of the drug also, *Bhavana Dravya* acts as antidote or detoxifier.^[1] KM is an Ayurvedic medicine with herbal and mineral ingredients. It is used in treating gastritis (*Amlapitta*) and bleeding diseases.^[3]

Amlapitta is a common disorder which requires a cost effective formulation and which can be prepared very easily. KM, mentioned by Vaidya Yadavji Trikamji Acharya in *Rasaamritam* contains easily available drugs which are cost effective too. Hence in the present study the formulation of KM has been prepared as per the above reference and its preliminary physico-chemical analysis has been carried out.^[4]

KM, currently marketed is prepared as per the reference of *Rasa Yoga Sagar*. Those contain *Mouktik Bhasma*, *Praval Bhasma*, *Shankha*, *Bhasma Shukti Bhasma*, *Gairika* and *Guduchi Sattva*. In the present study undertaken KM was prepared as per the reference mentioned in *Rasaamritam*.

Materials and Methods

Collection of raw drugs:

Fresh *Guduchi* was procured from Bhavmistra Vatika of Mahatma Gandhi Ayurved College, Hospital and Research Centre, Salod (H), Wardha. *Amalaki* fruits, *Gairik* and *Mishri* were procured from local market.

Authentication of raw drugs:

Authentication of *Guduchi* and *Amalaki* fruits was done by the *Dravyaguna* department of Mahatma Gandhi Ayurved College, Hospital and Research Centre, Salod (H), Wardha. Authentication of *Gairika* and *Mishri* was done from Dattatraya Ayurved Rasashala, of the above institute.

Observation & Results

The study undertaken was divided into two phases viz., Pharmaceutical and Analytical study.

Pharmaceutical Study

In this phase of study, following pharmaceutical processes were carried out-

- I. Preparation of *Guduchi Sattva*
- II. Extraction of *Amalaki Swarasa*
- III. *Shodhana* of *Swarna Gairika* with *Go-Ghrita*
- IV. *Bhavana* to *Shodhit Swarna Gairik* by fresh *Amalaki Swarasa* 21 times
- V. Preparation of *Kamdudha Rasa*

I. Preparation of *Guduchi Sattva*

Physical impurities from *Guduchi* stems were removed and washed with water. Stem was made into pieces of 1-2 inches and crushed thoroughly to convert into slimy paste. This mass was further mixed with mentioned quantity (six times) of potable water in a stainless steel vessel and kept for soaking overnight (12 hrs) and covered with cotton cloth. On the next day this mass was macerated thoroughly in water for about 1 hour, filtered slowly through a clean four folded cotton cloth. The liquid was kept aside for 4 hrs for settlement. The supernatant liquid was decanted carefully. The sediment was shifted in to a tray and air dried under running fan.

II. Extraction of *Amalaki Swarasa*

6 kg of fresh *Amalaki* fruits were taken and cleaned well. *Swarasa* was prepared but addition of water was required to get better yield for which 300 ml potable water was added. The final juice obtained was 4.5 litre.

III. *Shodhan* of *Swarna Gairika (Orche)* with *Go-Ghrita*

First, *Gairika* was made into fine powder then *Go-ghrit* in 1/4th quantity was added and roasted on (low flame) moderate fire till it turns to brick red colour.

IV. *Bhavana* to *Shodhit Swarna Gairika*

Amalaki Swarasa was added in the *Shodhit Swarna Gairik* till all the *Swarasa* was soaked by *Gairika* and *Kalka* (paste) like consistency of *Swarna Gairika* was obtained. The details of quantity of *Amalaki Swarasa* and the duration of *Bhavana* is mentioned in the table no.1.

V. Preparation of *Kamdudha Rasa*

KM was prepared according to *Rasamritam*. To *Amalaki Swarasa Bhavit Swarna Gairika*, powdered and dried *Guduchi Sattva* was added in prescribed quantity which was equal to *Shudha Swarna Gairika*. *Mishri* was powdered and added to the mixture and mixed well. After proper mixing of all ingredients the weight of KM was 1200 gm (Table no.2). Thus prepared KM was stored in a airtight container.

Table no. 1: Quantity of *Amalaki Swarasa* required for *Bhavana* of *Shodhit Swarna Gairika* (for 21 days)

Day of <i>Bhavana</i>	Quantity of <i>Swarasa</i>	Duration of <i>Bhavana</i>
1 st	2300ml	2hrs
2 nd	100ml	6hrs
3 rd	100 ml	5hrs
4 th	100 ml	4hrs
5 th	1200ml	5hrs
6 th	200ml	4hrs
7 th	200ml	4hrs
8 th	1100ml	4hrs
9 th	200ml	6hrs
10 th	250ml	5hrs
11 th	200ml	7hrs
12 th	200ml	4hrs
13 th	100ml	6hrs
14 th	300ml	7hrs
15 th	200ml	6hrs
16 th	200ml	6hrs
17 th	200ml	6hrs
18 th	300ml	7hrs
19 th	100 ml	5hrs
20 th	200ml	6hrs
21 th	200ml	6hrs
Total	7950ml	110hrs

Table no.2: Ingredients of *Kamdudha Rasa*

Sr. no	Ingredients	Quantity
1	<i>Amalaki Swarasa</i> <i>Bhavit Swarna Gairika</i>	300 gm
2	<i>Guduchi Sattva</i> (<i>Tinospora cordifolia</i>)	300 gm
3	<i>Mishri</i> (Sugar candy)	600 gm
	Total quantity	1200 gm

Analytical Study

In the present study, analytical evaluation of *Kamdudha Rasa* was carried out to develop preliminary standards. The samples were analysed first of all on the basis of organoleptic characters. The organoleptic characters involved the testing of samples using sensory organs. These are four subjective parameters – Colour, Taste, Odour, Touch. Organoleptic features of samples are as shown in Table no.3.

Table no. 3 Organoleptic characters of *Kamdudha Rasa*

Parameters	<i>Kamdudha Rasa</i>
Colour	Ash colour
Taste	<i>Madhur, Amla</i>
Odour	<i>Ghrita Gandhi</i>
Touch	Smooth

Physico-chemical parameters analyzed were loss on drying, Water soluble extractive value, Alcohol soluble extractive value, pH, Particle size, Bulk Density and Tap Density. The results are mentioned in Table no.4. The Microbial Load of *Kamadudha Rasa* was within normal level (Table no.5). HPTLC profile of *Guduchi Sattva* was visualised at 254, 366 nm and in daylight. 4 peaks at 254 nm and 3 peaks at 366 nm were visualised (Table no.6. & Figure no.1).

Table no. 4 Result of physico-chemical analysis of *Kamdudha Rasa*

Parameter	<i>Kamdudha Rasa</i>
Loss on drying at 105° C.	0.01% (Gain in weight)
Water Soluble Extractive Value	37.5%
Alcohol Soluble Extractive Value	5.5
pH	5.14
Particle size	100
Bulk density	0.4 gm/ml
Tap density	0.3921gm/ml

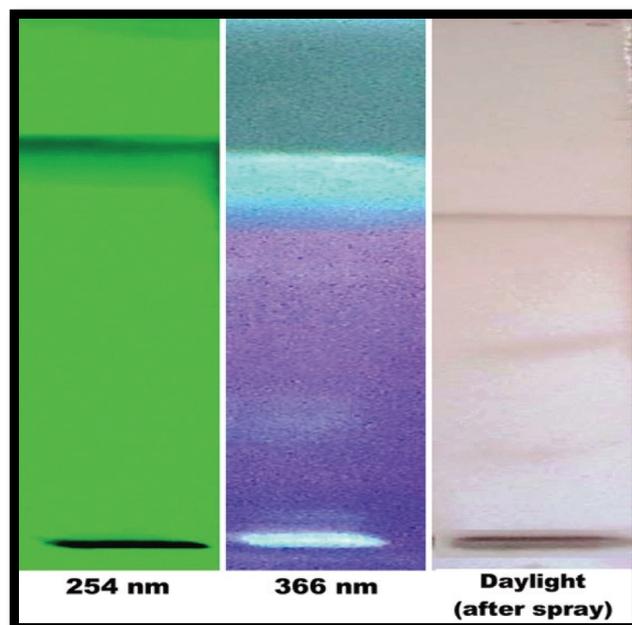
Table no.5: Results of Microbial load in *Kamdudha Rasa*

Test Parameters	Result	Limits
Total Microbial Count		100 CFU/gm
Total Bacterial count	Absent	
Total Fungal Count	Absent	
Pathogens		Should be Absent / 10 gm
E. Coli	Absent	
Salmonella spp	Absent	
Pseudomonas aeruginosa	Absent	

Table no.6: HPTLC profile of *Guduchi Sattva*

Under 254 nm		Under 366 nm	
No. Of peaks (spots)	Rf values	No. Of peaks (spots)	Rf values
4	0.04	3	0.04
	0.50		0.50
	0.58		0.56
	0.73		

Fig. No.1 HPTLC of *Guduchi Sattva*



Discussion

Bhavana Samskara is one of the pharmaceutical processes which has wide applicability in today's modern era of drug manufacturing for its various merits. The merits include increased patient compliance due to acceptable dosage form, acceptable appearance and odour of drug, reduced dosage, minimum side effects and higher palatability. [5] The potency of drug is to be increased or decrease as per the need by adopting various *Samskara* which may be done with the help of *Agni*, *Toya*, *Agnitoya Sannikarsha* etc. among them *Bhavana* is most important process to enhance the therapeutic efficacy of a drug. On this basis *Shodhit Swarna Gairika* was given *Bhavana* with fresh *Amalaki Swarasa* for twenty-one times which resulted in increase of weight of the drug. The *Swarasa* required for the initial *Bhavana* was more (2100 ml) than the subsequent *Bhavana* (200 ml). The reason behind the decreased amount of liquid required for subsequent *Bhavana* can be elicited by reduced porosity of powder by process of trituration. Other reason for this may be decreased particle size which lowered the permeability. The porosity or pore volume of a material has been defined as the total proportion of air spaces contained between the solid particles of which the body is composed while permeability is restricted to interconnecting voids. [5]

The organoleptic characters being a subjective nature cannot be evaluated numerically for reproducibility in the results. Significant colour change was observed in KM as compared to original drugs. It may indicate the absorption of contents from *Amalaki Swarasa* during *Bhavana* and addition of *Guduchi Sattva* and *Mishri*. Taste was *Madhur* (sugar) mainly and *Amla Rasa* (sour) additionally. It was found to be smooth in touch, twenty-one *Bhavana* with *Amalaki Swaras* might have resulted in fineness of KM. For the analysis of moisture content, the drug was kept for loss on drying at 105^o C. The loss on drying in the sample was 0.5%. The water soluble extractive value was 36.2 % and Alcohol soluble extractive value of KM was 5.5 %. This indicates that the *Amalaki Swaras* used for *Bhavana Dravya* imparted its active ingredients in KM. So it can be understood that the *Bhavana* plays an important role in increasing quality of the product. The residue remaining after incineration is the ash content of the drug which simply represents inorganic salts, naturally occurring in drug or adhering to it or deliberately added to it as form of adulteration. The total ash is of importance and indicates to some extent the amount of care taken in the preparation of the drug. In the determination of total ash values the carbon must be removed at low temperature (450^oC) because alkali and chlorides, which are volatile at high temperature, would otherwise be lost.

The total ash usually indicates mainly carbonates, phosphates, silicates and silica. [7] In KM, no change was observed when kept in muffle furnace at 450^o C, which may be due to oxidized form of *Gairika* used. The pH value of KM expresses the degree of acidity or alkalinity of a sample solution. The pH value of KM was 5.14, indicating. Particle size of the drug affects its absorption and the rate of absorption can be assessed by determining the particle size of the drug. The Particle size of KM was 100. Bulk density of the KM was 0.4 gm/ml which indicates that the particle size was bulky and did not allow much space between particles.

Microbial load of all drug samples were having microbial content under limit which is shown in table no.5. No any pathogens were detected in KM.

Chromatographic study of *Guduchi Sattva* was carried out under 254 and 366 nm UV to establish the finger printing profile. It showed Rf values of 0.04, 0.50, 0.58, 0.73 at under 254 nm and at 366 nm 3 bands were observed at Rf value of 0.04, 0.50 and 0.56.

As *Guduci Sattva* was observed to have hygroscopic nature, it readily gains moisture if kept exposed to environment, which in turn may promote microbial growth in it. Thus, it is recommended to store it in dry, sterile and airtight containers.

Conclusion

Shodhana of *Gairika* with *Goghrit* results in conversion of its biophysical properties into more effective therapeutic activities. In the process of *Bhavana*, *Amalki Swarasa* required for the initial *Bhavana* was more (2100ml) than the subsequent *Bhavana* (200ml) and there was a total yield of 38.88% weight gain. Hence, we can conclude that *Bhavana* plays an important role in increasing quality of the product without compromising its physicochemical properties.

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