COMPARATIVE PHARMACEUTICO ANALYTICAL STUDY OF MADHUTAILIKA BASTI FORMULATION PREPARED BY CLASSICAL AND MODIFIED METHODS

C.S.Shruthi¹, RenjalPrabhakaraUpadhyaya², K.Sujatha³

¹Final Year PG Scholar, ²Professor and HOD, ³Professor and HOD,

¹²Department of Rasashashtra and Bhaishajya Kalpana, SDM College of Ayurveda, Udupi, Karnataka, India

³Department of Rasashashtra and Bhaishajya Kalpana, SDM Institute of Ayurveda, Bengaluru, Karnataka, India

Email: dr.shruthicheemullu346@gmail.com

ABSTRACT

Context: The formulation of MadhutailikaBasti comprises of Madhu (honey), Lavana (salt), Taila(oil), Kalka(paste) & Quatha (decoction). These ingredients are not easily miscible with each other. As per classics they are made miscible by adding the ingredients in sequence and mixing with the help of churner. But in large scale work it is replaced by mixer or edge runner mill. Aim and objectives: To do the preparation of Madhutailikabasti formulation by using classical and modified methods. To do physico-chemical analysis and stability study of Madhutailikabasti formulation prepared by classical and modified methods and to compare their results. Methodology: 6 samples of Madhutailikabasti formulation were prepared and subjected for physico-chemical and stability study. Results: Physico chemical analysis show that better rate of absorption in samples prepared with classical method than modified methods. Based on rate of sedimentation it was observed that classical method of Madhutailikabasti formulation is having more stability than modified methods. Conclusion: Classical method of preparation of Madhutailikabasti with serial order of mixing the ingredients using churner is more stable and would be better absorbed compared to other modified methods.

Keywords: MadhutailikaBasti, Classical method, Modified method, Stability study.
‘MadhutailikaBasti’, a type of ‘AasthapanaBasti’ also termed as ‘NiruhaBasti’. The formulation of MadhutailikaBasti comprises of Madhu, Lavana, Taila, Kalka & Quatha. These ingredients are not easily miscible with each other. But to get the optimum therapeutic action from the formulation homogeneous mixture of ingredients is necessary. References regarding serial order of mixing the ingredients are available in classics as madhu and saindhava followed by taila, then kalka after that kashaya. Homogeneity of final mixture is assessed with certain features known as suyojithaniruhalakshanas. They are, non-spreadig, not remain smeared, not retaining its markings when it is placed on the palm. Importance towards methodology of mixing might be to maintain these features i.e. Physical stability of the mixture for a longer duration. Manual method of mixing is adopted during the addition of each ingredient to get the homogeneous mixture. As this process needs creation of vigorous shear force within the mass material, usage of sophisticated equipment for mixing may make the preparation processing easier and convenient, especially in large scale work. Hence the study was conducted on MadhutailikaBasti formulation prepared through classical and modified methods. Samples were subjected for physico chemical analysis and stability study.

AIMS &OBJECTIVES:
a) To do the preparation of MadhutailikaBasti formulation by using classical and modified methods.
b) To do physico-chemical analysis and stability study of Madhutailikabasti formulation prepared by classical and modified methods.
c) To compare the results of physico-chemical analysis and stability study of MadhutailikaBasti formulation prepared by classical and modified methods.

MATERIALS AND METHODS:
Source of Data:
a) Medicinal source:
- Raw drugs required for preparation collected from SDM Ayurveda Pharmacy Udupi
- Preparation of MadhutailikaBasti formulation was carried out in –Rasashastra and Bhaishajyakalpana Practical Hall, SDM college of Ayurveda Udupi.
b) Analytical source:
- Formulation was subjected to physico-chemical analysis and stability study in SDM Centre for research in Ayurveda and Allied sciences Udupi.

METHODOLOGY:
In the present study 6 samples of MadhutailikaBasti are prepared with same ingredients taken in same quantity but with different methods. Reference for the study is taken from Bhaavaprakasha, which include following ingredients:
- Madhu: 50ml
- Saindhavalavana: 3.125g
- Tilataila(Sesamumindicum DC): 50ml
- **Shathapushpakalka** *(Anethumsowa Kurz)*: 6.25g
- **Erandamulaquatha** *(Ricinus communis Linn.)*: 200ml

Preparation of *Madhutailika Basti* formulation with following instruments as mentioned below:

- **Sample 1**: Mixing the ingredients in sequence using mixer
- **Sample 2**: Mixing the ingredients all together using mixer
- **Sample 3**: Mixing the ingredients all together using edge runner mill
- **Sample 4**: Mixing the ingredients in sequence using edge runner mill
- **Sample 5**: Mixing the ingredients in sequence using churner
- **Sample 6**: Mixing the ingredients all together using churner

Among the above samples 5th and 6th samples were prepared using classical method while first 4 samples are the modified methods.

**Modified methods:**
Sample 1: Mixing the ingredients in sequence using mixer

**Procedure involved:**
- Initially *madhu* and *saindhavalavana* are taken in the mixer.
- Mixing is continued until *lavana* is completely dissolved.
- Then *tilataila* is added and again mixed for specific time period. Here oil layer should become minute globules, mixture should become homogeneous.
- It is followed by adding of *shatapushpakalka*. Mixing is done so that *kalka* particles remain uniformly distributed and do not settle down at the base of the vessel.
- At last *erandamulakwatha* is added, mixing is continued until it properly mixes with oil globules and homogeneous features are seen.
- Homogeneity of final mixture is assessed with certain features under the heading *su-yojithaniruhalakshana*.
- Finally quantity of *basti* formulation is measured.

**2nd Sample**: Mixing the ingredients all together using mixer

**Procedure involved:**
- All ingredients are taken together in the mixer jar.
- Mixer is turned on until all the ingredients get properly mixed with each other. i.e There is no sedimentation of *kalkadravya*, *saindhava* is properly dissolved, *tala* and *kashaya* should not be a separate layer instead they should look like a single entity.
- Finally mixing is continued until *su-yojithaniruhalakshanas* are seen.
- At last quantity of *basti* formulation is measured.

**Sample 3**: Mixing the ingredients all together using edge runner mill

**Procedure involved:**
- All ingredients are taken together in the edge runner mill and mixed until *su-yojithaniruhalakshanas* are seen.
Sample 4: Mixing the ingredients in sequence using edge runner mill  
**Procedure involved:**  
- Ingredients are mixed in sequence as mentioned in classics until it become homogeneous.

**Classical method:**  
Sample 5: Mixing the ingredients in sequence using churner  
**Procedure involved:**  
- Initially ingredients like madhu and lavaṇa are taken in a steel vessel and mixed until lavaṇa dissolves completely.
- Then tilataila is added and churned until it gets distributed into fine globules.
- It is followed by kalka which is churned until its particle gets uniformly suspended.
- At last kashaya is added and churned until su-yojithaniruhalakshana are seen.

Sample 6: Mixing the ingredients all together using churner  
**Procedure involved:**  
- All ingredients are added together and churned until su-yojithaniruhalakshana are seen.

Features of different mixing methods which were observed is explained in table no.1.

The parameters used for the analysis has been mentioned below:  
**A. Organoleptic Characteristics:**  
- Colour  
- Taste  
- Smell  
- Consistency

**B. Physico-chemical analysis**  
- Acid value  
- Saponification value  
- Iodine value  
- Refractive Index at 25°C  
- Specific Gravity  
- Viscosity  
- pH

**C. Physical stability test**  
- Dilution Test  
- Conductivity Test  
- Dye Test

**RESULTS:**  
**A. Organoleptic Characteristics:**  
The drug is examined by means of the sense organs and the difference in the drugs which are observable at a macroscopic level is appreciated and listed in table no.2.

**B. Physico-chemical Analysis:**  
Results of physico-chemical analysis are enlisted in table no.3.

For comparison and better understanding few tests were done to taila and kashaya along with samples.

**C. Physical stability test:**  
There are two types of emulsions namely O/W type and W/O type. Since both the emulsions are similar in appearance it is very difficult to differentiate them with naked eye. They cannot be identified with single tests hence confirmed with 2-3 tests. It mainly includes dilution test, conductivity test and dye-solubility test.

**Sedimentation rate:**  
Stability is also assessed with rate of sedimentation.
Results of Physical stability test:
Dilution test, conductivity test and dye test are used for identification of type of emulsion whether it is oil in water type (O/W) or water in oil type (W/O). In oil in water type emulsion the oil is the dispersed phase whereas water is the continuous phase. This type is generally preferred for internal use because the unpleasant taste and odour is masked by emulsification and oil being in finely dispersed state is more quickly assimilated in the body. In water in oil type emulsion the water is the dispersed phase whereas oil is the continuous phase. These types of emulsions are mainly used externally as lotions or creams.

**Dilution test:**
Dilution test was carried out on all 6 samples; they are identified as O/W type of emulsion.

**Conductivity test:**
Conductivity test was carried out on taila and kashaya which were considered as standard. Kashaya being water media easily conducts electricity while taila did not allow the electricity to pass through it. Later the test was done on 6 samples and all of them conducted electricity. So it was identified as O/W type of emulsion.

**Dye test:**
Dye test was initially done on taila and kashaya which were considered as standard. On treating Amaranth (water soluble dye) with taila drop and when observed under microscope continuous phase appeared colorless and on adding Sudan III (oil soluble dye) with taila it showed continuous phase red. On adding Amaranth to the kashaya and observing under microscope showed continuous phase red and it was colourless with Sudan III. Later 6 samples were treated with Amaranth and Sudan III Dye separately and observed under microscope. All the samples gave continuous phase red with Amaranth and droplets appeared colorless, continuous phase colorless with Sudan III and droplets showing reddish pink colour. All were categorized as O/W type emulsion.

**Rate of sedimentation:**
For a basti formulation to yield better result the ingredients should be a homogeneous mixture and a single entity. If all the ingredients getting separated then the purpose will not be served hence rate of sedimentation is given importance. Based on onset and rate of separation along with total time taken for separation, samples can be rated from less stable to highly stable sample as mentioned in table no. 4.

**DISCUSSION**

- Mechanism adopted having a great influence on mixing of immiscible ingredients. This can be understood by the time taken by each sample to get mixed with each other.
- Merits and demerits of method adopted for the study is described in table no. 5.
- Organoleptic examination reveal difference in colour, taste, consistency among all samples which indicate some chemical changes in each method while smell of all samples being the same.
- Acid value is increased in sample 6th, followed by 2nd, 1st, 3rd, 5th and 4th sample. It indicate short shelf life in 6th sample followed by other samples. Hence early chances of rancidity in 6th
sample followed by 2nd sample, 1st sample, 3rd sample, 5th sample, 4th sample with delayed chances of rancidity.

- Highest rate of absorption to lowest rate is seen among samples in following order: sample 6th followed by 1st sample, 2nd sample, 5th sample, 3rd sample, and last 4th sample which is indicated by saponification value.

- Level of unsaturation is indicated by iodine value which is more in 4th sample followed by 6th sample, 5th sample, 1st sample, 3rd sample, least value in 2nd sample

- 4th sample is said more viscous, followed by 5th sample, 2nd sample, 1st sample, 6th sample and 3rd sample in decreasing order respectively based on viscosity value.

- All the samples are identified as O/W type of Emulsion.

- Based on rate of sedimentation it can be understood that classical method of Madhutailika Basti formulation is having more stability than modified methods.

- Better action will be seen with the formulation which is prepared using churner than mixer or edge runner mill.

**CONCLUSION**

After comparing results of physico chemical analysis and stability study it was concluded that classical method of preparation of Madhutailikabasti with serial order of mixing the ingredients using churner is more stable and would be better absorbed compared to other modified methods.

**REFERENCES**


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**Table 1: Time taken by different samples to get mixed**

<table>
<thead>
<tr>
<th>Samples</th>
<th>Time consumed for the ingredients to get mixed</th>
<th>Total time taken</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Madhu+ Lavana +tilataila +shatapushpa kalka +ErandaMula quatha</td>
<td></td>
</tr>
<tr>
<td>1st sample (mixer –serial order)</td>
<td>6 min 2 min 5 min 2 min</td>
<td>15min</td>
</tr>
<tr>
<td>2nd sample (mixer-all together)</td>
<td>-</td>
<td>13min</td>
</tr>
<tr>
<td>3rd sample (edge runner mill -all together)</td>
<td>-</td>
<td>40min</td>
</tr>
<tr>
<td>4th sample (edge runner mill- serial order)</td>
<td>11 min 13 min 4 min 20min</td>
<td>48min</td>
</tr>
<tr>
<td>5th sample (churner- serial order)</td>
<td>15 min 15 min 11 min 10min</td>
<td>51min</td>
</tr>
<tr>
<td>6th sample (churner-all together)</td>
<td>-</td>
<td>66min</td>
</tr>
</tbody>
</table>

**Table 2: Organoleptic Characteristics of all samples**

<table>
<thead>
<tr>
<th>Features</th>
<th>1st sample</th>
<th>2nd sample</th>
<th>3rd sample</th>
<th>4th sample</th>
<th>5th sample</th>
<th>6th sample</th>
</tr>
</thead>
<tbody>
<tr>
<td>Colour</td>
<td>Dull brown</td>
<td>Dull brown</td>
<td>Dark brown</td>
<td>Dull brown</td>
<td>Dark brown</td>
<td>Dark brown</td>
</tr>
<tr>
<td>Taste</td>
<td>Lavana kashaya</td>
<td>Kashaya lavana</td>
<td>Madhura Lavana Kashaya</td>
<td>Madhura Lavana Kashaya</td>
<td>Madhura Lavana Kashaya</td>
<td>Lavana Madhura Kashaya</td>
</tr>
<tr>
<td>Smell</td>
<td>Taila gandha</td>
<td>Taila gandha</td>
<td>Taila gandha</td>
<td>Taila gandha</td>
<td>Taila gandha</td>
<td>Taila gandha</td>
</tr>
<tr>
<td>Consistency</td>
<td>Viscous liquid</td>
<td>Moderate viscous liquid</td>
<td>Less viscous liquid</td>
<td>Less viscous liquid</td>
<td>Moderate viscous liquid</td>
<td>Moderate viscous liquid</td>
</tr>
</tbody>
</table>
### Table 3: Results of standardization parameters

<table>
<thead>
<tr>
<th>Samples</th>
<th>Parameter</th>
<th>Acid value</th>
<th>Saponification value</th>
<th>Iodine value</th>
<th>Refractive index</th>
<th>Specific gravity</th>
<th>Viscosity</th>
<th>pH</th>
</tr>
</thead>
<tbody>
<tr>
<td>I</td>
<td></td>
<td>3.29</td>
<td>78.30</td>
<td>16.16</td>
<td>1.38717</td>
<td>1.1171</td>
<td>7.0740</td>
<td>6.0</td>
</tr>
<tr>
<td>II</td>
<td></td>
<td>3.73</td>
<td>76.22</td>
<td>11.43</td>
<td>1.3886</td>
<td>1.1258</td>
<td>9.7898</td>
<td>5.0</td>
</tr>
<tr>
<td>III</td>
<td></td>
<td>2.7855</td>
<td>71.22</td>
<td>13.30</td>
<td>1.3895</td>
<td>1.1245</td>
<td>5.4127</td>
<td>5.0</td>
</tr>
<tr>
<td>IV</td>
<td></td>
<td>2.6562</td>
<td>61.5601</td>
<td>44.6132</td>
<td>1.38606</td>
<td>1.1191</td>
<td>11.7834</td>
<td>6.0</td>
</tr>
<tr>
<td>V</td>
<td></td>
<td>2.7690</td>
<td>71.8168</td>
<td>22.51</td>
<td>1.38830</td>
<td>1.1406</td>
<td>10.8502</td>
<td>5.0</td>
</tr>
<tr>
<td>VI</td>
<td></td>
<td>4.2357</td>
<td>91.5578</td>
<td>23.7473</td>
<td>1.39794</td>
<td>1.1428</td>
<td>6.3360</td>
<td>6.0</td>
</tr>
<tr>
<td>Taila</td>
<td></td>
<td>1.0989</td>
<td>21.5980</td>
<td>45.4567</td>
<td>-</td>
<td>0.9422</td>
<td>75.7795</td>
<td>6.0</td>
</tr>
<tr>
<td>Kashaya</td>
<td></td>
<td>-</td>
<td>-</td>
<td>-</td>
<td>-</td>
<td>1.0286</td>
<td>1.2083</td>
<td>6.8</td>
</tr>
</tbody>
</table>

### Table 4: Rate of sedimentation

<table>
<thead>
<tr>
<th>Samples</th>
<th>Sedimentation Rate</th>
<th>Stability</th>
</tr>
</thead>
<tbody>
<tr>
<td>3rd sample</td>
<td>Quick onset and rapid separation</td>
<td>Less stable/not stable</td>
</tr>
<tr>
<td>4th sample</td>
<td>Rapid onset and rapid separation</td>
<td>Less stable/not stable</td>
</tr>
<tr>
<td>2nd sample</td>
<td>Mild onset but rapid separation</td>
<td>Less stable/not stable</td>
</tr>
<tr>
<td>1st sample</td>
<td>Slow onset, mild rate of separation</td>
<td>Stable</td>
</tr>
<tr>
<td>6th sample</td>
<td>Mild rate of onset, mild separation</td>
<td>Stable</td>
</tr>
<tr>
<td>5th sample</td>
<td>Very slow onset, very slow separation</td>
<td>Highly stable</td>
</tr>
</tbody>
</table>

### Table 5: Merits and demerits of methods adopted

<table>
<thead>
<tr>
<th>Method</th>
<th>Merits</th>
<th>Demerits</th>
</tr>
</thead>
<tbody>
<tr>
<td>Mixer method:</td>
<td>1. Easy to prepare 2. Requires less time</td>
<td>1. Early separation of ingredients</td>
</tr>
<tr>
<td>Edge runner mill method</td>
<td>1. Easy to prepare</td>
<td>1. Separation is rapid due to positive and negative mixture mechanism 2. More time is required to prepare</td>
</tr>
<tr>
<td>Churnermethod</td>
<td>1. Material remain mixed for long time</td>
<td>2. Depends on manual pressure</td>
</tr>
</tbody>
</table>

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**Conflict Of Interest:** None Declared

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