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## Effect of preservatives on shelf life of Kharwas

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### Abstract

The present investigation was carried out to check the influence of two different preservatives viz. Sodium benzoate and Potassium sorbate individually and in combination (300ppm, 100ppm (individually), 200ppm and 50ppm (in combination) respectively on the basis of finished product) with addition of sorbitol on microbiological and sensory changes in Kharwas packed in polypropylene cups and stored at ambient (30 °C) and commercial refrigeration 7 °C. Irrespective of storage temperature addition of Sodium benzoate, Potassium sorbate and sorbitol into Kharwas at initial stage of its preparation helped to suppress microbial growth and retarded deterioration of organoleptic quality, though the deterioration was faster at ambient condition. Kharwas samples treated with Sodium benzoate and Potassium sorbate individually, with addition of sorbitol were found acceptable up to 2 days and 20 days at 30 °C and 7 °C storage temperature respectively, while Kharwas samples treated with Sodium benzoate and Potassium sorbate in combination with addition of sorbitol were found acceptable up to 4 days and 24 days at 30 °C and 7 °C storage temperature respectively.

**Keywords:** Kharwas, colostrum, sensory evaluation, potassium sorbate, sodium benzoate, sorbitol

### Introduction

Colostrum used to prepare some Indian traditional sweet product in different region like Kharwas, Khees, Ginnu, Junnu etc. Kharwas is a Maharashtra sweet product. It can be prepared by simply diluting colostrum with appropriate proportion of milk or water, sweetener like cane sugar or jaggery and flavoring like cardamom or saffron into it. By steam cooking solid mass of cake is obtained called Kharwas.

Dairy products are very good source of essential nutrients such as protein, fat, carbohydrates, vitamins, minerals, essential amino acids which makes prone to microbial spoilage. The microbial count of raw milk is very important to produce hygienic milk product. Milk and milk products like cheese, cream, khoa and kharwas were gets deteriorate by microbes due to high moisture and nutrient content.

Since dairy products are packed with all the necessary nutrients, mould may easily grow on them, and on Kharwas also. The market quality of kharwas is comparatively lower due to an appropriate moisture content that ranges from 40 to 45%. Additionally, the conditions that Kharwas is made and marketed is not ideal. The poor shelf-life of these products is caused due to a lot of factors in the production chain, such as the location and condition of the halwai shops in unsanitary and filthy surroundings, exposure to air, flies, and insects, cross contamination of products through constant filthy handling and storage of products in filthy and uncleaned utensils (Malhotra, 1998) [21].

The microbial growth leads to spoilage, unsafe food needs to be reduced or controlled for which preservatives may be used. These preservatives reduce food borne illness, reduce the possibility of microbiological spoilage, keeps food fresh, and maintain its nutritional quality.

As per FSSAI (2015) [6] regulation in dairy based sweet calcium and potassium salt of sorbic acid is permitted up to 1000 ppm maximum acceptable limit and permitted benzoic acid up to 300 ppm maximum limit. Sorbitol is generally recognized as safe in dairy based sweet.

### Materials and Methods Material collection

Colostrum was harvested from 1st milk of murrha breed of buffalo from the Department of Animal Husbandry and Dairy Science of College of Agriculture, Parbhani. Then sample were stored at -5 °C. The milk was collected from same breed of buffalo then it clarified and sterilized in College of Food Technology. Cardamom and sugar were procured from local market of Parbhani.

### Method of Kharwas manufacturing

The milk was collected, filtered then sterilized at 115 °C for 15 min. Colostrum was clarified and according to ratio, sterile milk and colostrum were mix then sweetener (cane sugar) 12% and flavouring agent were added into mixture. Mixture was filled into the polypropylene cups and three batches were prepared. In first batch 300ppm Sodium Benzoate and 0.5% Sorbitol, in second batch 100ppm Potassium sorbate and 0.5% Sorbitol and in third batch 200ppm Sodium Benzoate, 50ppm Potassium sorbate and 0.5% Sorbitol were added then in package steaming had been done at 72±2 °C for 15 min and stored at 7±1 °C for 15 hr.

### Formulations

**Table 1:** Standardization of recipe for kharwas preparation

Ingredients	T0	T1	T2	T3	T4
Colostrum	88	83	78	73	68
Sterile Milk	-	5	10	15	20
Sugar	12	12	12	12	12

T0 = 88% colostrum.

T1 = 83% colostrum + 5% sterile milk+12% sugar.

T2 = 78% colostrum + 10 sterile milk +12% sugar.

T3 = 73% colostrum + 15 sterile milk+12% sugar.

T4 = 68% colostrum + 20 sterile milk+12% sugar.

(Minor quantity of flavour were added so it not mentioned).

### Packaging and storage

Product was packed in polypropylene cup and stored at 7±1

°C at refrigerator and 30±1 °C at room temperature. Product was analysed at days of perticular interval for microbial analysis. Storage was continued until the sensory quality of sample become unacceptable.

### Microbiological examination

The standard plate count (SPC)/g, Coliform count/g and moulds counts (YMC)/g in Khrwas were determined by using Nutrient Agar, Violet Red Bile Agar (VRBA) and Potato Dextrose Agar (PDA), respectively (APHA, 1978).

### Sensory evaluation

The fresh and stored Kharwas samples were subjected to sensory evaluation, immediately after opening by a panel of seven semi trained judges using a nine-point hedonic scale at a regular interval. The Kharwas samples were scored for colour and appearance, flavour, taste, body and texture and overall acceptability separately. Sample without any additives were used as control.

### Result and Discussion

#### Sensory evaluation of formulations

The Kharwas were prepared from different mixture of colostrum and sterile milk and subjected to the organoleptic evaluation. The score recorded for different parameters are given in Table no. 2.

**Table 2:** Sensory evaluation of Kharwas

Samples	Organoleptic attributes					
	Color	Taste	Texture	Flavour	Mouthfeel	Overall acceptability
T0	8	8	6.8	8	7.1	7.6
T1	8	7.8	7.3	7.5	7.3	7.5
T2	7.3	8	7.5	7.5	7.8	7.6
T3	8.1	8.2	8.5	8	8.1	8.1
T4	6.8	7.3	8.3	7.6	8	7.6
SE	0.078	0.052	0.078	0.078	0.104	0.026
CD@(5%)	0.237	0.158	0.237	0.237	0.316	0.0791

\*Each value is the average of three determinations

Color is considered as one of the important quality judging parameters in selection of food product. Attractive color of product is must have fast moving consumer goods to appeal consumer for consumption. Data present in Table 2. revealed that sample T3 obtained higher score for color and rated as liked very much (8.1) whereas other samples were rated as slightly liked and lowest color value were observed for T4 (6.8). The color value of Kharwas changed due to addition of sterile milk. Sample T3 obtained higher score of taste and flavour i.e. 8.2 and

8. Texture is a property of product which is related to touch. Texture is a reason which provides mouthfeel. The higher rating for texture and mouthfeel obtained for sample T3 i.e. 8.5 and 8.1. Because addition of sterile milk can leads to increasing softness in product and its leads to give soft

mouthfeel during chewing, so the values were shows high for 15 per cent of sterile milk i.e. sample T3.

The sample T3 obtained good score for overall acceptability (8.1) as compared to control and other samples. Thus, on overall acceptability score T3 (15 per cent sterile milk) was considered acceptable and use for further analysis. The kharwas sample T3 was found significantly superior over other samples with respect to sensory properties.

Increasing the concentration of sterile milk may cause softness in the product but it can disturb the appearance and texture of product which was unacceptable to the panel members. Added moisture can leads to a decrease in shelf life. So the acceptable limits for the sterile milk were 15%. It gives a better mouthfeel, well texture and softness to the product.

**Table 3:** Effects of addition of preservatives on sensory quality of Kharwas samples at ambient temperature (30±2 °C)

Days	Organoleptic qualities																			
	Color and Appearance					Taste and flavour					Body and texture					Overall acceptability				
	T0	T3	A	B	C	T0	T3	A	B	C	T0	T3	A	B	C	T0	T3	A	B	C
0	8	8	8	8	8	8	8.2	8.2	8.2	8.2	6.8	8.5	8.4	8.5	8.5	7.6	8.2	8.1	8.2	8.2
2	NA	5.3	7.5	7.5	7.5	NA	5.6	7.6	7.8	7.7	NA	5.4	7.4	7.5	7.6	NA	5.4	7.5	7.6	7.6
4	NA	NA	NA	NA	6.1	NA	NA	NA	NA	6.4	NA	NA	NA	NA	6.1	NA	NA	NA	NA	6.2
6	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
SE	0.10	0.10	0.03	0.02	0.10	0.04	0.08	0.02	0.02	0.15	0.08	0.12	0.03	0.11	0.18	0.06	0.11	0.02	0.01	0.11
CD@5%	0.30	0.31	0.09	0.06	0.32	0.12	0.25	0.07	0.08	0.44	0.24	0.37	0.09	0.33	0.54	0.18	0.35	0.06	0.05	0.32

\*Each value represents the average of three determinations

T<sub>0</sub> = Control sample

T<sub>3</sub> = Standardised sample containing 73% colostrum and 15% sterile milk

A = Standardised sample T<sub>3</sub> with 0.5% sorbitol, 300 ppm sodium benzoate B = Standardised sample T<sub>3</sub> with 0.5% sorbitol, 100 ppm potassium sorbate.

C = Standardised sample T<sub>3</sub> with 0.5% sorbitol, 200 ppm sodium benzoate and 50 ppm potassium sorbate. NA= Not Analyzed further due to spoilage

**Table 4:** Effects of addition of preservatives on sensory quality of Kharwas samples at refrigerated temperature (7±2 °C)

Days	Organoleptic qualities																			
	Color and Appearance					Taste and flavour					Body and texture					Overall acceptability				
	T0	T3	A	B	C	T0	T3	A	B	C	T0	T3	A	B	C	T0	T3	A	B	C
0	8	8	8	8	8	8	8.2	8.2	8.2	8.2	6.8	8.5	8.4	8.5	8.5	7.6	8.2	8.1	8.2	8.2
4	6.6	7.3	7.5	7.5	7.5	6.5	7.3	7.6	7.8	7.9	5.6	7.1	7.4	7.5	7.8	6.2	7.2	7.5	7.6	7.7
8	4.7	7	7.1	7	7.3	4.6	7	7.2	7.4	7.5	4.6	6.8	7	7.3	7.4	4.6	6.9	7.1	7.2	7.4
12	NA	6.3	6.5	6.5	6.9	NA	6.2	6.6	6.8	6.8	NA	6.2	6.4	6.5	6.7	NA	6.2	6.5	6.6	6.8
16	NA	5.7	6.1	6	6.4	NA	5.6	6.2	6.4	6.5	NA	5.3	5.5	6.3	6.4	NA	5.5	5.9	6.2	6.4
20	NA	4.5	5.5	5.5	5.6	NA	4.7	5.4	5.6	5.7	NA	4.6	5	5.5	5.5	NA	4.6	5.3	5.5	5.6
24	NA	NA	4.9	4.8	5.4	NA	NA	4.9	4.9	5.5	NA	NA	4.5	4.6	5.3	NA	NA	4.7	4.7	5.4
28	NA	NA	NA	NA	4.7	NA	NA	NA	NA	4.6	NA	NA	NA	NA	4.5	NA	NA	NA	NA	4.6
SE	0.21	0.10	0.02	0.04	0.63	0.23	0.06	0.03	0.03	0.64	0.15	0.16	0.02	0.04	0.62	0.10	0.09	0.02	0.03	0.58
CD@5%	0.64	0.32	0.08	0.13	1.92	0.72	0.20	0.09	0.12	1.96	0.45	0.50	0.06	0.13	1.86	0.30	0.27	0.08	0.10	1.75

\*Each value represents the average of three determinations

T<sub>0</sub> = Control sample.

T<sub>3</sub> = Standardised sample containing 73% colostrum and 15% sterile milk.

A = Standardised sample T<sub>3</sub> with 0.5% sorbitol, 300 ppm sodium benzoate B = Standardised sample T<sub>3</sub> with 0.5% sorbitol, 100 ppm potassium sorbate.

C = Standardised sample T<sub>3</sub> with 0.5% sorbitol, 200 ppm sodium benzoate and 50 ppm potassium sorbate. NA= Not Analyzed further due to spoilage.

### Effect of addition of preservatives on sensory analysis

Kharwas samples packed in polypropylene cups were stored at ambient and refrigerated temperature and analyzed at a particular interval of days regularly for its overall acceptability. In the present study, attempts were made to study the effect of different preservatives on shelf life of kharwas. For that various treatments were carried out which involves

1. Addition of sodium benzoate (300 ppm) and 0.5 per cent Sorbitol (A).
2. Potassium sorbate (100 ppm) and 0.5 per cent Sorbitol (B).
3. A combination of sodium benzoate (200 ppm), potassium sorbate (50 ppm) and 0.5 per cent Sorbitol (C).

The effect of the above treatments on product quality were studied in comparison with a control and standardized kharwas sample T<sub>3</sub> (without preservative).

The sensory examination showed that the overall acceptability scores of control sample of Kharwas sample were within acceptable limit upto one day, when stored at 30 °C and up to 6 days when stored at 7 °C, while T<sub>3</sub> sample shows acceptable limit upto 2 days, when stored at 30 °C and up to 16 days when stored at 7 °C. Overall acceptability score Kharwas samples were the average of flavor score, colour and appearance score and body texture score. On the other hand Kharwas sample A and B showed better sensory quality and

lesser chemical deterioration upto 2 days and 20 days of storage at 30 °C and 7 °C, respectively. Sample C showed deterioration upto 4 days and 24 days of storage at 30 °C and 7 °C. Table 3 and 4 showed that due to the synergistic effect of Sodium benzoate and Potassium sorbate on sample C, sensory scores were very much better than the other samples it does not gets fallen very quickly and product remain acceptable for 4 days at 30 °C and 24 days at 7 °C. Sample C showed prolong shelf life because both the chemical preservatives showed the desirable results in combination than either of the other two samples on the basis of sensorial score. So, it was use for future microbial study. Prolonged storage of the treated product for the above said periods showed off- flavor, foul smell and mould growth.

### Microbial quality of Kharwas

Table 5 and 6 revealed that as compared to the control sample (T<sub>0</sub>) and (T<sub>3</sub>), sample (C) shows reduction in microbial counts and higher shelf life. It was due to the action of preservatives, and results were found similar to (Malhotra, 1998) [21] as 200 ppm Sodium Benzoate and 50 ppm potassium sorbate for the preservation of khoa and it remains palatable up to 24 days. Similar results were obtained by (Jha *et al.*, 1977) [14] as bacterial and yeast and mould count inhibited by addition of potassium sorbate (0.20 to 0.30 per cent) in khoa extends its shelf life up to 11 days at 30 °C upto 40 days at 5 °C. (Kadian, 2000) observed similar results that

kheese treated (0.20 to 0.25%) potassium sorbate stored in polythene bag by wrapping with butter paper in air tight tin container at  $7 \pm 2$  °C had 30 days shelf life.

The microbial count of the sample (T0), (T3) and treatment (C) was found specified limit for a particular interval period, given by FSSAI, 2015<sup>[6]</sup> microbial standards for khoa and khoa based sweets.

**Table 5:** Microbial analysis of Kharwas samples stored at ambient temperature ( $30 \pm 2$  °C)

Storage period of Samples	Microbial quality (cfu/g)								
	TPC (cfu/g)			Yeast and mold count (cfu/g)			Coliform count (cfu/g)		
	T0	T3	C	T0	T3	C	T0	T3	C
0	ND	ND	ND	ND	ND	ND	ND	ND	ND
2	73x10 <sup>3</sup>	38x10 <sup>3</sup>	35x10 <sup>3</sup>	4.8x10	3.6x10	2.0x10	ND	ND	ND
4	NA	NA	50x10 <sup>3</sup>	NA	NA	3.8x10	ND	ND	ND

\*Each value is the average of three determinations

T0 = Control sample

T3 = Standardised sample containing 73% colostrum and 15% sterile milk

C = Standardised sample T3 with 0.5% sorbitol, 200 ppm sodium benzoate and 50 ppm potassium sorbate.

ND = Not Detected any microbial count NA= Not Analyzed further due to spoilage.

**Table 6:** Microbial analysis of Kharwas samples stored at refrigerated temperature ( $7 \pm 2$  °C)

Storage period of Samples	Microbial quality (cfu/g)								
	TPC (cfu/g)			Yeast and mold count (cfu/g)			Coliform count (cfu/g)		
	T0	T3	C	T0	T3	C	T0	T3	C
0	ND	ND	ND	ND	ND	ND	ND	ND	ND
4	62x10 <sup>3</sup>	21x10 <sup>3</sup>	9x10 <sup>3</sup>	2.7x10	1.6x10	1.0x10	ND	ND	ND
6	70x10 <sup>3</sup>	46x10 <sup>3</sup>	12x10 <sup>3</sup>	4.9x10	2.9x10	1.4x10	ND	ND	ND
8	NA	56x10 <sup>3</sup>	25x10 <sup>3</sup>	NA	3.6x10	2.8x10	ND	ND	ND
12	NA	65x10 <sup>3</sup>	34x10 <sup>3</sup>	NA	4.1x10	3.2x10	ND	ND	ND
16	NA	72x10 <sup>3</sup>	43x10 <sup>3</sup>	NA	4.8x10	3.8x10	ND	ND	ND
20	NA	NA	57x10 <sup>3</sup>	NA	NA	4.2x10	ND	ND	ND
24	NA	NA	69x10 <sup>3</sup>	NA	NA	5.0x10	ND	ND	ND

\*Each value is the average of three determinations.

T0 = Control sample.

T3 = Standardised sample containing 73% colostrum and 15% sterile milk.

C = Standardised sample T3 with 0.5% sorbitol, 200 ppm sodium benzoate and 50 ppm potassium sorbate.

ND = Not Detected any microbial count.

NA= Not Analyzed further due to spoilage.

## Conclusion

Addition of food additives like Sodium benzoate, Potassium sorbate (individually and in combination) and sorbitol helps to increase the shelf life of kharwas. Better effectiveness of preservatives was observed in combination treatment i.e. 200ppm Sodium benzoate 50ppm Potassium sorbate and 0.5% sorbitol showed increase in shelf life up to 4 days and 24 days at 30 °C and 7 °C storage temperature respectively.

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