Original Research

Development of Carotene Enriched Functional Ice Cream

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Abstract

An attempt was made to incorporate the carotene in the ice cream. Milk was supplemented with carrot juice at 10, 15 and 20 per cent levels. The carotene content of ice cream was analyzed on day 0, 3, 5 and 7 of storage and sensory quality of the ice cream was assessed by a panel of judges. The mean yield of carrot juice was 50.13 ± 11 per cent. The mean β-carotene content of milk, carrot juice, ice cream mix and ice cream were 0.45 ± 0.10, 60.25 ± 0.12, 7.91 ± 0.25 and 4.30 ±0.12 µg/ml respectively. The ice cream prepared by addition of 10 per cent w/v of the carrot juice was found to have acceptable colour and flavour as judged by the taste panel. The members of the taste panel could not differentiate the sensory quality of fresh and the stored ice cream. The daily requirement of vitamin A is 5000 IU. By the consumption of 150 ml of carrot enriched ice cream, about 10 per cent of the vitamin A daily requirement can be fulfilled.

Key words: Carotene Enrichment, Ice Cream, Sensory Evaluation

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Introduction

Vitamin A is essential for sight and cell differentiation. Deficiency of vitamin A results in night blindness and ultimately blindness, growth retardation, damage of mucous membrane, and reproductive disorders. Children with vitamin A deficiency are often deficient in multiple micronutrients and are likely to be anemic, have impaired growth and be at increased risk of severe morbidity from common childhood infections such as diarrheal diseases and measles. Pregnant women with vitamin A deficiency may be at increased risk of mortality. About 127 million preschool children are vitamin A deficient, which is about one-quarter of all preschool children in high-risk regions of the developing world. Provitamin A carotenoids, predominantly β-carotene (Edwards, 2001) and α - carotene are important sources of vitamin A, particularly in countries where vitamin A deficiency is prevalent and sources of preformed vitamin A are consumed infrequently (Underwood, 1984). Carotenes have been reported to be more bioavailable in

purified form than from foods (Jensen *et al*., 1985). Key meal-based factors in the bioavailability of carotenoids include the presence of fat and fibre and the nature and surface area of the food matrix itself (Castenmiller *et al.,* 1999), which may be altered by processing. Heat and/or homogenization have been shown to improve bioavailability of β - Carotene from green leafy vegetables (Castenmiller *et al.*,1999), carrots and tomatoes (van het Hof *et al.*, 2000) as assessed by change in serum β carotene. Plants, fungi and bacteria synthesize carotenoids de novo while animals do not and rather obtain carotenoids from the diet and are enzymatically altered to vitamin A (Miki, 1991). Carotenoids perform a variety of biological functions which include functioning as vitamin A precursors (Matsuno, 1991), scavenger and quencher against free radicals and active singlet oxygen (Miki, 1991), anti-cancer agents (Krinsky, 1989) and immune system enhancers.

Carotene supplementation of milk is very simple and easy to incorporate. The supplementation like iodine in salt, vitamin A in milk is being done in routine practice (Petrogianni *et al*., 2014). The objective of the research work was aimed to develop vitamin A fortified ice cream because vitamin A deficiency is highly prevalent among children and also in adults. The ice cream is selected as a food for vitamin A fortification since ice cream is consumed by all age groups of people as a delicacy. Hence, an attempt had been made to incorporate carotene in ice cream and make it as a functional food and there by address the vitamin A deficiency in the society.

Materials and Methods

The ice cream mix was prepared by incorporating ingredients viz. milk, butter, skim milk powder, sugar, stabilizer (Carboxy methyl cellulose) and emulsifier (Glycerol mono stearate). Fresh carrot was obtained from local vegetable market and washed with water, after removal of the superficial layer and carrot juice was extracted. The carotene content of the carrot juice was estimated by the method described by Sherry and Kristina (2002). Milk was supplemented with carrot juice at 10, 15 and 20 per cent levels. The milk was heated to 65°C and homogenized at 2500 and 500 PSI in a two stage homogenizer (Arbuckle, 1972). Ice cream mix of standard (IS: 2802, 1964) composition was prepared. The mix was heated to 80°C for 30 sec. Pasteurized mix was cooled to 5°C and aged at that temperature for 5 hours. After ageing the mix was frozen in a batch freezer and packed in cups for storage at -23°C. The carotene content of ice cream was analyzed on day 0, 3, 5 and 7 of storage and sensory quality of the ice cream was assessed by a panel of judges. The data was analyzed and interpreted as per Snedecor and Cochran (1989).

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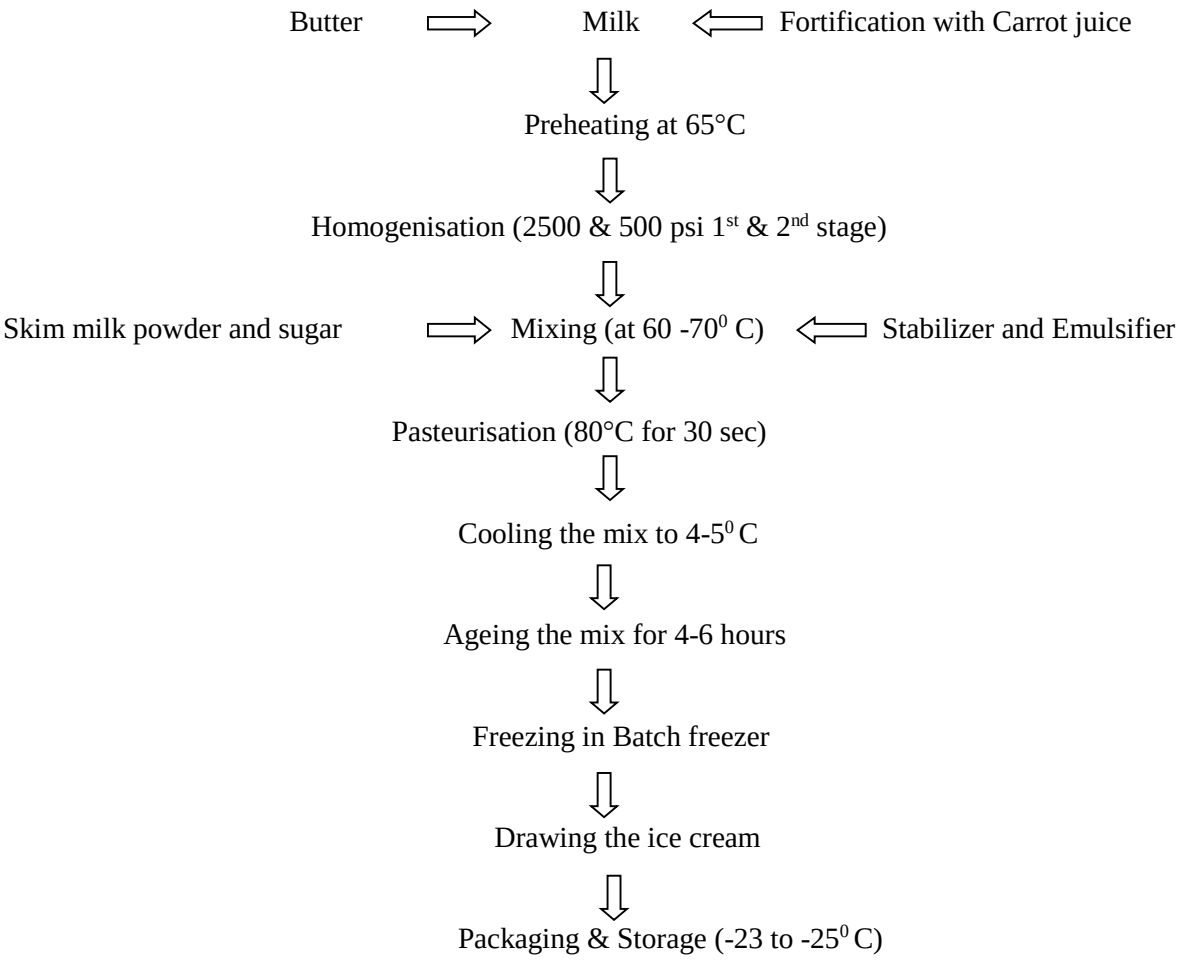
Process Flow Chart for the Preparation of Carotene Fortified Ice Cream



Results and Discussion

The mean yield of carrot juice was 50.13 ± 11 per cent. The mean β-carotene content of milk, carrot juice, ice cream mix and ice cream were 0.45 ± 0.10, 60.25 ± 0.12, 7.91 ± 0.25 and 4.30 ±0.12 µg/ml respectively (Table 1).

Table 1: Mean β carotene content of carrot milk and carrot juice (µg of β-carotene/ml)

S. No.	Name of the Materials	µg of β carotene / ml
1.	Milk	0.45 ± 0.10
2.	Carrot Juice	60.25 ± 0.12
3.	Carotene enriched ice cream mix	7.91 ± 0.25
4.	Carotene enriched ice cream	4.30 ± 0.12

(1.2 µg of β carotene is equivalent to 1 IU of vitamin A and 10 IU of vitamin A is equivalent to 1 Retinol equivalent)

Hamilton *et al.* (1985) reported the carotene content of 211 µg/ml of carrot juice. This variation may be due to strain variation in carrot. The estimated β-carotene content of the supplemented ice cream was less than the supplemented level. This may be attributed to destruction of β carotene due the heat treatment of ice

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cream mix and overrun in ice cream. There was no change in the carotene content on storage of ice cream. The ice cream prepared by addition of 10 per cent w/v of the carrot juice was found to have acceptable colour and flavour as judged by the taste panel. The members of the taste panel could not differentiate the sensory quality of fresh and the stored ice cream.

Conclusion

Intake of retinol in older people leads to an increased risk of hip fractures. Vitamin A stimulates osteoclasts - the cells that degrade bone and inhibits osteoblasts - the cells that build bone. Hence, the vitamin A requirement should be met by ingested beta-carotene that is probably the best way to get the vitamin A as the body only converts enough beta-carotene into vitamin A to meet its needs. Carrot juice could be used as a β-carotene supplement since it is cheap and easily available. The daily requirement of vitamin A is 5000 IU. By the consumption of 150 ml of carrot enriched ice cream, about 10 per cent of the daily requirement of vitamin A can be fulfilled.

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