



## Pharmaceutical Standardization

# Standard manufacturing procedure for *Laghu Malini Vasanta Rasa* in context of *Bhavana* (levigation)

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### Abstract

**Introduction:** *Laghu Malini Vasanta* (LMV) *Rasa* is a well-known *Vasanta Kalpa* (formulation). As per reference of *Yoga Ratnakara*, *Rasaka* and *Maricha* are chief ingredients in 2:1 proportion. *Bhavana* (levigation) is said to be given first with *Navaneeta* (freshly prepared cow's butter) and then with *Nimbu Swarasa* (lemon juice) until *Ghritha Vimukta* stage is reached. Quantity of *Bhavana Dravya* (levigating media) and duration of levigation are not mentioned. **Aims:** To develop standard manufacturing procedure of LMV *Rasa*. **Materials and Methods:** The study was carried out in two stages - preparation of *Yashada Bhasma* and preparation of LMV *Rasa* and its tablet. A pilot study was carried out to fix quantity of cow's butter as levigation media. Based on results of the pilot study, LMV *Rasa* was prepared in two groups, that is, LMV 50 (LMV *Rasa* - prepared with weight of freshly prepared butter in 50% quantity of total ingredients) and LMV 75 (LMV *Rasa* prepared with weight of freshly prepared butter in 75% quantity of total ingredients). Complete drying of levigated mass and minimal spreading of fatty portion on filter paper was considered as the end point of levigation. Tablets of both samples were prepared by adding *Pippali* and honey in it and analyzed for their quality control parameters. **Results:** Twenty-eight hours duration of repeated levigation was required in LMV 50 which was prolonged up to 48 h in batch carried out in rainy season. In LMV 75, comparatively maximum duration of 54 h was required for levigation which was prolonged in the rainy season to 88 h. In both groups, lemon juice required for repeated levigation was 10 times of quantity of butter added initially. **Conclusion:** From pharmaceutical point of view, preparation of LMV *Rasa* tablets with quantity of butter in 50% of total ingredients is more convenient.

**Key words:** *Bhavana*, *Laghu Malini Vasanta Rasa*, *Rasaka*

## Introduction

*Laghu Malini Vasanta* (LMV) *Rasa*, a renowned *Vasanta Kalpa*, comes under *Kharaliya Rasayana* that is drugs prepared by trituration in mortar and pestle. Use of processed metal or mercurial compound has been advised in least doses that too with specific herbal drugs as *Anupana* (adjuvant) for a specific period. Herbal drugs and media used in *Kharaliya Rasayana* induce the organic quality in the final product for its better therapeutic efficacy and least toxic effect. It also helps in target specific action of drug. In Ayurvedic Formulary of India (AFI), LMV *Rasa* has been cited under *Rasa Yoga* section. As per the reference in *Yoga Ratnakara*, *Rasaka* and *Maricha* are the

basic ingredients in 2:1 proportion. *Navaneeta* (freshly prepared butter) and *Nimbu Swarasa* (lemon juice) are the levigating media. The first levigation is to be carried out with *Navaneeta* followed by lemon juice until levigated mass become *Ghritha Vimukta* (devoid of greasiness).<sup>[1]</sup>

*Rasaka* has been mentioned as the chief ingredient in the formulation. AFI in the context of preparation of this formulation suggests to use *Yashada Bhasma* in case of non-availability of genuine *Rasaka*;<sup>[2]</sup> hence, here an attempt has been made to standardize the formulation with *Yashada*

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*Bhasma* as chief ingredient, also to determine the proportion of freshly prepared cow's butter and lemon juice and period of repeated levigations with lemon juice.

## Materials and Methods

The whole pharmaceutical study was arranged in two unit processes - preparation of *Yashada Bhasma* and preparation of *LMV Rasa* and its tablet.

### Collection and authentication of raw materials

Raw *Yashada* of Binani mark in metal sheet form, *Tila Taila* (sesame oil), *Maricha* (*Piper nigrum* Linn. fruits), and *Pippali* (*Piper longum* Linn. fruits) were procured from Pharmacy, Gujarat Ayurved University, Jamnagar. *Kulattha* (*Dolichos biflorus* Linn.) seeds, *Nimbu*, and Amul gold brand milk and honey were purchased from local market of Jamnagar. After collection, *Yashada* was authenticated as per classical *Grahya Lakshana*<sup>[3]</sup> (acceptable qualities).

*Takra* (freshly prepared buttermilk),<sup>[4]</sup> *Kanji* (sour gruel),<sup>[5]</sup> *Kulattha Kwatha* (decoction of *D. biflorus* seeds),<sup>[6]</sup> preparation of *Yashada Bhasma*,<sup>[7]</sup> and extraction of freshly prepared cow's butter were carried out as per classical reference. Equipment specification needed to develop SMP of *LMV Rasa* is given in Table 1.

### Preparation of *Yashada Bhasma*

For preparation of *Yashada Bhasma*, first *Samanya Shodhana* of *Yashada* was carried out by quenching it in five media successively namely *Tila Taila*, *Takra*, *Kanji*, *Gomutra* (cow's urine), and *Kulattha Kwatha*; with three consecutive quenching in each media. *Shodhita Yashada* was then subjected to *Jarana* for which raw *Apamarga* (*Achyranthes aspera* Linn.) *Panchanga* (entire plant) was used as *Avapa* media. *Kumari* (*Aloe barbadensis* Mill.) *Swarasa* (leaf juice) was used as *Bhavana Dravya* (levigation media) to prepare *Chakrikas* (pellets). Successive *Putas* were given to *Jarita Yashada* in electric muffle furnace (EMF) with 650°C as peak temperature until the attainment of chief desired characteristics (CDC) of *Yashada Bhasma* – white in color with a yellowish tint.

### Preparation of *Laghu Malini Vasanta Rasa*

For the preparation of *LMV Rasa*, a pilot study was carried as per reference of AFI<sup>[2]</sup> to find out actual proportion of freshly prepared butter, lemon juice required to neutralize the fat content and also to determine the duration of levigation. Details of ingredients used for the pilot study are listed in Table 2. First *Yashada Bhasma* was taken in porcelain mortar and pestle (*Khalva Yantra*). Fine powder of *Maricha* (85#) was added to it, and levigation process was done till mixture became homogenous. Freshly prepared butter was added little by little till whole mixture became moist. Levigation up to 6 h was carried out until mixture turned into doughy consistency. Lemon juice was added in repetitive manner to the mass, and levigation was carried out simultaneously in mechanical wet grinder until greasiness of mixture disappeared.

On the basis of inferences from the pilot study, *LMV Rasa* was prepared in two samples [Figure 1]. These samples were identified as *LMV 50* (*LMV Rasa* prepared with weight of freshly prepared butter in 50% quantity of total ingredients) and *LMV 75* (*LMV Rasa* prepared with weight of freshly prepared butter in 75% quantity of total ingredients).

To assess *Ghritha Vimukta* (devoid of unctuousness) stage, two criteria were fixed. Complete drying and minimal or no spreading of oily layer were assessed by spreading test. In this test, 20 g of sample was separated from the mixture at regular interval of 6 h of levigation, respectively. Ten grams of this sample was kept for drying, and remaining 10 g was made into pellet form kept over Whatman filter paper no. 40 to assess fat content of mass by virtue of spreading. Each sample was observed for 48 h. Levigation was continued until complete drying of the sample and minimal or no spreading of oily portion on filter paper which was assessed by spreading test [Figure 2]. The whole mixture was then kept in an oven at 50°C until it got completely dried.

### Preparation of *Laghu Malini Vasanta Rasa* tablets

*LMV Rasa* and *Pippali Churna* in equal proportion were taken and mixed homogeneously. This mixture was transferred to

**Table 1: Equipment specification for the preparation of *Yashada Bhasma* and *LMV Rasa***

| Equipment   | Specification  |
|---|--|
| For <i>Shodhana</i> of <i>Yashada</i>                                     |  |
| Iron ladle  | Length: 89.5 cm, diameter of body: 15 cm, depth: 5 cm, capacity: 800 ml  |
| <i>Pithara Yantra</i>   | Body: Height: 30 cm, diameter: 17 cm<br>Lid: Shape: Conical, diameter of the hole: 2 cm, capacity: 5800 ml   |
| For <i>Jarana</i>   |  |
| Iron ladle  | Length: 89.5 cm, diameter of body: 15 cm, depth: 5 cm; capacity: 800 ml  |
| <i>Lauha Kadhai</i>   | Diameter: 57.5 cm, depth: 23.5 cm, circumference: 183.5 cm   |
| For preparation of <i>Yashada Bhasma</i> and <i>LMV Rasa</i>              |  |
| Porcelain <i>Khalva</i>   | Mortar: Inner diameter: 20.5 cm<br>Outer diameter: 24.5 cm<br>Depth: 12.5 cm<br>Inner circumference: 62 cm<br>Outer circumference: 75 cm   |
| Butterfly matchless table top wet grinder with three conical roller stone | Depth: 16 cm, diameter: 26 cm, roller stone: Outer diameter of middle roller stone: 9 cm, height of middle roller stone: 8 cm, outer diameter of lateral roller stone: 15 cm, height of lateral roller stone: 9 cm, capacity: 2 kg |

LMV: *Laghu Malini Vasanta*

stainless steel (SS) vessel. In LMV 50%, 30% honey was added as binding agent and converted into granules with the help of a 20# sieve. Prepared granules taken into a SS tray and kept in the oven at 50°C until complete drying. Granules were passed through a tablet punching machine to prepare tablets of 325 mg [Figure 3]. A 16 station rotary tablet machine was used for tableting. Details of equipment and their respective specifications used for preparation of tablet are listed in Table 3. The tablets were collected, weighed, and stored in air tight sterile glass containers along with small pieces of cotton in them. In LMV 75%, the same procedure was followed with 20% honey as a binding agent.

**Table 2: Details of ingredients of LMV *Rasa* for pilot study**

| Drug             | Botanical name            | Part used     | Proportion |
|------------------|---------------------------|---------------|------------|
| <i>Yashada</i>   | Calcinated zinc           | <i>Bhasma</i> | 1 part     |
| <i>Maricha</i>   | <i>Piper nigrum</i> Linn. | Fruit         | 2 parts    |
| <i>Navaneeta</i> | Freshly prepared butter   |               | Q.s.       |
| <i>Nimbu</i>     | <i>Citrus acida</i> Linn. | Fruit         | Q.s.       |

LMV: *Laghu Malini Vasanta*

## Observations and Results

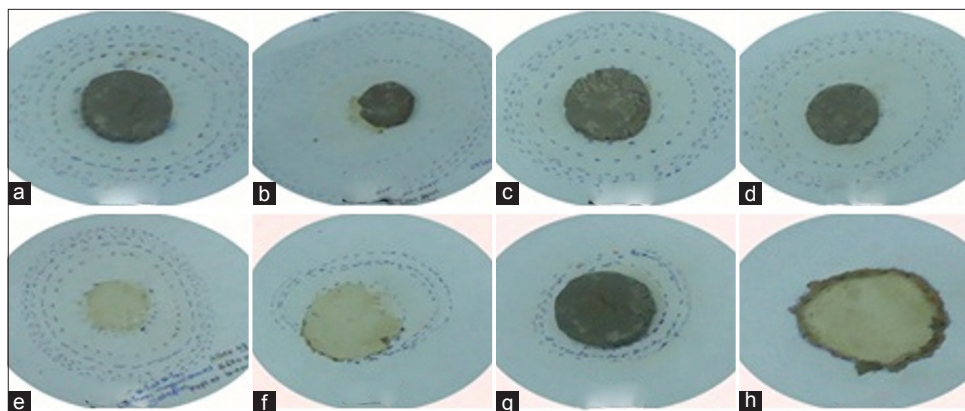
Quantitative analysis of raw *Yashada* revealed the presence of 99.99% pure zinc in the sample. Total five *Putas* were required to achieve CDC of *Yashada Bhasma* such as *Rekha-purnatva* (finesness), *Gatarasatva* (tasteless), *Varitaratva* (lightness), and *Bhasma* white in color with yellowish tint. The details of the preparation of *Yashada Bhasma* are listed in Table 4.

The pilot study inferred that minimum 50% of weight of butter was required of total ingredients for levigation, whereas with 75% quantity of butter, levigation can be carried out more conveniently. Observations and results of the LMV *Rasa* preparation pilot study are given in Table 5. On the basis of inferences of pilot study, LMV *Rasa* was prepared in two samples LMV 50 and LMV 75; observation profile of media used in the preparation of LMV is presented in Table 6.

In preparation of LMV 50, 180 g of butter was used while in LMV 75, 270 g of butter was used for levigation. On addition of butter, the mixture turned greasy making levigation laborious. On addition of lemon juice, greasiness decreased to some extent



**Figure 1:** (a) *Maricha* added to *Yashada Bhasma*. (b) Freshly prepared butter. (c) Trituration after addition of *Navaneeta* for 6 h. (d and e) Butterfly matchless table top wet grinder with three conical roller stone. (f) Ten grams pellet kept over Whatman filter paper (no. 40) to assess fat content of mass by virtue of spreading



**Figure 2:** (a) Spreading on Whatman filter paper at end of 6 h. (b) Spreading on Whatman filter paper at end of 12 h. (c) Spreading on Whatman filter paper at end of 18 h. (d) Spreading on Whatman filter paper at end of 24 h. (e) Spreading on Whatman filter paper at end of 30 h. (f) Spreading on Whatman filter paper at end of 36 h. (g) Spreading on Whatman filter paper at end of 42 h. (h) Spreading on Whatman filter paper at end of 48 h





Figure 3: (a) Laghu Malini Vasanta Rasa tablets. (b) Packing of Laghu Malini Vasanta tablets. (c) Label of Laghu Malini Vasanta tablets

Table 3: Equipment specification for the preparation of LMV Rasa tablet

| Name of equipment                      | Specification   |
|--|---|
| Stainless steel tray                   | Length - 8 inch, breadth - 8 inch   |
| Stainless steel sieve:<br>Number 20    | Diameter 5.5 inch   |
| 16 station rotary<br>tableting machine | 12 mm diameter, maximum<br>capacity up to 15 mm<br>Speed variable   |
| Hot air oven                           | Inner chamber stainless steel,<br>outer body mild steel<br>Size of chamber<br>12.0×12.0×12.0 inches<br>Temperature range up to 300°C,<br>accuracy ±10°C<br>Temperature control-thermostatic |
| Weighing balance<br>(for tablet)       | Analytical balance model - 200d,<br>range - 200 g   |

LMV: Laghu Malini Vasanta

making levigation convenient. To remove greasiness of mixture, the quantity of lemon juice utilized in repeated levigation was observed to be 10 times of butter used in both samples. As levigation advanced fatty portion within mass was decreased gradually when assessed by spreading test [Figure 2]. In LMV 50, 73.92% average weight gain was observed after completion of levigation [Table 7]. Twenty-eight hours of levigation with lemon juice was required to attain end point of levigation which was prolonged up to 48 h in the rainy season.

In LMV 75, 54 h of duration was required for levigation with lemon juice and 88 h in rainy season which were comparatively higher when compared to LMV 50. 84.99% average gain was observed in final product comparatively higher than LMV 50 (73.92%) [Table 7]. In both groups, the final product was grayish in color, pungent in taste with characteristic butter smell and was completely dry. The smell was observed more in LMV 75 sample.

In preparation of tablet, 30% quantity of honey was required for LMV 50 as the binding agent and 20% in LMV 75. About 14.24% and 22.91% of loss were observed in the preparation of tablets of LMV 50 and LMV 75, respectively [Table 8].

Organoleptic characters of tablets showed that the tablets of both LMV 50 and LMV 75 were greenish in color, pungent in taste, and circular with flat facets. The average weight of tablet was 312 and 335 mg in LMV 50 and LMV 75 with disintegration time of 45 min and 41 min, respectively [Table 9]. Physicochemical analysis of LMV Rasa and its tablet was carried out details of which are presented in Table 10.

## Discussion

LMV Rasa has been described in 30 texts with the earliest citation in *Rasa Paddhati*.<sup>[8,9]</sup> As per reference of *Rasa Paddhati*, levigation with butter is said to be done for 3 days, but quantity has not been specified. Levigation with lemon juice is said to be done until levigated mass becomes dry. Whereas *Yoga Ratnakara* has not mentioned duration of levigation with butter, and levigation with lemon juice is said to be done until *Ghritha Vimukta* stage. Composition of formulation mentioned as per reference of *Yoga Ratnakara* has been quoted by Maximum texts including AFI, hence followed in the current study.

In the pilot study, addition of freshly prepared butter was started in 1/8<sup>th</sup> proportion of total ingredients and was gradually increased in same manner until the mixture became thoroughly wet. The pilot study inferred that minimum 50% of total ingredient weight of freshly prepared butter was required for levigation. Whereas with 75% quantity of freshly prepared butter levigation can be carried out more conveniently. Based on these inferences, two final samples of LMV Rasa were prepared, that is, LMV 50 and LMV 75. As period of levigation with freshly prepared butter was not mentioned in *Yogaratanakara*, it was done manually for 6 h in porcelain *Khabyantra* due to inconvenience of levigation in butterfly grinder machine because of more greasy nature of compound. Whereas the repeated levigation with lemon juice was carried in the wet grinder machine. Interpretation of *Ghritha Vimukta* stage can be assumed as removal of exceeding amount of butter from mass by lemon juice. In the context of preparation, it has been mentioned that “*Shushka Churnam Yadavadhi*”<sup>[9]</sup> (until mass gets completely dried) as the end point of levigation with lemon juice. Spreading test developed in the department was utilized to assess unctuousness more precisely. Negligible or no spreading of the fatty portion on filter paper along with complete drying was considered as the end point of levigation with lemon juice. In the later stage of repeated levigation with lemon juice, spreading of fatty portion on filter paper got decreased. It signifies that repeated levigation with lemon juice decreases greasiness of compound. Generally, blotting paper is used to absorb greasiness of material. However, it is found difficult to standardize the method due to weight variation of blotting paper. It was observed in the pilot study that the spread of oleaginous contents was not uniform on blotting paper, but there was no such difficulty with Whatman filter paper. Therefore, to standardize method, Whatman filter paper (no. 40) has been used to assess extent of greasiness of compound.

The extent of levigation was observed to be higher in rainy season in both samples. Increased humidity within atmosphere

**Table 4: Details of preparation of *Yashada Bhasma***

| <b>Details of Shodhana</b>            |  |                              |   |                            |     |                                     |   |   |   |                             |     |                             |  |
|---------------------------------------|--|------------------------------|---|----------------------------|-----|-------------------------------------|---|---|---|-----------------------------|-----|-----------------------------|--|
| Media                                 | Processing stage                           | Weight of <i>Yashada</i> (g) |   |                            |     |                                     |   | Average loss/gain of <i>Yashada</i> (%) |   |                             |     |                             |  |
|                                       |  | B1                           | B2                                      | B3                         | B1  | B2                                  | B3  |   |   |                             |     |                             |  |
| <i>Tila Taila</i>                     | Before                                     | 700                          | 700                                     | 600                        |     |                                     |   | 0.22↓                                   |   |                             |     |                             |  |
|                                       | After                                      | 712                          | 695                                     | 590                        |     |                                     |   |   |   |                             |     |                             |  |
|                                       | Percentage of ↑/↓                          | 1.71↑                        | 0.71↓                                   | 1.66↓                      |     |                                     |   |   |   |                             |     |                             |  |
| <i>Takra</i>                          | Before                                     | 712                          | 695                                     | 590                        |     |                                     |   | 2.91↓                                   |   |                             |     |                             |  |
|                                       | After                                      | 695.4                        | 698                                     | 584                        |     |                                     |   |   |   |                             |     |                             |  |
|                                       | Percentage of ↑/↓                          | 2.33↓                        | 0.43↑                                   | 1.01↓                      |     |                                     |   |   |   |                             |     |                             |  |
| <i>Kanji</i>                          | Before                                     | 695.4                        | 698                                     | 584                        |     |                                     |   | 1.36↓                                   |   |                             |     |                             |  |
|                                       | After                                      | 685                          | 687                                     | 578                        |     |                                     |   |   |   |                             |     |                             |  |
|                                       | Percentage of ↑/↓                          | 1.49↓                        | 1.57↓                                   | 1.03↓                      |     |                                     |   |   |   |                             |     |                             |  |
| <i>Gomutra</i>                        | Before                                     | 685                          | 687                                     | 578                        |     |                                     |   | 2.50↓                                   |   |                             |     |                             |  |
|                                       | After                                      | 659                          | 672                                     | 569                        |     |                                     |   |   |   |                             |     |                             |  |
|                                       | Percentage of ↑/↓                          | 3.79↓                        | 2.18↓                                   | 1.55↓                      |     |                                     |   |   |   |                             |     |                             |  |
| <i>Kulattha Kwatha</i>                | Before                                     | 659                          | 672                                     | 569                        |     |                                     |   | 0.49↓                                   |   |                             |     |                             |  |
|                                       | After                                      | 665.8                        | 664.8                                   | 560.8                      |     |                                     |   |   |   |                             |     |                             |  |
|                                       | Percentage of ↑/↓                          | 1.03↑                        | 1.07↓                                   | 1.44↓                      |     |                                     |   |   |   |                             |     |                             |  |
| Percentage of gain/loss in total      |  |                              |   |                            |     |                                     |   | 5.47↓                                   |   |                             |     |                             |  |
| <b>Details of Jarana</b>              |  |                              |   |                            |     |                                     |   |   |   |                             |     |                             |  |
| Weight of <i>Shodhita Yashada</i> (g) |  |                              | Weight of <i>Apamarga Panchanga</i> (g) |                            |     | Weight of <i>Jarita Yashada</i> (g) |   |   | Weight of <i>Jarita Yashada</i> (after <i>Prakshalana</i> ) (g) |                             |     | Average weight increase (%) |  |
| B1                                    | B2   | B3                           | B1                                      | B2                         | B3  | B1                                  | B2  | B3                                      | B1  | B2                          | B3  |                             |  |
| 615                                   | 615  | 615                          | 148                                     | 154                        | 140 | 650.92                              | 645   | 655                                     | 635   | 628                         | 630 | 2.59↑                       |  |
| <b>Details of Marana</b>              |  |                              |   |                            |     |                                     |   |   |   |                             |     |                             |  |
| Number of <i>Putra</i>                | Weight of <i>Jarita/Marita Yashada</i> (g) |                              |   | <i>Kumari Swarasa</i> (ml) |     |                                     | Weight of <i>Yashada</i> after <i>Putra</i> (g) |   |   | Percentage of loss or yield |     |                             |  |
|                                       | B1   | B2                           | B3                                      | B1                         | B2  | B3                                  | B1  | B2                                      | B3  |                             |     |                             |  |
| 1                                     | 625  | 625                          | 625                                     | 250                        | 255 | 250                                 | 544   | 588                                     | 550   | 22.53↓                      |     |                             |  |
| 2                                     | 540  | 554                          | 546                                     | 230                        | 230 | 240                                 | 522   | 535                                     | 520   |                             |     |                             |  |
| 3                                     | 515  | 530                          | 515                                     | 220                        | 220 | 220                                 | 503.5   | 518                                     | 510   |                             |     |                             |  |
| 4                                     | 500  | 515                          | 505                                     | 190                        | 210 | 210                                 | 491   | 508                                     | 495   |                             |     |                             |  |
| 5                                     | 485  | 500                          | 490                                     | 190                        | 195 | 195                                 | 478   | 491.5                                   | 483   |                             |     |                             |  |

**Table 5: Observations and results of pilot studies of *LMV Rasa***

| Parameters   | LMV 50        | LMV 75        |
|--|---------------|---------------|
| Weight of <i>Yashada Bhasma</i> (g)                        | 50            | 50            |
| Weight of <i>Maricha Churna</i> (g)                        | 25            | 25            |
| Weight of freshly prepared cow's butter for levigation (g) | 37.6          | 56            |
| Total quantity of lemon juice required (ml)                | 335           | 540           |
| Total duration of levigation (h.min)                       | 15.45         | 25.30         |
| Weight of final product after complete drying (g)          | 90.6          | 120.5         |
| Color of final product                                     | Grayish white | Grayish white |

LMV: *Laghu Malini Vasanta*

might be the reason for prolonged duration of trituration. Average yield (84.99%) was maximum in LMV 75 in comparison to LMV 50 (73.92%) which signifies that increase in proportion

of freshly prepared butter increases extent of levigation with lemon juice, and as period of levigation increases more solid contents of levigation media gets impregnated within compound, increasing percentage of yield. Freshly prepared butter was weak base and lemon juice was weak acid in nature. There might be possibility of neutralization<sup>[10]</sup> taking place when these two media inter-react during levigation. For the neutralization as proportion of base and acid remains definite, this could be the reason for fixed ratio (1:10) of butter and lemon juice that was observed during levigation in both samples. By virtue of degreasing property of citric acid,<sup>[11]</sup> lemon juice cleanses greasiness of compound which gets separated in oily tinge over surface. Freshly prepared butter is water in oil emulsion, the continuous phase being the oil and the dispersed phase being the water. Agitation and elevated temperature are one of the several methods that break water in oil emulsion into oil in water emulsion with water as continuous phase. During agitation, mixing increases the collision number among particles and their coalescence decreases stability of emulsion. An elevated temperature accelerates the water separation by increasing the probability of the water

**Table 6: Mean observation profile of media used in the preparation of LMV *Rasa***

| Media       | Quantity obtained (g)   | Color     | Odor  | Taste          | pH   |
|-------------|-------------------------|-----------|-------|----------------|------|
| Cow butter  | 139.66 (per liter milk) | White     | Milky | Slight sour    | 4.57 |
| Lemon juice | 23.20 (per lemon)       | Yellowish | Sour  | Lemon specific | 3    |

LMV: *Laghu Malini Vasanta*

droplets to collide and decreasing the viscosity of the continuous phase.<sup>[12]</sup> During levigation, both agitation and slight elevation in temperature of compound takes place. These sequences act as demulsifying agent causing breaking of water in oil emulsion of freshly prepared butter which increases its viscosity and separation of water portion from butter. This breaking of emulsion further allows its interaction with lemon juice and compound.

For preparation of tablets, *Pippali Churna* was added in equal proportion to LMV *Rasa* as per reference of *Sharangdhara*

**Table 7: Details of observation obtained during levigation of LMV *Rasa***

| Ingredients  | Batch code |          |           |         |          |           |
|--|------------|----------|-----------|---------|----------|-----------|
|  | LMV 50     |          |           | LMV 75  |          |           |
|  | Batch I    | Batch II | Batch III | Batch I | Batch II | Batch III |
| Weight of <i>Yashada Bhasma</i> (g)  | 240        | 240      | 240       | 240     | 240      | 240       |
| Weight of <i>Maricha Churna</i> (g)  | 120        | 120      | 120       | 120     | 120      | 120       |
| Quality of <i>freshly prepared butter</i> utilized in 1 <sup>st</sup> <i>Bhavana</i> (g) | 180        | 180      | 180       | 270     | 270      | 270       |
| Lemon juice utilized in 2 <sup>nd</sup> <i>Bhavana</i> (ml)                              | 1785       | 1820     | 1750      | 2680    | 2720     | 2685      |
| Duration of levigation in 2 <sup>nd</sup> <i>Bhavana</i> (h)                             | 28         | 28       | 54        | 54      | 54       | 82        |
| Final weight of product after complete drying (g)  | 598.56     | 603      | 676.8     | 645     | 648      | 725.76    |
| Percentage weight gain   | 66.26      | 67.5     | 88        | 79.16   | 80       | 101.6     |
| Average weight gain (%)  | 73.92      |          |           | 84.99   |          |           |
| Ratio of freshly prepared butter: Lemon juice  | 1:9.9      | 1:10.1   | 1:9.72    | 1:9.9   | 1:10.07  | 1:9.9     |
| Average  | 1:9.9      |          |           | 1:9.9   |          |           |
| Color of final product   | Grayish    | Grayish  | Grayish   | Grayish | Grayish  | Grayish   |
| Taste of final product   | Pungent    | Pungent  | Pungent   | Pungent | Pungent  | Pungent   |
| Greasiness of final product  | Absent     | Absent   | Absent    | Absent  | Absent   | Absent    |

Note: Batch III of both samples was prepared in rainy season. LMV: *Laghu Malini Vasanta*

**Table 8: Details of observation obtained during preparation of LMV *Rasa* tablet**

| Group  | Weight of LMV <i>Rasa</i> (g) | Weight of <i>Pippali Churna</i> (g) | Honey (g) | Weight of tablets (g) | Weight of residue (g) | Total loss (%) |
|--------|-------------------------------|-------------------------------------|-----------|-----------------------|-----------------------|----------------|
| LMV 50 | 1000                          | 1000                                | 600       | 2229.8                | 273                   | 14.24          |
| LMV 75 | 1000                          | 1000                                | 400       | 1850                  | 142                   | 22.91          |

LMV: *Laghu Malini Vasanta*

**Table 9: Details of physical analysis of LMV *Rasa* tablet**

| Group  | Shape                     | Size (mm) |       | Hardness (kg/cm <sup>2</sup> ) | Average weight of tablet (mg) | Disintegration time (min) |
|--------|---------------------------|-----------|-------|--------------------------------|-------------------------------|---------------------------|
|        |                           | Diameter  | Width |                                |                               |                           |
| LMV 50 | Circular with flat facets | 9         | 3     | Na                             | 312                           | 45                        |
| LMV 75 | Circular with flat facets | 9         | 3     | Na                             | 335                           | 41                        |

LMV: *Laghu Malini Vasanta*

**Table 10: Details of physiochemical analysis of LMV *Rasa* and tablet**

| Group                                   | pH  | Loss on drying (%) | Ash value (%) | Water soluble extractive (% w/w) | Methanol soluble extractive (% w/w) |
|---|-----|--------------------|---------------|----------------------------------|-------------------------------------|
| <i>Laghu Malini Vasanta Rasa</i>        |     |                    |               |                                  |                                     |
| LMV 50                                  | 6.5 | 4.13               | 33.14         | 14.56                            | 14.07                               |
| LMV 75                                  | 6.5 | 3.6                | 34.83         | 15.10                            | 15.68                               |
| <i>Laghu Malini Vasanta Rasa</i> tablet |     |                    |               |                                  |                                     |
| LMV 50                                  | 6.5 | 8.62               | 17.44         | 34.67                            | 25.15                               |
| LMV 75                                  | 6.5 | 10.14              | 14.15         | 36.54                            | 49.80                               |

LMV: *Laghu Malini Vasanta*

*Samhita*.<sup>[13]</sup> In authentic textual reference of formulation as mentioned in *Yogaratanakara Jwaradhikara*, both *Pippali* powder and honey have been indicated as adjuvant for therapeutic action of the drug. Though there is no any published data on interactions of *Pippali Churna* and honey with LMV at pharmacokinetic–dynamic levels; to avoid the inconvenience to take *Pippali* and honey each time at time of administration, the tablet has been formulated by combining these two adjuvants with the base drug. Quantity of honey was fixed (30% in LMV 50 and 20% in LMV 75) on the basis of appropriate formation of granules. Granules prepared with same proportion as that of LMV 50 in LMV 75 did not dry completely. This signifies that either moisture content or fat content in LMV 75 is comparatively higher, and hence proportion of honey has to be decreased until formation of appropriate granules.

## Conclusion

From pharmaceutical point of view, preparation of LMV *Rasa* tablets with quantity of butter in 50% of total ingredients was more convenient. To assess *Ghritha Vimukta* stage of LMV, spreading test can be utilized. Complete drying of levigated mass and minimal or no spreading of fatty portion on filter paper can be considered as end points of levigation. In both groups, approximately 10 times of lemon juice of the quantity of butter used is required to neutralize excess fat within compound. The extent of repeated levigation with lemon juice was increased with percentage of butter used for levigation and the moisture content of the atmosphere.

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## Conflicts of interest

There are no conflicts of interest.

## References

1. Sastri L, editor. *Yoga Ratnakara, Jwaradhikara*. Reprint Edition. Varanasi: Chaukhambha Prakashana; 2002. p. 245.
2. Anonymus. *The Ayurvedic Formulary of India, Part 1*. 2<sup>nd</sup> ed. New Delhi: Ministry of Health and Family welfare, Department of AYUSH Government of India Publication; 2001. p. 271.
3. Shastri SK, translator: *Rasa Tarangini of Sadananda Sharma, Ch. 19, Ver. 95*. 11<sup>th</sup> ed. (reprint). New Delhi: Motilal Banarsidas Publication; 2009. p. 474.
4. Acharya YT, editor. *Susruta Samhita of Susruta, Sutra Sthana, Ch. 45, Ver./85*. Reprint Edition. Varanasi: Chaukhambha Surbharati Prakashana; 2010. p. 203.
5. Anonymus. *The Ayurvedic Formulary of India, Part 2, Part B, Paribhasha*. 2<sup>nd</sup> ed. New Delhi: Ministry of Health and Family Welfare, Department of AYUSH Government of India Publication; 2001. p. 8.
6. Shastri PP, editor. *Sharangadhara Samhita of Sharangadhara, Madhyam Khanda, Ch. 2, Ver. 1*. 6<sup>th</sup> ed. Varanasi: Chaukhambha Orientalia; 2005. p. 144.
7. Anonymus. *The Ayurvedic Formulary of India, Part 1*. 2<sup>nd</sup> ed. New Delhi: Ministry of Health and Family welfare, Department of AYUSH Government of India Publication; 2001. p. 95.
8. Hariprapannaji P. *Rasayogasagar, (Vol - II), Yakaradi Rasa-430*. Reprint Edition. Varanasi: Chaukhambha Krishnadas Academy; 2004. p. 351.
9. Mishra S, commentator, *Rasapaddhati of Bindu., 2<sup>nd</sup> ed*. Varanasi: Chaukhambha Orientalia; 2005. p. 167.
10. Neutralization [Chemistry]-Wikipedia the Free Encyclopedia. Available from: <http://www.en.wikipedia.org/wiki/Neutralization-Chemistry>. [Last updated on 2014 Mar 30; Last cited on 2014 April 20].
11. Citric Acid-Wikipedia the Free Encyclopedia. Available from: [http://www.en.wikipedia.org/wiki/Citric\\_acid](http://www.en.wikipedia.org/wiki/Citric_acid). [Last updated on 2014 April 14; Last cited on 2014 Apr 20].
12. Demulsifiers – SET Laboratories, Inc.; c2008. Available from: <http://www.setlaboratories.com/demulsif/tabid/74/Default.aspx>. [Last cited on 2014 Apr 20].
13. Shastri PP, editor. *Sharangadhara Samhita of Sharangadhara, Madhyam Khanda, Ch. 7, Ver. 4*. 7<sup>th</sup> ed. Varanasi: Chaukhambha Orientalia; 2008. p. 197.

## हिन्दी सारांश

### लघु मालिनी वसंत रस का भावना के संदर्भ में मानक विनिर्माण

मनिषा बी. वालुंज, बिस्वाज्योति पटगिरी, विनय जे. शुक्ला, प्रदीपकुमार प्रजापति

लघु मालिनी वसंत रस एक प्रसिद्ध वसंत कल्प है। योगरत्नाकर के अनुसार रसक और मरिच ये २ प्रमुख घटक २:१ के अनुपात में हैं। सर्व प्रथम इसमें नवनीत से और फिर नींबू स्वरस से भावना घृत विमुक्ती तक दी जाती है। परन्तु भावना द्रव्य की मात्रा और अवधि का उल्लेख नहीं किया गया है। अतः लघु मालिनी वसंत रस के मानक विनिर्माण को विकसित करने के उद्देश्य से अध्ययन दो हिस्सों में किया गया। यशद भस्म निर्माण और लघु मालिनी वसंत रस वटी निर्माण। भावना के लिए नवनीत की मात्रा तय करने के लिए पायलट अध्ययन किया गया। पायलट अध्ययन के परिणामों के आधार पर लघुमालिनी वसंत रस २ समूह में तैयार किया गया, एलएमव्ही ५० (कुल सामग्री के ५०% मात्रा में नवनीत) और एलएमव्ही ७५ (कुल सामग्री के ७५% मात्रा में नवनीत) भावना का अंत बिंदु द्रव्यमान का सूखना और स्नेह का न्यूनतम प्रसार माना गया था। दोनों नमूनों की गोलियों में पिप्पली और शहद को शामिल करके उनकी गुणवत्ता नियंत्रण के मानकों का विश्लेषण किया गया। एलएमव्ही ५० में २८ घंटे भावना अवधि थी जो बरसात के मौसम में ४८ घंटे हो गयी। एलएमव्ही ७५ में ५४ घंटे भावना अवधि थी जो बरसात में ८८ घंटे अवधि हो गयी। भावना के लिए दोनों समूहों में नवनीत के दस गुना नींबू का रस आवश्यक है। अतः भैषजिक दृष्टि से, एलएमव्ही ५० की गोलियाँ बनाना अधिक सुविधाजनक है।