



Development of carotene enriched pasteurized milk incorporated with carrot (*Daucus carota* L.)

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Vitamin A deficiency is common nutrient deficiency problem in many developing countries affecting large numbers of pre-school children. It is often associated with protein-energy malnutrition, parasitic infestation and diarrheal diseases. For many communities in developing countries, the major source of vitamin A in the diet is carotenoids. The main objective of the present study was to develop a carotene enriched pasteurized milk with incorporated carrot. After the standardization of milk fat to 3%, a preliminary experiment was conducted to select the suitable formulation using 250 ml of cow milk with steamed and blended carrot (15, 25 and 35 g) and sugar (15, 25 and 35 g). The sensory properties of the pasteurized milk were determined using 15 trained panelists on a five-point hedonic scale. The product containing milk (250 ml), carrot (25 g) and sugar (25 g) was selected as the best product considering its significantly higher ($P < 0.05$) sensory properties. Further improvements to the final product were done by adding flavor (cardamom, vanilla and mint) and the sensory properties of the improved product was determined in another round of sensory evaluation. Shelf-life of the improved product (cardamom added) was determined considering physicochemical (pH and titratable acidity) and microbiological (coliform, Total Colony Count, Yeast and Mould count) properties during storage at 4 °C for 5 days. The data of the sensory evaluation were analyzed using Kruskal-Wallis non parametric one way ANOVA method using STATISTIX software (Ver. 2.0) for WINDOWS. Beta-carotene (precursor of vitamin A) content of the developed product was quantitatively analyzed by using Open Column Chromatography (OCC) technique and the amount of Beta-carotene was 2.04 µg/g. This was 5 times more beta carotene than normal cow milk. The coliforms were absent in the final product whereas the Total Colony Count was less than 3.0×10^4 cfu/ml. The yeast & mould Count was one cfu/ml after 5 days of cold storage (4 °C). Physicochemical analytical results of the final product revealed that titratable acidity was 0.13-0.15%. Methylene Blue Reduction time of the final product was 6 hrs and 45min and alcohol test result was negative. The ash, total solid, fat and protein contents of the developed product were 0.92 %, 21.4 % , 3%, and 3.5 %, respectively. Beta carotene content was significantly ($P < 0.05$) higher in the developed product than the commercially available pasteurized milk packets. The shelf-life of the product was five days under refrigeration conditions (4 °C). It can be concluded that the carrot incorporated pasteurized milk can be effectively consumed as a healthy and nutritious drink especially to obtain sufficient amount of carotenoids for the body to prevent vitamin A deficiencies. Carotene enriched pasteurized milk products can commercially be produced to attract a health-conscious population in Sri Lanka.

Keywords: carrot, vitamin A deficiency, carotenoids, pasteurized milk, shelf-life