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"TO DETERMINE THE SHELF LIFE OF KANJI"

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ABSTRACT

Kanji i.e sour gruel is an important formulation in Rasashastra and Bhaishajyakalpana. It is widely used in different manufacturing processes, especially for shodhana of different Ras dravyas as well as in Astha-sanskaras of Parada. The therapeutic importance of *Kanji* is also well explained by ancient Indian physicians. Sushruta Acharya's advice *Kanji* in treatment of Grahani, Arsha, Shula e.t.c. whereas Charakacharayas advised it in a treatment of Jwara, Vibhandha and so on. Thus preparation and therapeutical indication of *Kanji* are well explained in Ayurvedic texts. However, no information is available regarding the siddhi lakshanas (standardization test) and saviryata avdhai i.e Shelf life of Kanji. *Kanji* is a perishable product. It cannot be stored for a long time. It requires near about 8-10 days for the preparation of *Kanji*. When patient comes to us; we can't ask them to wait till the preparation of *Kanji*. As *Kanji* is not available when needed, it is being lost from general clinical practice. In Ayurvedic Formulary of India part I and part II which is published by Dept. of AYUSH, Govt. of India, in which standard parameter for Aasava and Arishta are described. However standard parameter to access the quality of *Kanji* are not mentioned. Hence we need to determine standard parameters to access the quality and shelf life of *Kanji*. Prof. Dr. Wadodkar and Dr. Prashantshastri Bhokardankar in the year 2002-2005 carried out research work on the standardisation of *Kanji*. There are different formulations for the preparation of *Kanji*, however in this study they had used the formulations explained by Acharya Yadavji Trikamji because it is very simple and widely used for the preparation of *Kanji*. In the previous study physico-chemical parameters like pH, percent acidity value, refractive index, turbidity and microbial load were used for standardization of *Kanji*. The same parameters were used in the present study. The method of preparation of kanji was also the same as previous study. In the present study it is observed that well prepared *Kanji* can retain its

qualities up to 3 months without any extra precautions like refrigeration or adding preservatives.

KEYWORDS: *Rasashastra*, Shelf life of *Kanji, Grahani, Arsha, Shula.*

INTRODUCTION

Kanji is very important formulation in *Rasashastra* and *Bhaishajyakalpana*. *Kanji* prepared by *Dhanya* is said to be *Jivaniya* (nourishing), *Daha nashana* (relieve burning sensation), *Vata Kapha hara* (alleviate Vata and Kapha), *Trushna hara* (relieves thirst) etc. when used internally.[1] It is widely used for two purposes one is for manufacturing process and second is for therapeutic uses which are most important for ayurvedic vaidya. *Sushrutacharya* advised *Kanji* in the treatment of *Grahani, Arsha, and Shula* e.t.c.

The *Kanji* as explained in the Paribhasha prakarana of the text *Dravya guna vigyana,* said to be specific for *dhatu shodhana* (purification of metals) and other Mercurial processing's.[2]

Different methods of *Kanji* are described in *Sharangdhara Samhita*, *Bhavaprakasha Samhita* and *Parad Vidnyaniyam*. There is also description about lakshanas, gundharmas and therapeutic efficacy of *Kanji*. However no comment has been found regarding the shelf life of *Kanji* i.e. How long it can retain its efficacy in normal condition. *Kanji* is a grain based product and it is perishable. Near about 7 to 10 days are required for the preparation of *Kanji*. But we don't know for how many days it is remain in normal condition and is not spoiled. Hence, an attempt is made to determine the shelf life of *Kanji*, so that it can be made available to patients when they come.

Previous research work had done on standardization of *Kanji* regarding to its normal pH value and percent acidity under the guidance of Prof. Dr. Dilip S. Wadodkar in Govt. Ayurved College and Hospital, Nanded by Dr. Prashant Shastri Bhokardankar in the year 2002-05[4] in which physicochemical parameters like pH, percent acidity value, refractive index, turbidity and microbial load are used to decide the quality of *Kanji*. Parameters for standardisation of Kanji are not available even in Ayurvedic Formulary of India. Hence these tests are used as tool to determine the quality and shelf life of Kanji.

AIM AND OBJECTIVES

AIM: "To Determine the Shelf Life of Kanji".

OBJECTIVES

1) To prepare *Kanji* by classical method as described in Dravyaguna Vigyan, which was used in previous study i.e. standardisation of *Kanji*.

2) Analytical study of *Kanji.*

3) To carry out shelf life estimation of *Kanji.*

Plan of Study

1. Kanji was prepared in 10 batches with 3 samples per batch thus making total 30 samples.
2. Preparation of Kanji was done from month of January to September.
3. Duration of study was 90 days.
4. Each Sample was observed for 90 days.
5. Standardisation parameters like pH, % acidity value, refractive index, turbidity and microbial load were observed.

MATERIALS AND METHOD

MATERIALS

Raw Materials: - Basmati rice (*Oryza Sativum*) – ½ kg

Drinking water – 1litre

Equipments

Gas Stove, Stainless Steel Pot, Tong, Food grade pet containers, Drinking water, Multani clay, Cotton Cloth.

METHODS: Preparation of Kanji by classical method:-

“अन्नं शाल्यादिसन्सिद्धं प्रशिसम् त्रिगुणे जले ॥

धान्याम्लं संधितं प्रोक्तं आरनालं च काजिकम् ।

शालिकोद्रव मण्डैर्वा सन्धितं काजिकं भवेत्” ॥

(द्रव्य. वि. परिभाषा खण्ड पृ.४०)

Procedure

1. Firstly the Food grade pet containers of 8 liters capacity were sterilized.
2. ½ kg rice was taken in rice cooker and 1 liter water was added to it. Then it was kept on gas stove for cooking. After cooking 1kg 400 gm cooked rice was obtained.

3. Then warm cooked rice was taken in food grade pet container and 4.2 liter (3 times) water was added to it.
4. Then lid of bottle was covered with silver foil and sealed with the help of Multani clay and cotton cloth.
5. The containers were kept in open, cool and dry places with good ventilation for 7 days for preparation. After seven days the liquid inside the container was collected. This is known as Kanji.[5]

Table no.1 Procedure for preparation of Kanji

Annam(Cooked rice)	Three times Jal according to Dravyaguna Vidyanium	Approximate Kanji will be obtained
1½ kg Cooked rice (1 part)	4.2 litres drinking water (3 parts)	5 litres

The sub batches were prepared by same procedure.

Three samples of Kanji SAMPLE -1, SAMPLE-2, SAMPLE-3 OF BATCH–I to BATCH-X was prepared. Organoleptic and Analytical tests was carried out.

Organoleptic Characters: - Colour, Taste, Sound, Odour and Touch of Kanji was checked periodically.

Analytical Study

Just after the preparation the sample of Kanji were taken for Analytical tests and also on the days after preparation that is on 8^{th}, 10^{th}, 15^{th}, 20^{th}, 25^{th}, 30^{th}, 35^{th}, 40^{th}, 50^{th}, 60^{th}, 70^{th}, 80^{th} & 90^{th} day the sample of Kanji were taken for following analytical tests.

1. Organoleptic characteristics
2. Refractive index
3. Turbidity
4. Percent acidity
5. pH value
6. Microbial load

Preparation of Kanji

Determination of microbial load

It was carried out by DILUTION METHOD: - Serial Dilution.

1. **Dilution set preparation.**
2. **Media Preparation.**

- **Nutrient Agar Medium**.
- **Nutrient Broth Medium.**

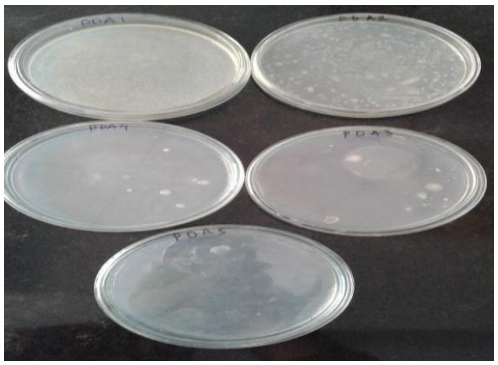
Plate count for bacteria: Colony count of not more than 300 may be expected. Prepare at least two such Petri dishes using the same dilution and incubate at 300 to 350 for 5 days, unless a more reliable count is obtained in a shorter time. Count the number of colonies that are formed. Calculate the results using plates with the greatest number of colonies but taking 300 colonies per plate as the maximum consistent with good evaluation.

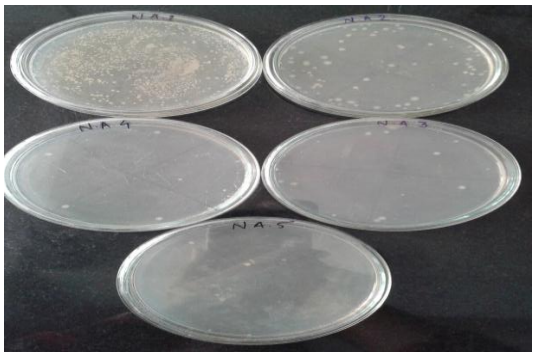
Plate count for fungi: Calculate the results using plates with not more than 100 colonies.

Incubation: Incubate the prepared dishes, inverted at 37^0c of 4hours or 30^0c+1^0c for 72 hours.

Counting the colonies: Following incubation, count all colonies on dishes containing 300 colonies and record the results.

Determination of Microbial load of Kanji





OBSERVATIONS AND RESULTS

Day 1- Day of Preparation of Kanji, Day 7- Day of completion of Kanji, Day 8- 1 day after preparation of Kanji

Table 2:-Showing Batch-I, Sample-1, 2, 3 Days by Analysis of Kanji

Sample Date	Sample No.	Day of Analysis	pH value	Percent acidity Value	Refractive Index	Turbidity
15/12/2014	**1**	8th	3.87	1.112	1.3336	31
		10th	3.85	1.114	1.3337	
		15th	3.83	1.115	1.3340	
		20th	3.79	1.116	1.3340	
		25th	3.65	1.116	1.3342	
		30th	3.61	1.117	1.3349	
		35th	3.55	1.118	1.3350	
		40th	3.30	1.125	1.3353	19
		50th	3.25	1.130	1.3359	
		60th	3.21	1.140	1.3360	
		70th	3.11	1.154	1.3366	
		80th	3.05	1.160	1.3366	
		90th	3.00	1.174	1.3368	10
	2	8th	3.85	1.111	1.3337	29
		10th	3.84	1.111	1.3337	
		15th	3.83	1.115	1.3340	
		20th	3.79	1.116	1.3342	
		25th	3.63	1.117	1.3340	
		30th	3.61	1.118	1.3349	
		35th	3.54	1.118	1.3350	
		40th	3.30	1.124	1.3353	18
		50th	3.25	1.130	1.3359	
		60th	3.21	1.140	1.3360	
		70th	3.10	1.152	1.3364	
		80th	3.04	1.160	1.3366	
		90th	3.01	1.171	1.3366	12

	3	8th	3.82	1.110	1.3338	26
		10th	3.83	1.111	1.3339	
		15th	3.80	1.112	1.3340	
		20th	3.79	1.113	1.3340	
		25th	3.65	1.115	1.3342	
		30th	3.61	1.116	1.3349	
		35th	3.55	1.118	1.3350	
		40th	3.30	1.125	1.3354	18
		50th	3.25	1.130	1.3368	
		60th	3.21	1.140	1.3369	
		70th	3.10	1.154	1.3370	
		80th	3.05	1.162	1.3370	
		90th	3.00	1.184	1.3370	11

Organoleptic characteristic of Kanji

Table 3:- Showing Days wise organoleptic characteristic of Kanji batch: 1, sample 1, 2 & 3

Sample date	Sample no.	Days of analysis	Sparsha snigdha	Rupa	Rasa	Gandha
15/12/2014	1, 2 & 3	8th	+	Slight Milky white, turbid +++	Amla Madhur	Slight amlagandhi
		10th	+	Slight Milky white turbid +++	Amla madhur	Slight amlagandhi
		15th	+	Slight Milky white turbid ++	Amla madhur	Slight amlagandhi
		20th	+	Milky white turbid ++	Amla madhur	Amlagandhi
		25th	+	turbid ++	Amla	amlagandhi
		30th	+	turbid ++	Amla	amlagandhi
		35th	+	turbid +	Amla	amlagandhi
		40th	+	turbid +	Amla	amlagandhi
		50th	+	turbid +	Amla	amlagandhi
		60th	+	turbid +	Amla	amlagandhi
		70th	+	Slightly orangish	Amla +	Ugra amlagandhi
		80th	+	Slightly orangish	Amla +	Ugra amlagandhi
		90th	+	Slightly orangish red	Amla++	Ugra amlagandhi

MICROBIAL LOAD COUNT

Days of tests

Day 1st :- Day of preparation**,** Day 7th :- Day of complitiom**,** Day 15th :- 15th Day from preparation**,** Day 30th :- 30th Day from day of preparation.

Table 4:- Showing Result of Microbial load count of Batch 1st, sample 1, 2 & 3

Date	Sample	Agent	Day 1	Day 7	Day 15	Day 30
15/12/2014	**I**	N.A	3987	981	478	-
		P.D.A	4123	642	328	-
	II	N.A	3549	623	250	-
		P.D.A	3712	512	571	-
	III	N.A	4500	1065	375	-
		P.D.A	3652	475	413	-

Observation of Microbial load

Microbial load of Kanji was calculated on Day 1, Day 7, Day 15 Day 30. It was observed that there was decrease in the Microbial load of Kanji as day's increases. Ranging from 4123 to Nil. It can be concluded that Kanji becomes pathogen free as day's passes or it gets older, hence safe for internal use up to 3 months. With no extra precaution like using freezing or preservative. After that freezing and preservative helps to increase the Shelf life of Kanji.

MICROBIAL LIMIT TEST RESULT

Table 5:- Showing Result of selective media (Broth) to detect the presence of Representative pathogens as per the Microbial limit test (as described in IP- Vol-2)-1966

Sr.no	Name of culture	Name of media	Result
1	*Escherichia coli*	MacConkey Broth	Not present
2	*Pseudomonas aurginosa*	Cetrimide Broth	Not present
3	*Staphylococcus aureus*	Mannitol-Salt Broth	Not present
4	*Salmonella* species	Tetrathionate Broth	Not present

Means that the Kanji prepared in the study is very safe to consume internally.

DISCUSSION

SHELF LIFE OF KANJI

On the basis of this study it was observed that,

1. In organoleptic characteristics: - There is no remarkable changes in the Shabda, Sparsh. But there are some changes in Rupa, Rasa and Gandha as the days passes from 8th day to 90th of all 10 Batches of all samples 1, 2 & 3 during observations.

Changes like

Table:- Showing changes in Rupa, Rasa and Gandha as the days passes from 8th day to 90th day

Sr.no	Sample day	Rupa	Rasa	Gandha
1	8th day	Slightly Milky white turbid +++	Amlamadhur	slightly amlagandhi
2	40th day	turbid +	Amla	amlagandhi
3	90th day	slightly orangish red	Amla rasa +++	Ugra amlagandhi.

2. There are no remarkable changes in the pH of Kanji, percent acidity value, Refractive index, Turbidity value and Microbial Load, but it was noted that there is slight changes started after 70-80th day of sandhana. If kept properly without any preservation and freezing condition.
3. Previous work was done by Dr. Bhokardankar under Prof Dr. Dilip Wadodkar on topic "Standardization of Kanji" in 2002-2005, in which they specify the Standard values of analytical tests of Kanji. And as we know that there is no explanation given regarding standard values of analytical tests of Kanji in API and AFI, I decided to compare my values with this previous work.

4. The standard value of previous work are as follows:-

1. The pH of good Quality of Kanji ranges from 3.55 to 3.88 and degradation starts from pH ranging from below 3.2 or above 4.
2. Percent acidity ranges from 103-121 ml of 0.1 N NAOH.
3. Refractive Index ranges from 1.3340-1.3395.
4. Acetic acid % 0.66 gm-0.76 gm. /100ml.

5. It was observed that changes had started occurred from near about 70th to 80th day. And also observed that, Rupa, Rasa and Gandha of Kanji also shows changes after same period of time.
6. The pH values of all samples at 80th day is approximately 3.00 to 2.87. The changes in the pH value clearly indicates the degradation starts after 70th day to 80th day.
7. According to standard values, it was observed that when if pH of Kanji goes less than 3.00 or greater than 4.00 then the degradation starts and the opportunistic organisms may infect the product.
8. It was also observed that the microbial load on the 1st day of preparation of Kanji was near about 4000, on 7th day near about 1000, on 15th day near about 500 and nil on 30th day.
9. Also during microbial limit test of Kanji, it was observed that there absence of *coliform bacteria*, *Escherichia coli*, *Salmonella* species, *Pseudomonas aurginosa and Staphylococcus aureus.* So, we can say that it is safe for consumption.
10. Then, I come to the conclusion that Kanji remains in good condition up to 3 months without any freezing and preservative condition.

11. As, we know that Kanji is used as Therapeutically as well as in manufacturing process so, we can say that before 3 months it can use Kanji internally for therapeutically use and above 3 months for the Manufacturing process.

CONCLUSION

- It conclude that if Kanji is kept properly in amber color bottle or in the Food grade pet containers in Normal Room Temperature and Pressure with proper ventilation, it retains its qualities up to 3 months. With no extra precaution like using freezing or preservative.
- As, we know that Kanji is used as Therapeutically as well as in manufacturing process so, we can say that before 3 months it can use Kanji internally for therapeutically use and above 3 months for the Manufacturing process.

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