

Original Research Article

<https://doi.org/10.20546/ijcmas.2017.609.201>

Effect of Sodium benzoate and Potassium sorbate on the Shelf Life of *Kheer*

Satish Kumar, J.P. Sriwastav and Virendra Kumar*

Department of Animal Husbandry and Dairying, C. S. Azad University of Agriculture and Technology, Kanpur-208002, India

*Corresponding author

ABSTRACT

Keywords

Kheer, Payasam, Organoleptic quality, Preservatives, Sodiumbenzoate, Potassiumsorbate, Shelf life.

Article Info

Accepted:
19 July 2017
Available Online:
10 September 2017

Investigation was carried out on the influence of two different preservatives viz. Sodium benzoate and Potassium sorbate (0.1% and 0.2%, respectively on the basis of finished product) on chemical, microbiological and sensory changes in *Kheer* packed in plastic cups and stored at ambient (30°C) and commercial refrigeration 7°C. Irrespective of storage temperature addition of two preservatives Sodium benzoate and Potassium sorbate into *Kheer* at final stage of its preparation helped in lowering down the rate of increase in titrable acidity, suppressed microbial growth and retarded deterioration of organoleptic quality, though the deterioration was faster at ambient condition. *Kheer* samples treated with Sodium benzoate and Potassium sorbate, individually, were found acceptable upto 5 days and 25 days at 30°C and 7°C storage temperature respectively.

Introduction

Kheer is also called *Basundhi* (De, 1993) *Payas*, *Payasam* and *Palpayasam* in various part of the country. It is prepared by desiccating milk partially with small quantity of rice soaked in water. Cane sugar and dry fruits are also some time mixed to enhance its taste, besides, cardamom and saffron are also mixed to improve its smell and colour. It is considered to be a very notorious food for all age groups. It is characterized with sweet, nutty and pleasant flavor which is highly acceptable to the Indian palate. The product (*Kheer*) could not achieve market due to its scattered nature of production with a lot of variation in its method of manufacture,

chemical composition and due to very short storage life (Jha, 2000). This is one of the important reason due to which its industrial production was hampered.

Sodium benzoate widely used a food preservative in the various food products is permitted under the FPA Rules, 1955 as well as fruit product order 1955. In India under the FPA rules (1976) addition of Potassium sorbate and Potassium metabisulphite is permitted in canned *rassogolla*, but to a limited extent only. This investigation was therefore, undertaken to assess the shelf-life enhancement of *Kheer* treated with Sodium

benzoate (C₇H₅O₂Na) and Potassium sorbate (C₇H₅O₂K) individually and stored at 30⁰C and 7⁰C respectively.

Materials and Methods

Milk

Fresh mixed cow milk was procured from the experimental dairy farm of the university.

Sugar

Commercial grade white crystalline cane sugar was used as sweetening agent free from dust, dirt and any other foreign impurities purchased from the local market of Kanpur city.

Rice

Rambhog rice free from foreign materials purchased from the local market of Kanpur city.

Kheer was prepared according to the method of De *et al.*, (1976) and Rangappa and Achaya (1973) with some modification. Weighed quantity of fresh cow milk was transferred in to a clean stainless steel *Karahi* through muslin cloth. Heating of milk was started slowly then briskly. After boiling of milk the weighed amount of rice @ 5% of milk weight, which is washed with cold water and soaked in lukewarm water for a predetermined time, was added after draining water. To avoid burning of milk solids, continuous stirring and scraping was done with the help of stainless steel ladle. As soon as the proper cooking of rice and desired total solids were achieved, the required amount of sugar was added and contents were brought just to boiling. The product (*Kheer*) was then divided into three equal part. In the first and second portion of the product (*Kheer*) Sodium benzoate and potassium sorbate were added at the rate of 0.1 and 0.2 per cent respectively,

on the basis of finished product and third one is leave without any additives as control. Each trial replicated thrice.

Packaging and storage

Finished product was packaged in clean and pre-sterilized plastic cups and sealed by laminated aluminum foil and placed in an incubator at 30±1⁰C.

Sample stored under refrigeration were analyzed at five days and incubator were after one day's intervals, respectively. Storage was continued until the sensory quality of sample become unacceptable.

Kheer samples were tested for moisture (BIS, 1981), fat (IS: 24, (Part II), 1977), Protean (Devis and Mac Denold, 1953), lactose [IS: 1479 (part II), 1961], sucrose (BIS,1981) and ash content (ICAR, 1951).During storage the *Kheer* samples were analyzed for changes in moisture (BIS, 1981), tritable acidity (TA) as per cent lactic acid (BIS 1981),and lactose [IS: 1479, (Part-II), 1961] (Table 1).

Microbiological examination

The standard plate count (SPC)/g, coli form count/g and moulds counts (YMC)/g in *Kheer* were determined by using Standard Plate Count Agar Violet Red Bile Agar (VRBA) and Potato Dextrose Agar (PDA), respectively (APHA, 1978).

Sensory evaluation

The fresh and stored *Kheer* samples were subjected to sensory evaluation, immediately after opening by a panel of seven semi trained judges using a nine point hedonic scale (Amerine *et al.*, 1965) at a regular interval. The *Kheer* samples were scored for flavor, colour and appearance, sweetness and overall acceptability separately. Sample without any additive s were used as control.

Table.1 Effect of addition of sodium benzoate (T₁) and potassium sorbate (T₂) on the organoleptic, chemical and microbial quality of *Kheer* stored at 30 °C and 7°C

Type of treatment	Storage Temperature															
	30°C								7°C							
	Storage Days	OA	TA	Moisture	Lactose	SPC/g	Coil/g	YMC/g	Storage Days	OA	TA	Moisture	Lactose	SPC/g	Coil/g	YMC/g
Control	0	8.51	0.161	60.69	8.56	1421.52	0.000	0.000	0	8.51	0.161	60.69	8.56	1421.52	0.000	0.000
	1	8.20	0.190	60.68	8.54	4075.23	32.48	3.94	5	8.20	0.167	60.65	8.55	2357.25	3.946	3.933
	2	6.00	0.220	60.66	8.53	9537.64	63.251	13.58	10	7.50	0.185	60.66	8.54	3625.23	13.58	15.56
	3	5.80	0.242	60.64	8.52	16481.64	138.41	64.01	15	6.72	0.275	60.65	8.53	6485.64	25.01	125.19
	4	5.66	0.265	60.63	8.51	31018.52	215.14	181.12	20	5.35	0.299	60.50	8.52	9118.52	55.02	154.01
	5	5.25	0.320	60.63	8.50	65478.06	524.23	250.02	25	4.83	0.320	60.52	8.52	9935.20	175.06	258.15
Sodium benzoate (T ₁)	0	8.43	0.164	60.69	8.56	1337.21	0.000	0.000	0	8.43	0.164	60.69	8.56	1337.21	0.000	0.000
	1	8.30	0.175	60.67	8.55	1988.31	0.000	0.000	5	8.20	0.170	60.66	8.55	1498.31	0.000	0.000
	2	8.00	0.180	60.66	8.54	3605.50	10.00	0.305	10	7.95	0.174	60.61	8.55	2039.50	0.000	2.000
	3	7.75	0.188	60.63	8.54	7827.02	25.14	1.390	15	7.82	0.178	60.58	8.54	3246.03	0.300	8.300
	4	7.45	0.196	60.62	8.53	14345.16	32.44	4.953	20	7.60	0.184	60.52	8.53	4815.26	1.390	12.50
	5	7.30	0.200	60.62	8.53	35431.35	125.64	20.210	25	7.35	0.195	60.45	8.52	5431.35	4.551	34.95
Potassium sorbate (T ₂)	0	8.42	0.163	60.69	8.56	1415.54	0.000	0.000	0	8.42	0.163	60.69	8.55	1347.05	0.000	0.000
	1	8.25	0.172	60.67	8.54	2260.43	0.000	0.000	5	8.30	0.168	60.65	8.55	1425.53	0.000	0.000
	2	8.00	0.177	60.66	8.54	4835.13	2.120	0.300	10	7.95	0.173	60.62	8.55	1849.62	0.306	8.308
	3	7.80	0.185	60.64	8.53	8235.24	10.420	2.780	15	7.75	0.182	60.56	8.54	2081.13	2.780	12.78
	4	7.55	0.195	60.62	8.53	16045.32	25.530	4.960	20	7.35	0.186	60.52	8.53	2812.54	14.960	14.96
	5	7.25	0.210	60.62	8.52	3885.42	132.60	19.370	25	7.15	0.192	60.46	8.53	3825.66	9.530	39.37

Result and Discussion

The sensory examination showed that the overall acceptability scores of control *Kheer* sample were within acceptable limit upto one day, when stored at 30⁰C and up to 10 days when stored at 7⁰C. Overall acceptability score *Kheer* samples were the average of flavor score, colour and appearance score and body texture score. On the other hand *Kheer* sample treated with sodium benzoate and potassium sorbate individually showed better sensory quality and lesser chemical deterioration upto 5 days and 25 days of storage at 30⁰C and 7⁰C, respectively. Prolonged storage of the treated product for the above said periods gave off- flavor and discoloration.

The freshly prepared *Kheer* samples had 60.70% moisture, 8.48% fat, 7.56% protean, 8.56% lactose, 14.7% sucrose and 1.42% ash. The result relating to chemical changes of *kheer* during storage presented in table 1. Addition of either the two preservatives improved the storage quality of *Kheer* as determined by the changes in different chemical indices. In general, the chemical changes were higher at 30⁰C than at 7⁰C. The rate of decrease in moisture content of *kheer* was quite similar to control and sample treated with additives. The initial titrable acidity of T₁ and T₂ *Kheer* (0.164 and 0.163) was slightly higher than that of control samples (0.161) probably due to the decomposition of salt. During storage irrespective of temperature of storage, rate of increase in titrable acidity was higher in control sample of *Kheer* than the treated samples.

There was a marked reduction in microbial counts in the Sodium benzoate and Potassium sorbate treated *Kheer* sample throughout the storage period. Sodium benzoate had reducing effect on standard plate count coli form

counts. These results have more conformity to the findings of Patel *et al.*, (1985) and Kaushik *et al.*, (2000) who studied the effect of Potassium metabisulphite on the shelf life of *Kheer* and effect of Sodium metabisulphite and Potassium metabisulphite on the shelf life of cow milk *Burfi*, respectively.

References

- Amerine, M.A., Pangborn, R.M. and Roessler, E.B. 1965. Principles of Sensory Evaluation of Food. Academic Press Inc. New York.
- APHA, 1978. Standard Methods for the examination of Dairy Products Ed.; 12 American Public Health Association, Washington. D.C., USA.
- BIS, 1981. Methods test for dairy industry part-II. Chemical analysis of milk. Bureau of Indian Standards, Manak Bhawan, New Delhi.
- De, S., 1993. Outlines of Dairy Technology. Oxford University Press, New Delhi, 2nd Impression p.384.
- De, S., Thempinkson, D.K., Gahlot, D.P. and Mathur O.M. 1976. Studies on methods of preparation and preservation of *kheer*. *Indian J. Dairy Sci.*, 29(2):316-318.
- Devis, J.G., and Mac Denold F.J. 1953. Determination of Protein by Kjeldahl's method. Richmond Dairy Chemistry, Charles Criffin and Co.Ltd. London, Ed. 5th pp. 361.
- ICAR, 1950. Standard method for the examination and analysis of milk and milk products other than Ghee. Bulletin No. 70. The manager publications, New Delhi. 1:1-2.
- IS: 1224 1977. Determination of cheese fat by Greber's method, part-II, Bureau of Indian Standards, Manak Bhawan, New Delhi.
- IS: 1479 1961. Methods of test for dairy industry part-II. Chemical analysis of milk. Bureau of Indian Standards,

- Manak Bhawan, New Delhi.
- Jha, A., 2000. Development of process for long life *Kheer* and instant *Kheer* mix. Ph. D. Thesis, N.D.R.I., Karnal (India).
- Kaushik Sarkar, P.R. Ray and P.K. Gatak 2002. Effect of sodium and potassium metabisulphites on the shelf life of cow milk *Burfi*. *Indian J. Dairy Sc.* 55(2)79-82.
- Patel, K.H., Sai Prakash, B. and Sharma, R.S. 1985. Effect of sodium and Potassium metabisulphate on the shelf life of *Kheer*. *Asian J. of Dairy Research*.4:87.
- Preservation of Food Adulteration Rules. 1955. Ministry of health and family Welfare, New Delhi.
- Preservation of Food Adulteration Rules. 1976. Ministry of health and family Welfare, New Delhi.
- Rangappa, K.S., and Acharya, K.T. 1973. The chemistry and manufacturer of Indian Dairy Products. Asian Publishing House, Bombay, 109, p.324.

How to cite this article:

Satish Kumar, J.P. Sriwastav and Virendra Kumar. 2017. Effect of Sodiumbenzoate and Potasiumsorbate on the Shelf Life of *Kheer*. *Int.J.Curr.Microbiol.App.Sci.* 6(9): 1634-1638. doi: <https://doi.org/10.20546/ijcmas.2017.609.201>