

Studies on development and standardization of sterilized carrot *Kheer*

■ Mehar Afroz Qureshi, B.K. Goel, P.K. Khan, Archana Khare and S. Uprit

Received : 10.04.2018; Accepted : 13.04.2018

See end of the Paper for authors' affiliation

Correspondence to :

Mehar Afroz Qureshi
College of Dairy Science and
Food Technology, Chattisgarh
Krishi Vishwavidyalaya,
Raipur (C.G.) India

■ **Abstract** : It is a common practice in Indian continent to consume milk along with cereals, fruits and vegetables. Carrot is most commonly used vegetables for preparation of the carrot *Halwa* and carrot *Kheer* in the northern and central part of the India. It is a highly nutritious and popular product. Since carrot is available for a short duration in the market, the availability of these products throughout the year is a problem. An attempt is made here to develop and standardize carrot *Kheer* to extend its shelf-life. For preparation of the carrot *Kheer* shredded carrot was cooked in presence of ghee to develop characteristic flavour. Other ingredients like milk, sugar and dry fruits were then added to it and the whole mass was cooked till the desired consistency was obtained. Shredded carrot was added at three different levels of 20, 30 and 40 per cent with 8 per cent sugar. No other artificial flavouring and colouring materials were added in the products. The prepared carrot *Kheer* were sterilized and then stored at room temperature. The sensory quality of the *Kheer* was evaluated using 9 point Hedonic scale for its different attributes. The carrot *Kheer* containing 30 per cent shredded carrot was preferred most by the judges. The overall acceptability of the fresh samples of *Kheer* was 7.50 and at the end of the 28 days of storage period the score of the corresponding samples was 6.50. The carrot *Kheer* using shredded carrot at 30 per cent concentration contained 8.2 per cent fat, 33.30 per cent total solids, 0.17 per cent acidity in terms of lactic acid, and 21.10 °Brix TSS.

■ **KEY WORDS** : Carrot *Kheer*, Sterilization, Milk, Homogenization, Carotenoids

■ **How to cite this paper** : : Qureshi, Mehar Afroz, Goel, B.K., Khan, P.K., Khare, Archana and Uprit, S. (2018). Studies on development and standardization of sterilized carrot *Kheer*. *Internat. J. Agric. Engg.*, **11**(Sp. Issue): 193-196, DOI: 10.15740/HAS/IJAE/11 Sp. Issue/193-196. Copyright@2018: Hind Agri-Horticultural Society.

The Traditional Indian Dairy products are the products of masses being made in India since time immemorial and have great social, religious, cultural, medicinal and economic importance. The traditional milk products provide the means of preserving precious milk solids for a comparatively longer time than the fluid milk whose shelf-life under Indian tropical conditions is only 5-6 h at ambient temperature (Pal, 2000).

The addition of cereals, fruits, fruit pulps and vegetables in the milk results into value addition in terms of nutrition and the resultant products are tastier, healthier and nutritious (Aneja *et al.*, 2002). Such types of products are also very useful for infants and growing children's because it provides nourishment essential nutrients for the body growth and maintenance in infants.

Traditionally vegetable based milk products have been produced for centuries in many countries. Most of

these products are home made and prepared by using varieties of vegetables. Despite their nutritional significance and popularity, the milk- vegetables have remained confined to the domestic kitchen, and not yet available in Indian market. The different types of vegetable based milk products are *Sabbaki payasams*, *Sabudana kheer*, *Kaddu ki kheer*, *Lauki kheer*, *Gajar ki kheer*, *Gajar halwa*, *Lauki halwa*, etc.

An attempt was made for manufacturing of sterilized carrot *Kheer* with a broad objectives to

- Formulate and standardize the carrot *Kheer*.
- Study the shelf-life behavior of the sterilized products.
- Study the physicochemical and sensory properties of carrot *Kheer*.

Carrot is highly valued for it's highest of carotene content (2400 to 3000 ug/g). Carrot requires a long growing season and its harvesting period is limited (Machewad *et al.*, 2003). Carrot is known for its valuable nutrients *viz.*, carotene and carotenoids besides appreciable amounts of b₁, b₂, b₆ and b₁₂ vitamins and minerals (Walde *et al.*, 1992). Carotenoids are important micronutrients for human health (Castemiller and West, 1998).

The high intake of carotenoid rich vegetables and fruits and blood levels of b₁ – carotene are associate with decreased incidence of some cancers (Torronen *et al.*, 1996), age related macular degeneration characters, coronary heart disease or cardiovascular disease and other diseases and pathological processes (Sulaeman *et al.*, 2001). Besides having pro vitamin A activity, dietary intakes of carotenoids have also been shown posses anti ageing and anti ulcer properties (Speek *et al.*, 1988 and Sharma *et al.*, 2000). Since, carrot is one of the most nutritious vegetables assumed in the raw and processed form, which is rich in the carotenoids content.

■ METHODOLOGY

Raw materials :

The fresh cow milk containing 4.1% fat was collected from a private dairy farm located near the college of dairy technology, Raipur. The cane sugar and fresh carrot was procured from the local market.

Preparation of sterilized carrot *Kheer* :

The flow chart for manufacturing of carrot *Kheer* is shown in Fig. A. The three batches of carrot

Kheer were prepared by adding different concentration of shredded carrot *i.e.* 20%, 30%, and 40% with respect to quantity of milk.

The sugar 8%, *Ghee* 3% and dry fruits (almond, resin, and cashewnut) 2.5% were used with respect to the quantity of milk. For manufacturing carrot *Kheer* predetermined quantity of shredded carrot was taken and it was cooked in slow fire with the required quantity of *Ghee* till the development of desired flavour. Then dry fruits, sugar and milk was added in it and cooked till the required concentration and consistency of product was obtained.

Then, *Kheer* was filled in cleaned glass bottles and sealed it by using bottle caping machine. These sealed bottles were sterilized at 118-121°C/15 min. Then it was cooled and stored at room temperature for sensory evaluation and chemical analysis.

Analysis :

The sensory evaluation of fresh and stored samples of carrot *Kheer* with three different concentrations of shredded carrot *i.e.* 20%, 30%, and 40% was carried out. The sensory evaluation was performed by the panel of 6 judges based on a 9-point Hedonic scale at a regular interval of 7 days. Data obtained were subjected to statistical analysis in split plot design in RBD.

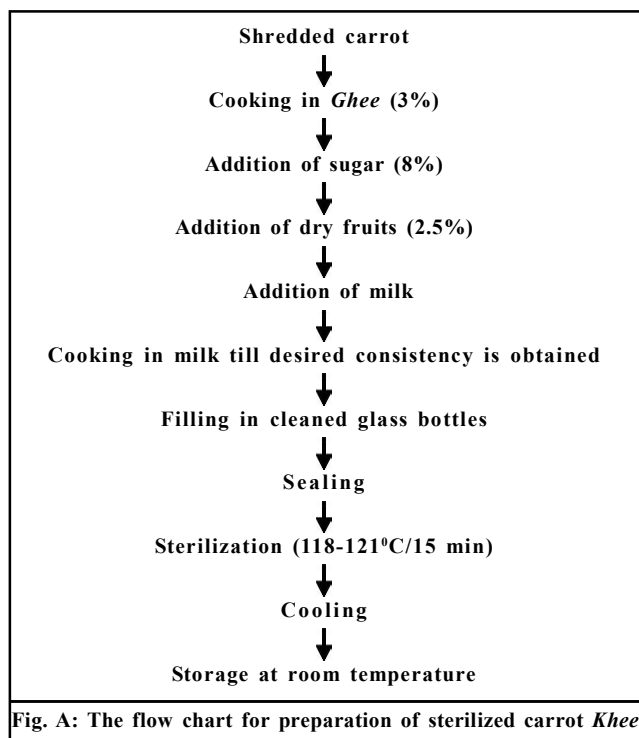


Fig. A: The flow chart for preparation of sterilized carrot *Kheer*

The flavoured milk and milk were analyzed for chemical parameters like fat by Gerber method, TS by gravimetric method, acidity by titration method as per ISI (1981). The pH was determined by using a systronic digital pH meter at 250C and Total Soluble Solids was determined in 0Brix, using a hand refractometer as per Rangana (1986).

■ RESULTS AND DISCUSSION

The carrot *Kheer* was prepared using three different concentrations of shredded carrot [20%(K), 30% (K), and 40%(K3)]. The product was analyzed for TS, pH, acidity, TSS and fat per cent. The physico-chemical characteristics of fresh *Kheer* prepared with different concentration of shredded carrot are detailed in Table 1.

From the observation shown in Table 1, different concentrations of shredded carrot affect the fat percentage of the samples. The fat percentage of K₁, K, K, were found to be 8.4, 8.2, and 8.1, respectively.

Similarly it was observed that the acidity and pH of the samples were not affected by the different concentrations of shredded carrot. The acidity and pH were found to be 0.17 and 6.3, respectively for each of the samples. The TS percentage of K₁, K₂ and K₃ were found to be the 32.0, 33.3 and 33.6 per cent, respectively which indicate that the TS of the samples increase when the concentration increases. The TSS of the K, K, and K₃ samples is 21.30, 21.10, and 20.90, respectively, which do not show any effective difference.

The samples of carrot *Kheer* were subjected to sensory evaluation using 9-point hedonic scale with some modification by the panel of six judges. The average scores obtained by the sensory evaluation of different

samples are presented in Table 2.

The sensory scores of carrot *Kheer* on overall acceptability characteristics are presented in Table 2. The overall acceptability scores of the three samples of carrot *Kheer* i.e. K₁, K₂, and K₃ are 7.67, 8.50, and 7.84, respectively. The K₂ treatment of carrot *Kheer* posses the optimum colour, mouthfeel, and overall flavour, which makes it more acceptable.

The sensory evaluation of the carrot *Kheer* was also done by a regular interval of 7 days to know the sensory quality and overall acceptability of the product during storage period. The overall acceptability of the carrot *Kheer* was found to be good at the end of 28 days of storage period. The score in fresh condition for K₁, K₂, and K₃ samples were recorded to be 7.67, 8.50, and 7.84, respectively and at the end of 28 days of storage period the scores of corresponding samples were found to be 6.17, 6.84, and 6.67, respectively.

The effect of treatment and effect of days of storage are statistically significant at 5% level of significance on overall acceptance of the product. The interaction between the treatment and storage period is found to be non significant. It means the effect of different concentration of carrot affect the overall acceptability of the product. The storage period also affect the overall acceptability. The overall acceptability of the product reduced in the progress of storage period.

Carrot *Kheer* prepared by taking 8% sugar, 3% *Ghee*, 2.5% dry fruits and 30% shredded carrot concentration with respect to milk was preferred mostly by the panel of trained judges. Despite the preference, acceptability and nutritional quality of the carrot based milk product, it also improved the shelf-life and palatability

Table 1 : Physico-chemical characteristics of fresh carrot *Kheer* with different levels of shredded carrot

| Sr. No. | Shredded carrot concentration | Fat | Acidity | pH | TS | TSS |
|---------|-------------------------------|-----|---------|-----|------|-------|
| 1. | K ₁ (20%) | 8.4 | 0.17 | 6.3 | 32.0 | 21.30 |
| 2. | K ₂ (30%) | 8.2 | 0.17 | 6.3 | 33.3 | 21.10 |
| 3. | K ₃ (40%) | 8.1 | 0.17 | 6.3 | 33.6 | 20.90 |

Table 2 : Effect of carrot concentration on sensory characteristics of fresh carrot *Kheer*

| Sr. No. | Carrot concentration | Colour and appearance | Sensory characteristics | | | Mouth feel | Overall acceptability |
|---------|----------------------|-----------------------|-------------------------|-----------|---------|------------|-----------------------|
| | | | Flavour | | | | |
| | | | IOC | Sweetness | Overall | | |
| 1. | K ₁ | 6.34 | 6.34 | 7.84 | 7.67 | 7.50 | 7.67 |
| 2. | K ₂ | 7.50 | 6.50 | 7.67 | 8.50 | 7.84 | 8.50 |
| 3. | K ₃ | 7.84 | 7.67 | 7.5 | 7.84 | 7.50 | 7.84 |

of the product. The carrot *Kheer* posse better shelf-life and was well within acceptable limit upto 1 month of storage at room temperature due to the sterilization process.

Authors' affiliations:

P.K. Khan, Department of Life Science, Pt. Ravishankar Shukla University, Raipur (C.G.) India

B.K. Goel, Archana Khare and S. Uprit, College of Dairy Science and Food Technology, Chattisgarh Krishi Vishwavidyalaya, Raipur (C.G.) India

■ REFERENCES

Aneja, R.P., Mathur, B.N., Chandan, R.C. and Banerjee, A.K. (2002). Technology of Indian Milk Products, Dairy India. 349-364.

Castemillar, J.J.M. and West, C.E. (1998). Bioavailability and bioconversion of carotenoids. *Anmn. Rev. Nutr.*, **18**: 19-38.

IS: (SP: 18), "ISI Handbook of Food Analysis, Part XI: Dairy Products," Indian Standards Institution, New Delhi, 1981.

Machewad, G.M., Kulkarni, D.N., Pawar, V.D. and Surve, V.D., (2003). Studies on dehydration of carrot (*Panchus carota* L.) *J. Food. Sci. Technol.*, **40**(4): 406-408.

Pal, Dharm (2000). Technological Advances in the

manufacture of heat desiccated traditional Indian milk products *Control for Fruit and Vegetable Products*. Tata McGraw-Hill Publishing Company, New Delhi, India. pp. 124-125.

Sharma, G.K., Semwal, A.D. and Arya, S.S. (2000). Effect of processing salt treatments on the carotenoids composition of dehydrated carrots. *J. Food. Sci. Technol.*, **37**: (2): 196-200.

Speek, A.J., Speek Saichna, S. and Schreurs, W.H.P. (1988). Total carotenoids and b-carotene contents of thai vegetables and the effect of processing. *Food Chem.*, **27**: 245-257.

Sulaeman, A., Keeler, L., Giraud, D.W., Taylor, S.L., Wehling,

R.L. and Driskel, J.A. (2001). Carotenoid content and physicochemical and sensory characteristics of carrot chips deep fried in different oils ant several temperatures. *Food. Sci.*, **66** (9): 1257-1264.

Törrönen, R., Lehmusaho, M., Häkkinen, S., Hänninen, O. and Mykkänen, H. (1996). Serum b-carotene response to supplementation with raw carrots, carrot juice of purified b-carotene in healthy non-smoking women. *Nutr. Res.*, **16** : 565-575.

Walde, S.G., Matn, R.G., Chakkarvarthi, A. and Rao, D.G. (1992). Preservation of carrots by dehydration techniques. A review. *Indian Food Packer*, **46**: 37-42.

11th
Year
★★★★★ of Excellence ★★★★★