Standardisation of Ayurvedic fermented product Kanji

Prashant S Bhokardankar¹¹, Dilip S. Wadodkar²

1. Professor & HOD, Department of Ras Shastra Bhaishajya Kalpana, Siddhakala Ayurved Mahavidyalaya Sangamner (M.S.), India
2. Professor & HOD, Department of Ras Shastra Bhaishajya Kalpana, Government Ayurved College, Osmanabad (M.S.), India.

*Corresponding author: Mobile-9422940848, email-drprashant44@gmail.com

Abstract:
Sharangdhara explained Panchavidha Kashyaya Kalpana¹, which are guru subsequently from Swarasa to Phanta. But Panchavidha Kashaya kalpana lack the ability of fast action and potency for longer duration. To compensate the above stated lacuna ‘Sandhana Kalpana’ were developed. Sandhan Kalpana¹ depends on the concept of biochemical fermentation, and one of the best dosage forms of Ayurveda in practice since thousands of years. In order to prepare these medicaments, certain sets of conditions are pre-arranged which leads to fermentation. Thus, products with self-generated ethyl alcohol, which potentiate these preparations. ‘Kanji’¹ is one of the Sandhan Kalpana. After consulting with many eminent personalities in Ayurveda a final procedure of preparation of Kanji is adopted. But Siddhi lakshanas (Standard tests) of Kanji are not explained properly in ancient texts. So it has been found that very less work on standardisation of Kanji has been done over past few years.

Thus, this paper deals with standardisation of Kanji.

Keywords- Kanji, Sandhan kalpana, Fermentation, Standardisation

Introduction:
To compensate the lacunae of Panchavidh Kashaya Kalpana ‘Sandhan Kalpana’ were developed by ancient texts which has ability of fast action and potency of working for longer duration. Ayurvedic herbal dosage forms are formulated through the transference of active ingredients by different manufacturing procedures. Among these Sandhan Kalpana is a unique dosage form in which acidic and alcoholic fermented formulations are prepared. In order to manufacture these medicines, drugs and liquids are kept for fermentation for certain period of time and which causes formation of ethyl alcohol by the use of in source material by pharmaceutical procedure.
Also, not only ethyl alcohol but many other organic components are yield out of these formulations and extraction of active principle of the drug is achieved with these formulations.

These formulations are described in detail in terms of procedure of their preparation in various Ayurvedic texts like Charaka, Sushruta, Yogratnakar and Bhavprakasha.

Sandhan Kalpana is divided into Shukta Kalpana and Madya Kalpana and one of the formulation of Sandhan Kalpana is Kanji, whose different types of preparation are explained in Rasatarangini, Paradvigyaniyam & Bhavprakasha.

Different uses of Kanji are given in text such as use of Kanji in Parada and Maharasa. Also, ashtasanskara of parada cannot be imagined without Kanji. Thus, all above explanation of Kanji is having longer shelf life, quick absorption and action with excellent therapeutic efficacy is available, but there is very less knowledge available of standardisation of the preparation procedure and the final product.

Siddhi Lakshana of Kanji is require more clarity instead of depending only upon the statement that “Kanj should be kept until the product become sour” as the feeling of sourness differs from person to person and hence it can not be marker test to decide the Quality of Kanji.

So in this research paper work has been done over standardisation of Kanji, which comprises physicochemical parameters like pH, percent acidity, refractive index, acetic acid percentage and specific gravity and spectrometric analysis. These parameters are used to decide the quality of Kanji which is done by preparing 30 sub batches of kanji in 3 different main batches and above stated parameters are studied to draw conclusion related to good quality of Kanji.

Material and Method

Ayurveda review:

Sharangdhara explained when one drug remain in contact with madhuradravya like guda or dhatki pushpa then the Sandhana (fermentation) process occurs. The dravyas should remain in contact with madhur dravya for several days.

Bhavprakashya explained Sandhan Kalpana and divided it into
1. Shukta Kalpana
2. Madya Kalpana

Under the heading of Sandhan Kalpana,Sura, Asava Arishta and Shukta Kalpanas are included.


2. Gunas of Madya Kalpana: All types of Madya are Pittajanak, AmlaRasayukta, Rochak, Amlasarak, KaphavatShamak, Hrudya, Tikshna

Kanji:

- Synonyms :Kanjikam, Kanjika, Viram, Avanti, Somam, Kulmash, Dhanyamla, Aarnala, Amlasarak
• Paribhasha: When the Manda of Kulith or other Dhanya gets Sandhan it is called as Kanji
Kaidydev Nighnatu explained properties of Kanji are as follows
• Guna Karma: Kanji is Amla, Tishna, ushna, rochak and Pachak.
• Karma and Rogaghnata: Kanji is Used in Shosha, Prameha, Arsha.

NirmanPadhati as per various Ayurved texts:

1) Rasayansaar 2/59/60: Kanji is prepared from 1 sherRai, 2 sherSaindhav, 4 sherKulithKwatha, 2sher cooked rice with its Manda, ½ sherHaldichurna, ½ sherVanhapatra, ¼sherHing are added in previously prepared Mrutpatra.
Sarso tail is applied in inner part of mrutapatra and 20 sher water is added. Then ½ sher Masha vadas are added into that Mrutpatra. By applying Mudra ,Mrudpatra is kept for 7 days.

2) Ayurved Prakash.: Tushrahita all Dravyas are added into Jalpuritamrutapatra. When it becomes Amla, add Musta, Bramhi, Sarpakshi, Sahdevi, Triphala, Hansaraj, Chitrak. Put the mixture for Sandhan. It is called as Dhanyakamla.

3) Parad Vidnyaniyam: Shaliaadi dhanya are cooked and 3 time and water is added into it and kept for 10 days. This is called as Kanjik, Dhanyaamal or Arnal.

4) Sharangdhar Nighantu: In new Mrutpatra Katu tail is applied. Then Nirmaljal is poured into it. After that rajika, ajaji, saindhav, hingu, haldi, cooked rice Vanshapatra, Kulitha Kwatha are added into it. Mash Vadas are added into it and is kept for 3 days. The product is filtered and called as Kanji.

Modern view of Fermentation:

The term fermentation (Latin ferment means to boil) formerly stood for decomposition of food stuff usually accompanied by evolution of gas. Fermentation of sugar to alcohol and carbon dioxide by yeast is one of the oldest example. The term fermentation is now applied to changes brought by microorganisms. Evolution of gas is not a essential criterion.

Historical background: The scientific nature of the process was explored by Louise Pasteur (1822). For a considerable time it was considered that fermentation processes are the result of direct action of living organism on the fermentable material. The controversy ended in 1896 when E butchner, showed that in the production of alcohol from sugar, the fermentation is brought about not by the direct action of living organism, but by an extract, called as Zymase obtained by squeezing not by hydraulic press yeast cells in a mortar with quartz sand kieselghur, all dust dry, zymase, which is present into cell of yeast, and can be extracted from yeast cell, owes its origin to living natter but, is itself devoid of life.

Conditions favorable for Fermentation:
The most important factors, which influence the process of fermentation are:
1) Temperature: The enzymes are destroyed at very high temperature, most of them become inactive above $80^\circ$ C. Process is very slow below $20^\circ$ C. Optimum temperature is $30^\circ - 50^\circ$ C
2) Aeration: Fermentation processes usually proceed well only in presence of air.
3) Concentration: High concentration of solution renders an enzyme inactive. Thus solutions used for fermentation should be sufficiently dilute to favor the process.
4) Presence of other substances: certain inorganic salt solutions act as food for ferment cell.
5) Absence of preservatives: Preservatives are those substances which destroy the ferment and retard the fermentation reaction. So the substances should not be present.

Methods:
Preparation of 30 sub batches of Kanji in 3 different batches is done and below stated parameters are studied.

Physiochemical parameters like pH, percent acidity, refractive index, acetic acid percentage and specific gravity and UV Spectro photometric analysis, these parameters are used to decide the quality of Kanji.

Apparatus:-
- Gas stove,
- 10 stainless steel pot
- 10 Autoclaved glass bottles, tong.

Ingredients:-
- Basmati rice -----100 gm
- Sterilized hot drinking water ---- 1 lit
- Sarso oil (SOS)

Procedure:-
1) Glass bottles were autoclaved
2) For making sub batches, 100 gm rice was taken in stainless steel pot.
3) 250 ml drinking water was boiled at $100^\circ$ C for 20 Minutes.
4) Inner part of Sterilized bottles were lined by Sarso tail.
5) Cooked rice was added to the bottle and boiled water 3 times the rice was also added, and the lid of the bottles were tightly closed.
Thus, in the same way three sub batches were prepared at different time period. All 30 bottles of kanji were placed at NTP in dry and warm place for 10 days.

NOTE: After 10 days the subbatches of Kanji were taken for analytical tests.

Precautions
a) The bottles were autoclaved.
b) Bottles of kanji were kept in warm and dry place.
c) Bottles were not opened before stipulated time of fermentation.
d) Lid of the bottles were tightly closed.

Observations:
Analytical studies:
The Kanji was placed for 10 days in NTP condition after which Physicochemical tests were applied as:
• pH
• Percent acidity
• Specific gravity
• Acetic acid percentage

• Refractive index
• UV spectro photometric analysis

Results are obtained as shown in Table 1 and Table 2.

Table 1 - Standardisation of Kanji

<table>
<thead>
<tr>
<th>S.no.</th>
<th>pH</th>
<th>Percent acidity</th>
<th>Refractive Index</th>
<th>Specific gravity</th>
</tr>
</thead>
<tbody>
<tr>
<td>Batch -1</td>
<td>3.65-3.82</td>
<td>105ml-112ml 0.1NaOH</td>
<td>1.3354--1.3395</td>
<td>1.007-1.013</td>
</tr>
<tr>
<td>Batch -2</td>
<td>3.66-3.88</td>
<td>103ml-110ml 0.1NaOH</td>
<td>1.3360--1.3388</td>
<td>1.005-1.009</td>
</tr>
<tr>
<td>Batch -3</td>
<td>3.55-3.75</td>
<td>112ml-121ml 0.1NaOH</td>
<td>1.3340--1.3384</td>
<td>1.007-1.013</td>
</tr>
</tbody>
</table>

Table 2 - Standardisation of Kanji

<table>
<thead>
<tr>
<th>Sr. no.</th>
<th>Acetic acid percentage</th>
<th>Spectro photometric Analysis</th>
</tr>
</thead>
<tbody>
<tr>
<td>Batch -1</td>
<td>0.66 -0.74gm/100ml</td>
<td>295nm-755nm</td>
</tr>
<tr>
<td>Batch -2</td>
<td>0.67 -0.71gm/100ml</td>
<td>292nm-690nm</td>
</tr>
<tr>
<td>Batch -3</td>
<td>0.70 -0.76gm/100ml</td>
<td>295nm-304 nm</td>
</tr>
</tbody>
</table>

Microbial quality of Kanji was tested and following results were observed:

• It was detected by MPN method that there were no coliform bacterias present in Kanji which means, Kanji prepared by this method is very safe for internal consumption.
• Growth of Coliform bacteria on macConkey’s agar was absent, which confirms above finding.
• Pour plate method using Nutrient agar shows that viable count is 20,000/ml nonpathogenic bacteria.
• Subculture of colony of Nutrient agar shows two different colony white and yellow which means that the bacteria belonging to bacilli and cocci groups respectively were present. This may be considered that these micro organism responsible for fermentation of Kanji.

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The Microbial study images are as follows (from image 1 to image 9)

1. Nutrient Agar
2. Yellow Colonies
3. White Colonies
7 Colonies of Cocci

8 Colonies of Rod Shaped Bacilli

9 M. P. N. Method
Discussion

The review of previous work on Kanji showed that no remarkable work has been carried out in this subject. In the study an attempt has been done to decide the parameters, which will be helpful to standardise the Kanji.

Many eminent personalities were concern and a process of Kanji preparation which is popularly used and described for various purposes. This method was used to prepare 30 sub batches at different time period and was kept for 10 days. The room temperature was noted.

After 10 days the product was collected with sterilized pipette and subjected to different analytical and microbial studies.

It was observed that,

- pH of Kanji ranges from 3.55 – 3.88.
- percent acidity ranges from 103ml to 121ml of 0.1 N NaOH
- specific gravity of Kanji ranges from 1.005 to 1.013
- Refractive index of Kanji ranges from 1.3340 to 1.3395.
- Wave length of peak of Kanji ranges from 292nm to 755nm.
- Acetic acid percentage ranges from 0.66gm/100ml to 0.76gm/100ml.
- Microbial testing for Kanji shows non pathogenic bacterias are responsible for fermentation

Conclusion

The present study is aim to determine the standard parameters of Kanji, so that it can used for various pharmaceutical procedures mentioned in ayurvedic texts. Specially standard Kanji needed for samanya shodhan of metals ( means Dhatu as mentioned in ayurved texts) as well as Parad ashtasamksars.

This study open new hope for untouched subject for shodhan dravya like Kanji as mentioned in Ayurvedic texts. Further more research is needed in this subject in upcoming future to add more standard parameters of Kanji.

Value addition of this study is that attempt was made to decide the shelf life of Kanji. So it was observed that degradation of Kanji starts when the pH of Kanji goes below 3.2 or above 4 and the opportunistic organisms especially fungi may infect the product. It was also observed that Kanji was kept in amber colored bottle with air tight lid in dry and warm place it retains its pleasant smell and other organic properties as it is for 5 to 6 months.

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