



Research Article

PREPARATION AND PHYSICO-CHEMICAL ANALYSIS OF AGNIKUMARA RASA (B.R JWARADHIKARA) PREPARED WITH VARIATION IN NUMBER OF BHAVANA (LEVIGATION)

Keerthana Madappattu^{1*}, R Rajam²

¹PG Scholar, ²Professor & HOD, Rasasastra & Bhaishajya Kalpana Department, Govt. Ayurveda College, Thiruvananthapuram, Kerala, India.

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ABSTRACT

Rasasastra is a specialised branch of Ayurveda that deals with *Rasa dravyas* which include *Visha dravyas* used for the preparation of therapeutically potent medicines. *Agnikumara rasa* of *Bhaishajya Ratnavali Jwara adhihara* reference is one such herbal formulation that contains a major proportion of *Shodhita Vatsanabha* and other ingredients of *Maricha*, *Vacha*, *Kushta*, *Mushta* and *Ardraka*. It is a *Kharaliya yoga* (a formulation prepared in mortar) prepared by *Bhavana samskara* (levigation). As the number of levigation is not mentioned, three samples were prepared by doubling the number of *Bhavana* (levigation) of the preceding sample and physico-chemical analysis of these samples was done and compared. In *Charaka samhita Vimanasthana*, *Acharya* has explained the relevance of *Samskara* for imparting new *Gunas* (properties) and thereby potentiating the drug. The present study was done to identify a better analytical profile among the samples. It was found that some of the analytical parameters like hardness, disintegration time were modified with *Bhavana* which may increase the bioavailability of the drug and thereby its therapeutic potency.

INTRODUCTION

In *Rasasastra*, there are four types of preparations based on the procedure. These include *Kharaliya*, *Parpati*, *Pottali* and *Kupipakwa* preparations. Formulations are prepared in *Kharaliya* by grinding in a mortar known as *Khalwa*. The specialty of such preparations lies in binding different varieties of drug into a single molecular form and minimizing the dose and making them more effective in action.

Agnikumara rasa^[1] is one such *Kharaliya* formulation mentioned in various Ayurvedic texts. It has references of herbo-mineral formulation and herbal formulation. The formulation mentioned in this study is a herbal formulation mentioned in *Bhaishajya Ratnavali Jwaradhikara*.

Though variation is observed among these, there is a resemblance in almost all formulations from the perspective of levigation. There are around 31 references^[2] of *Agnikumara rasa* in various textbooks and three formulations of the same name are found in *Bhaishajya Ratnavali* in the chapters of *Jwara adhihara*, *Agnimandya adhihara* and *Grahani adhihara*.

The formulation selected in this paper contains a major ingredient of *Shodhita Vatsanabha* (50% of purified *Aconitum ferox*) and other ingredients of *Maricha* (*Piper longum*), *Vacha* (*Acorus calamus*), *Kushta* (*Saussurea lappa*) and *Mushta* (*Cyperus rotundus*) (12.5% each). It is levigated in *Ardraka swarasa* (juice of *Zingiber officinale*). As per the reference of the formulation, the duration and number of *Bhavana* (levigation) are not mentioned, this paper details the preparation of three samples of *Agnikumara rasa* by doubling the number of *Bhavana* (levigation) done to the preceding sample and thereafter doing the physicochemical analysis of the respective samples. This helps to analyse the modifications that happened to the samples through the variation in the process.

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AIMS AND OBJECTIVES

The present study aimed to prepare and do the physico-chemical analysis of three samples of *Agnikumara rasa* (B.R Jwaradhikara) prepared with variation in the number of *Bhavana* (levigation).

MATERIALS AND METHODS

Preparation of three samples of *Agnikumara rasa* as per the reference in *Bhaishajya Ratnavali Jwaradhikara* by doubling the number of *bhavana* (levigation) of the previous sample. i.e., the three samples are; *Agnikumara rasa* with one *Bhavana* (levigation) done, *Agnikumara rasa* with twice *Bhavana* (levigation) done and *Agnikumara rasa* with quadruple times of *Bhavana* (levigation) done represented by sample 1, sample 2 and sample 3 respectively.

Pre-procedures**Collection, Identification and cleaning of the ingredients**

The ingredients namely *Vatsanabha*, *Vacha*, *Kushta* and *Mushta* were bought from a registered drug dealer at Belgaum, Karnataka. Fresh *Ardraka* and dried *Maricha* were collected from cultivators at Kottayam, Kerala.

The drugs were identified and authenticated by experts at Dravyaguna department of Government Ayurveda College, Thiruvananthapuram. The collected drugs were washed and dried properly before use.

***Vatsanabha shodhana* (purification of *Aconitum ferox*)**

Shodhana (purification) in *Gomutra* (cow's urine) as per *Rasa Tarangini* reference^[3].

Ingredients and Quantity

Raw *Vatsanabha* (raw sample of *Aconitum ferox*)- 498gm

Gomutra (cow's urine)- as sufficient.

Preparation of *Agnikumara rasa***Table 1: Quantity of ingredients**

| S.No | Ingredients | Latin name | Family | Part used | Quantity (fine powder) |
|------|--------------------------|------------------------------------|---------------|-----------|------------------------|
| 1. | <i>Shudha Vatsanabha</i> | <i>Aconitum ferox</i> Wall. | Ranunculaceae | Root | 81 grams |
| 2. | <i>Vacha</i> | <i>Acorus calamus</i> Linn. | Araceae | Rhizome | 20.5 grams |
| 3. | <i>Mushta</i> | <i>Cyperus rotundus</i> Linn. | Cyperaceae | Tubers | 20.5 grams |
| 4. | <i>Maricha</i> | <i>Piper nigrum</i> Linn. | Piperaceae | Fruit | 20.5 grams |
| 5. | <i>Kushta</i> | <i>Saussurea lappa</i> C.B. Clarke | Asteraceae | Root | 20.5 grams |
| 6. | <i>Ardraka</i> | <i>Zingiber officinale</i> Roscoe | Zingiberaceae | Rhizome | 20.5 grams |

Preparation

All the ingredients from 1 to 5 were crushed and powdered and sieved through sieve number 85. These were then mixed homogeneously and added to a *Khalwa yantra* and added with sufficient quantity of *Ardraka swarasa* (juice of *Zingiber officinale* Roscoe) till it was soaked completely. *Bhavana* (levigation) was carried out till a pill-rolling consistency of the paste was obtained and then pills of 125mg were rolled as per the reference and dried under shade. The process was repeated with twice and quadruple times of *Bhavana* (levigation) and thereby three samples of *Agnikumara rasa* were prepared.

The following analysis was conducted on the three samples

Total ash, acid-insoluble ash, alcohol-soluble extractive, water-soluble extractive, loss on drying, pH at 1%, qualitative analysis of pills like uniformity of weight, hardness, friability, disintegration time and preliminary phytochemical analysis like test for phenols, alkaloids, steroids, flavonoids, tannins and saponins.

FIGURES**a) Raw *Vatsanabha*****b) *Vatsanabha* cut into small pieces**



c) Cow's urine c) Fine powder of purified *Vatsanabha*

Fig. no. 1: Procedures of *Vatsanabha shodhana*



a) Raw *Vatsanabha*



b) *Vacha*



c) *Maricha*



d) *Kushta*



e) *Ardraka*



f) *Mushta*

Fig. no. 2: Ingredients of *Agnikumara rasa* (B.R Jwaradhikara)



a) Homogeneous mixture of finely powdered ingredients



b) Soaked in fresh ginger juice



c) Sample 1



d) Sample 2



e) Sample 3

Fig. no. 3: Preparation of three samples *Agnikumara rasa*

RESULTS**Results of Vatsanabha shodhana**

225gm of purified *Vatsanabha* (purified *Aconitum ferox*) obtained.

Results of Agnikumara rasa prepared**Table 2: Results of quantity of Agnikumara rasa prepared**

| S.no. | Samples | Sample detailed | Quantity |
|-------|----------|--|----------|
| 1. | Sample 1 | <i>Agnikumara rasa</i> of one <i>Bhavana</i> (levigation) | 58.42g |
| 2. | Sample 2 | <i>Agnikumara rasa</i> of twice <i>Bhavana</i> (levigation) | 42.13g |
| 3. | Sample 3 | <i>Agnikumara rasa</i> of quadruple times of <i>Bhavana</i> (levigation) | 110.11g |

Results of Analysis of Agnikumara rasa**Table 3: Organoleptic characters of Agnikumara rasa**

| Characters | Sample 1 | Sample 2 | Sample 3 |
|------------|------------------------------|---|---|
| Colour | Greenish brown | Greenish brown | Greenish brown |
| Odour | Ginger- <i>Gomutra</i> smell | Strong ginger with <i>Gomutra</i> smell | Stronger ginger with faint <i>Gomutra</i> smell |
| Taste | Pungent-bitter | Pungent-bitter | Pungent-bitter |
| Touch | Soft | Soft & fine | Soft & fine |

Table 4: Physico-chemical analysis of Agnikumara rasa

| S.no. | Parameters | Sample 1 | Sample 2 | Sample 3 |
|-------|----------------------------|------------------------|---------------------|-----------------------|
| 1. | Total ash | 6.96% | 7.62% | 9.05% |
| 2. | Acid-insoluble ash | 1.95% | 2.40% | 2.70% |
| 3. | Alcohol-soluble extractive | 11.29% | 11.34% | 13.11% |
| 4. | Water-soluble extractive | 13.05% | 13.96% | 16.34% |
| 5. | Loss on drying at 110°C | 9.95% | 8.89% | 8.61% |
| 6. | pH at 1% | 5.93 | 4.33 | 4.11 |
| 7. | Uniformity of weight | Within limit of 7.5 | Within limit of 7.5 | Within limit of 7.5 |
| 8. | Hardness | 5.67 kg/m ² | 5 kg/m ² | 3.33kg/m ² |
| 9. | Friability | 0.82 | 0.39 | 0.38 |
| 10. | Disintegration time | 1 min 20 sec | 1 min 5 sec | 49 sec |

Table 5: Preliminary Phytochemical analysis of Agnikumara rasa

| S.no | Phytochemicals | Test | Sample 1 | Sample 2 | Sample 3 |
|------|----------------|---------------|----------|----------|----------|
| 1. | Alkaloids | Dragandroff's | + | + | + |
| 2. | Tannins | | + | + | + |
| 3. | Phenols | | + | + | + |
| 4. | Flavonoids | Shinoda test | + | + | + |
| 5. | Steroids | | + | + | + |
| 6. | Saponins | | - | - | - |

DISCUSSION

Vatsanabha, *Maricha*, *Vacha*, *Kushta* and *Mushta* are the ingredients of *Agnikumara rasa* of *Bhaishajya Ratnavali Jwaradhikara* in the ratio of 4:1:1:1:1 respectively. Similar reference is also obtained in *Sahasrayoga* and *Basavarajeeyam Prathama Prakarana*. Its antipyretic effect has been studied in an animal model^[4]. The safe dose of the

formulation from a previous study is found to be 1 *Rathi* (125mg).^[5] It has various indications such as in *Jwara* (fever) respiratory conditions like *Swasa* (dyspnoea), *Kasa* (cough), *Pinasa* (catarrh) and *Prathishaya* (common cold), digestive disorders like *Agnimandya* (reduced digestive fire), *Grahani* (sprue), *Atisara* (diarrhea) and in inflammatory conditions also.

Preparation of Formulation

There was a net loss of 52% of *Vatsanabha* after *Shodhana*. From 225g *Shodhita Vatsanabha*, 145gm of fine powder was obtained. As there is no reference for how many times *Bhavana* (levigation) is to be given, the formulation was prepared in three samples with once, twice and quadruple times of *Bhavana* (levigation). Doubling of *Bhavana* with respect to the preceding sample was done with an expectation that this could bring a well differentiation in the analytical parameters as *Bhavana* can reduce the particle size of the formulation and in turn increase the bioavailability of the drug and thereby increasing absorption and speedy action of the drug.^[6] Also, from previous research works, it is proved that it is a process that affects the physico-chemical and biological properties of a dosage form.^[7] It took 3 hours, 6 hours 15 minutes, and 13 hours 27 minutes for the preparation of sample 1, sample 2 and sample 3 respectively, and 540ml, 120ml, and 145ml of *Ardraka swarasa* were required for the preparation. The final quantity of each of the samples is shown in [Table no.2].

Organoleptic parameters of each of the samples were performed [Table no.3]. The specific odour may be due to the aromatic components present in the *Shodhana drava - Gomutra* and the *Bhavana drava - Ardraka swarasa*. The consistency became soft and fine with *Bhavana* (levigation).

Physico-chemical Parameters

There were some differences in some of the parameters of the three samples prepared. There was a slight increase in total ash values among the samples. Total ash indicates the presence of inorganic contents in the sample. But Acid-insoluble ash values of the samples were more or less in the same range. The Acid-insoluble ash value indicates the percentage of insoluble inorganic content and thereby indicates the physiological availability of the drug. There was only a slight increase in alcohol-soluble extractive values compared to the water-soluble extractive values among the samples. This indicates that more water-soluble principles were added. Loss on drying (LOD) of sample 1 is higher compared to other samples, which were in a similar range. This may be due to the greater amount of *Ardraka swarasa* (540ml) required compared to other samples. The pH of all the samples were acidic and became more acidic than the preceding sample which may be due to the acidic pH of ginger juice. This indicates the site of absorption of the medicine is the stomach.

Uniformity of weight for all samples was within the limits of ± 7.5 . The highest weight was 141g and lowest 119g. Hardness of the samples were 5.67kg/m², 5kg/m² and 3.33kg/m² for sample 1, sample 2 and

sample 3 respectively. The hardness was decreased which may be due to the constant grinding in liquid media that turned the material soft.^[8] As the hardness of the *Vati* decreases, the disintegration time also decreases. The disintegration time obtained for the samples was 1 min 20 sec, 1 min 5 sec, and 49 sec. The friability of all the samples was within the range of 0.8. The binding capacity and hygroscopicity of liquid media especially its quantity may alter the parameters of pills such as hardness, disintegration, and friability which ultimately interferes with the kinetics of the final product in its absorption and thus its therapeutics.^[9]

Phytochemicals tannins, phenols, flavonoids, alkaloids, and steroids were present in all the samples. Saponins were found absent in all. The presence of tannins, alkaloids and phenolic compounds may be responsible for the potent antipyretic action of the formulation.^[10] Similarly, flavonoids proved to be antimicrobial, anti-inflammatory, and antioxidant^[11]. The presence of steroids shows the anti-inflammatory nature of the formulation.^[12] Further, to analyse the changes that happened to the constituents of the ingredients by the process of *Bhavana*, chromatographic analytical methods can be done.

CONCLUSION

Agnikumara rasa of *Bhaishajya Ratnavali Jwaradhikara* is a potent drug having various indications of *Jwara*, respiratory disorders like *Pinasa*, *Prathishyaya*, *Kasa*, and *Swasa*, digestive disorders such as *Agnimandya*, *Grahani*, *Atisara*. As the number and duration of the *Bhavana* (levigation) are not mentioned in the reference, three samples of the formulation were prepared namely *Agnikumara rasa* of one *Bhavana* (sample 1), *Agnikumara rasa* of twice *Bhavana* (sample 2) and *Agnikumara rasa* of quadruple times of *Bhavana* (sample 3). The physicochemical parameters of the samples were analysed and compared. It was found that some of the parameters were modified in the samples. The hardness of the samples was reduced which reduced the disintegration time. As the disintegration time is reduced, the bioavailability of the drug will be increased and thus quick action of the drug is expected.

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*Address for correspondence

Dr. Keerthana Madappattu

PG Scholar,

Department of Rasasastra &

Bhaishajya Kalpana,

Govt. Ayurveda College,

Thiruvananthapuram, Kerala.

Ph no: 9496003128

Email:

keerthanamadappattu@gmail.com

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