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Standardisation of Ayurvedic fermented product *Kanji*

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Abstract:

Sharangdhara explained *Panchavidha Kashyaya Kalpana*¹, 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 Kalpana*¹ 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 lacunas 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 *Bhavprakashya*.

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*, *Paradvigyaniam* & *Bhavprakashya*.

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 “*Kanji* 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 days¹.

Bhavprakashya explained *Sandhan Kalpana* and divided it into

1) *Shukta Kalpana*

2) *Madya Kalpana*²

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

1. *Gunas of Shukta Kalpana*: *Shukta causes Dravibhutana of Rakta, Pitta and Kapha, Vatanulomana. It is Ushna, Tikshna, Ruksha, Amla, Hridya, Ruchikarak, Rechak Agnipradipak, Pandu and Kriminashak*.²

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

Kanji:

- *Synonyms* : *Kanjikam, Kanjika, Viram, Avanti, Somam, Kulmash, Dhanyamla, Aarnala, Amlasarak*³

- *Paribhasha*: When the Manda of Kulith or other Dhanya gets Sandhan it is called as Kanji¹. Kaidydev Nighnatu explained properties of Kanji are as follows
 - *Guna Karma*: Kanji is Amla, Tishna, ushna, rochak and Pachak³.
 - *Karma and Rogaghnata*: Kanji is Used in Shosha, Prameha, Arsha³.

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 Dhanyakamla⁴
- 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 Arnal⁵.

- 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 life⁶.

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 80⁰ C . Process is very slow below 20⁰ C. Optimum temperature is 30⁰ – 50⁰ 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 present⁶.

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 100⁰ C for 20 Minutes.
- 4) Inner part of Sterilized bottles were lined by Sarso oil.
- 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*

S.no.	pH	Percent acidity	Refractive Index	Specific gravity
Batch -1	3.65- 3.82	105ml-112ml of 0.1NaOH	1.3354--1.3395	1.007-1.013
Batch-2	3.66-:3.88	103ml-110ml of 0.1NaOH	1.3360--1.3388	1.005-1.009
Batch-3	3.55-3.75	112ml-121 ml of 0.1NaOH	1.3340--1.3384	1.007-1.013

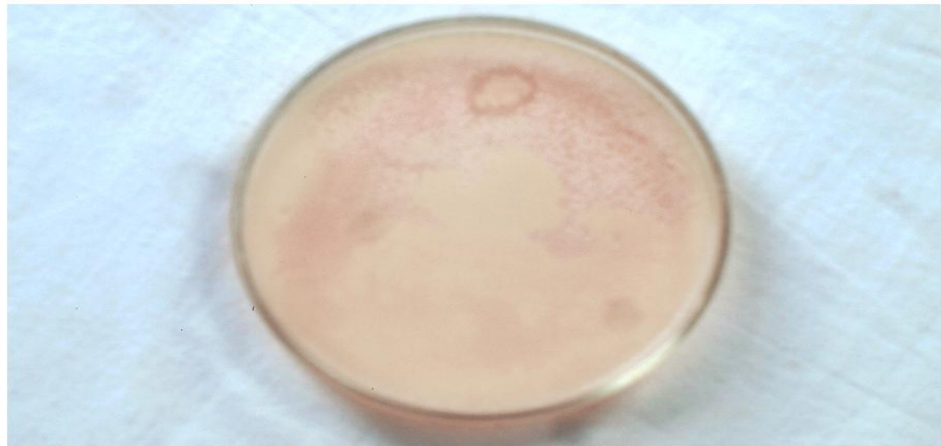
Table-2- Standardisation of *Kanji*

Sr. no.	Acetic acid percentage	Spectro photometric Analysis
Batch -1	0.66 -0.74gm/100ml	295nm-755nm
Batch-2	0.67 -0.71gm/100ml	292nm-690nm
Batch-3	0.70 -0.76gm/100ml	295nm-304 nm

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*⁷.

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



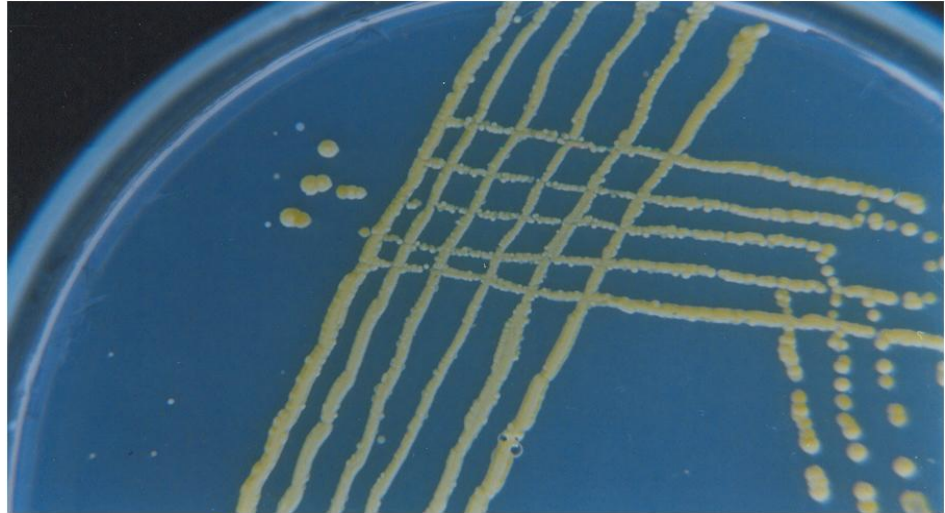
1 *Neutrient Agar*



2 *Yellow Colonies*



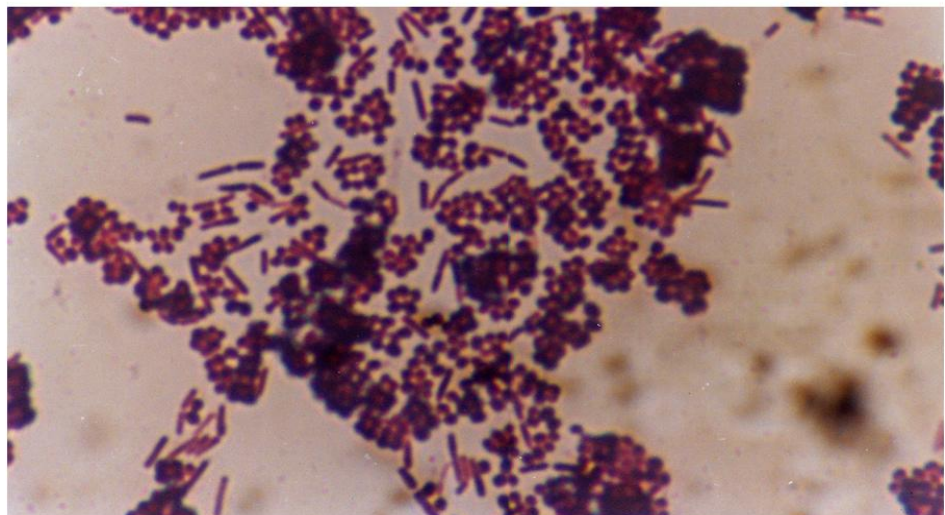
3 *White Colonies*



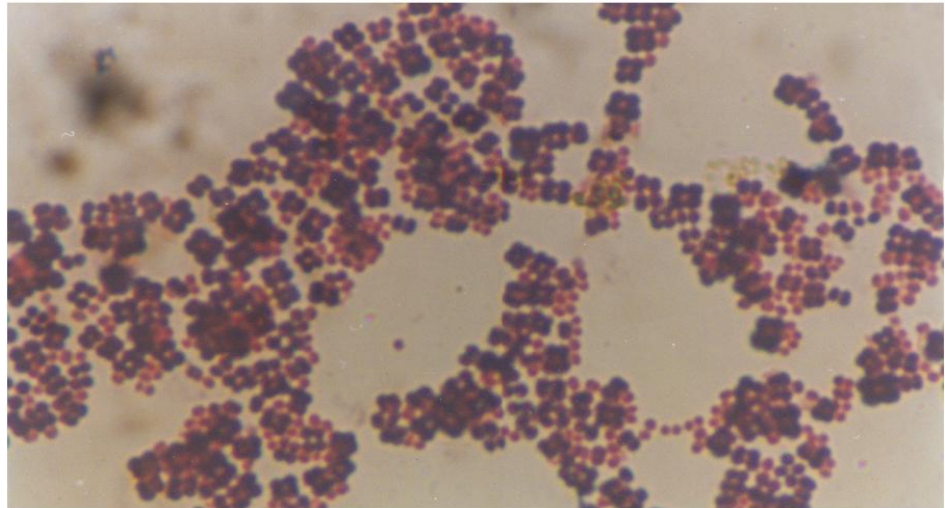
4 Sub Culture of Yellow Colony



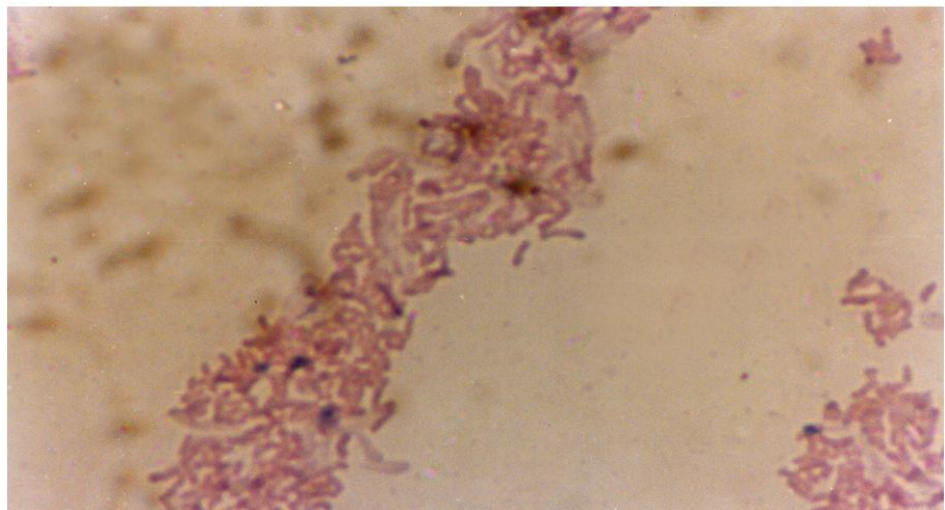
5 Sub Culture of White Colony



6 Mixed Colony



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 ashtasamskars*.

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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