

DEVELOPMENT AND QUALITY EVALUATION OF COCONUT MILK BASED SOFT ICE CREAM

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Abstract

Ice cream is a frozen sweetened product made out of heat treated mix consisting of edible fat and milk solids with or without other ingredients and permitted additives. In this study coconut milk was used as the main substrate and the coconut soft ice cream was prepared with the help of an instant ice cream machine (Hitachi) which was set at a hardness level of 6.0. The objectives of this study were to develop coconut milk ice cream with 2 flavours (vanilla and chocolate), to determine the overall acceptance of vanilla flavoured and chocolate flavoured ice cream (sensory evaluation), to determine the overall acceptance of the treated ice cream and to find out the proximate composition of the best treated ice cream.

The vanilla ice cream consisted of 37.3% total solid, 9.32% fat, 30.6% sugar and 0.27% protein while the chocolate flavoured ice cream consisted of 38.1% total solid, 9.42% fat, 30.6% sugar and 0.27% protein. Acceptance testing was carried out to gather information on the liking of the products based on a 5-point hedonic scale. According to the sensory evaluation of both types of ice cream, 95% of the responses fell in 4 and 5 of the hedonic scale.

Keywords: Coconut ice cream, stabilizer, sensory properties, proximate composition, hedonic scale.

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1. INTRODUCTION

Coconut milk is a milky fluid obtained by manual or mechanical extraction of fresh coconut (*Cocos nucifera L*) kernel with or without addition of water. Coconut milk (with no addition of water) contains 56.3% moisture, 33.4% fat, 4.1% protein, 1.2% minerals and 5.0% carbohydrates (Gonzalez, 1990). It is a white opaque protein-oil-water emulsion and essentially free from fibre (Gwee and Seow, 1997). Coconut milk plays an important part in the diet in coconut producing countries. It is valued mainly for its characteristic nutty flavour and for its nutritional content. It has been reported that 25% of the world's output of coconut is consumed as coconut milk (Gwee and Seow, 1997). There is a growing demand for coconut milk and is now being used in ice cream, ices, confectionaries etc. Ice cream by definition is a frozen sweetened product made out of heat treated mix consisting of edible fat and milk solids with or without other ingredients and permitted additives. Coconut milk-based ice cream is ideal for people who are vegans and it is a cholesterol free product. However, it has not yet been prepared on a

large scale. The objectives of this study were to develop coconut milk ice cream with 2 flavours (vanilla and chocolate), to determine the overall acceptance of vanilla flavoured and chocolate flavoured ice cream (sensory evaluation), to determine the overall acceptance of the treated ice cream and to find out the proximate composition of the best treated ice cream.

2. MATERIALS AND METHODS

Methodology

Four coconuts were split and they were scraped with the use of an electric scraper. Milk was extracted by blending the scraped coconut with water to get the consistency of cow's milk. Four coconuts yielded 4L of coconut milk with the addition of water. Sugar (1Kg/4L), ice cream stabilizer (10g/4L) and thickening agent (14g/4L) were mixed together and added to the coconut milk (4L). The mixture was heated to 75°C and glucose syrup (10g/4L) was added. Heating was continued to 90°C and margarine was added (100g/4L) with a pinch of salt. The mixture was pasteurized at 90°C for 20 minutes and cooled to room temperature and different flavours were added separately [vanilla (2

tablespoons) or chocolate (2 tablespoons)]. The mixture was fed into the instant ice cream machine and the hardness of the ice cream mixture was set at 6.0. Once the hardness of 6.0 was achieved, machine was ready to deliver ice cream on cones. The sensory properties were evaluated for both the vanilla flavoured coconut soft ice cream and the chocolate flavoured coconut soft ice cream on 5 point hedonic scale. Based on the sensory properties the better flavoured coconut ice cream was subjected to the following treatments.

Treatments

- Control-Stabilizer (5g/4L)+thickening agent (14g/4L)
- T1-Stabilizer (10g/4L)+ thickening agent (14g/4L)
- T2-Stabilizer (5g/4L)+ thickening agent (15g/4L)
- T3-Stabilizer (10g/4L)+ thickening agent (15g/4L)
- T4-Stabilizer (5g/4L)+ thickening agent (7g/4L)
- T5-Stabilizer (10g/4L)+ thickening agent (7g/4L)

The control and the treated coconut soft ice cream were sensory evaluated and the best treated coconut soft ice cream was analysed for total solids (Refractometer), fat (Rose Gottlieb method, Pearson, 1973), sugar (phenol sulphuric method, AOAC, 1985) and protein (Kjeldahl method, AOAC, 1990).

Statistical analysis

Statistical analysis was performed by using ANOVA in MINITAB 14 computer software. Sensory data were analysed by Kruskal Wallis one-way ANOVA non-parametric statistical test.

3. RESULTS AND DISCUSSION

It is reported that ice cream is not considered as an ideal dessert as it contains high quantities of milk fat, which may have an adverse effect on human health (Choo, Lenong and Henna Lu, 2010). Therefore, ice cream industries have produced a variety of low fat or fat free ice creams, which can mitigate some of the health concerns. Unfortunately, the changes of texture

and flavour profile of ice cream do not provide the same level of satisfaction as compared to the conventional ice cream (Alvarez et al., 2005). However, in this study the results of sensory evaluation reveal that 95% of the responses for both types of coconut ice cream fell in 4 and 5 of the hedonic scale.

Figure 1 shows the rank sums for the sensory attributes of flavoured coconut soft ice cream. Sensory results reveal that the vanilla flavoured coconut soft ice cream was preferred over chocolate flavoured coconut soft ice cream. However, results of proximate analysis of both the ice cream were similar to each other. The vanilla ice cream consisted of 37.3% total solid, 9.32% fat, 30.6% sugar and 0.27% protein while the chocolate flavoured ice cream consisted of 38.1% total solid, 9.42% fat, 30.6% sugar and 0.27% protein. Hui et al., (2004) pointed out that ice cream with fat content of 12-15% usually has 38-40% of total solid content. The fat content of the coconut ice cream produced in this study varies between 9.32% and 9.42% which is less than the value reported by Hui et al., (2004). However, it is within the Sri Lankan standard.

Acceptance testing was carried out to gather information on the liking of the vanilla based coconut soft ice creams. Figure 2 shows that there was a significant difference between the control and the treated vanilla ice cream ($P < 0.05$) for all the sensory attributes indicating that the panellists had more preference towards the control.

It is reported that amount of milk fat, stabilizer and the thickening agent contribute significantly to the creamy flavour as well as to the firm and smooth texture of ice cream (Marshall, Goff and Hartel 2003; Shim, Ahn, Kwak, 2003; Prindiville, Marshall and Haymann, 1999; Clarke, 2004). However, it is observed that when the amount of thickening agent was increased from 14g/4L to 15g/4L and the amount of stabilizer was increased from 5g/4L to 10g/4L, the firmness and the smoothness of the ice cream disappeared leading to consumer disliking.

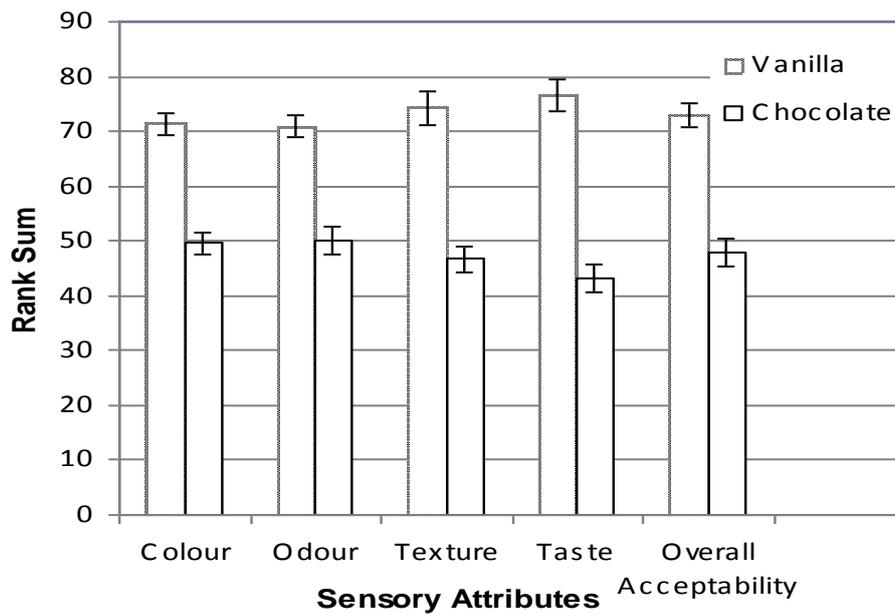


Fig. 1 Rank sums for the sensory attributes of flavoured coconut soft ice cream

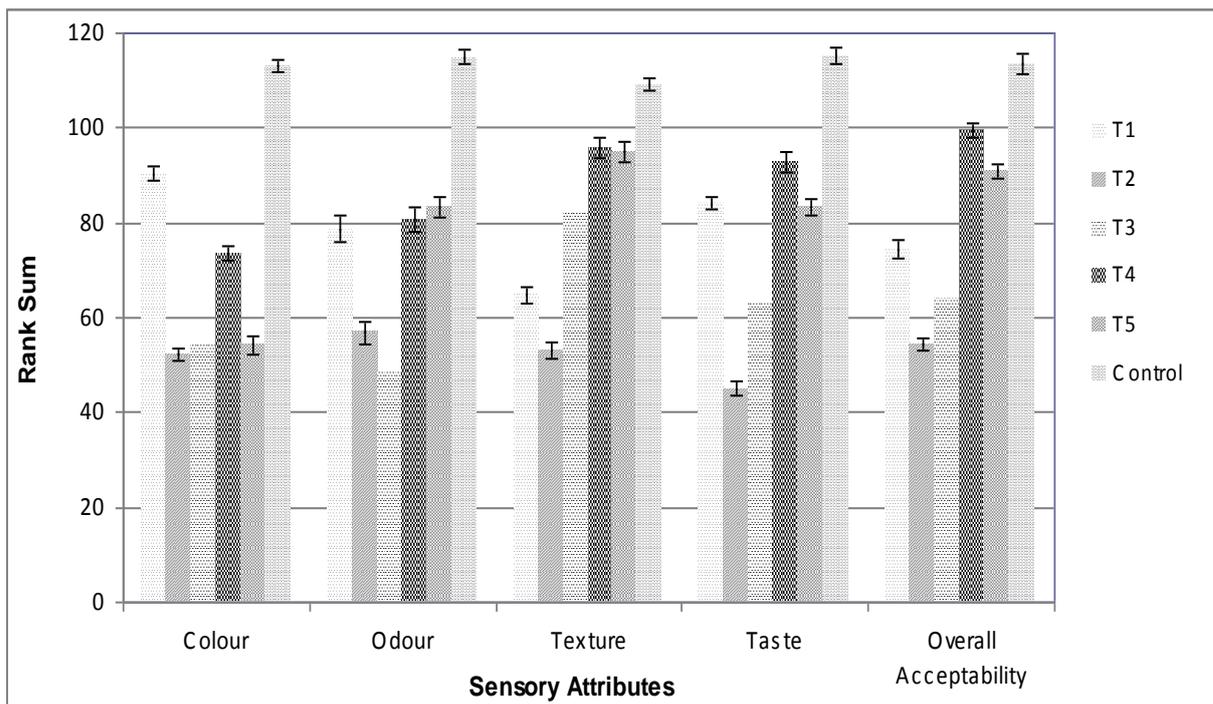


Fig. 2 Rank sums for the sensory attributes of the control and the treated coconut soft ice cream

This observation indicates that in the case of coconut ice cream the amount of thickening agent has to be 14g/4L while the amount of stabilizer has to be 5g/4L. It is worth mentioning here that in the formulation of coconut ice cream, the fat content was kept as constant as possible.

Results of Table 1 show that vanilla flavoured coconut soft ice cream conforms to Sri Lankan standards.

Table 1: Proximate composition of vanilla flavoured coconut soft ice cream

	Total Solids (%)	Fat (%)	Sugar (%)	Protein (%)
Vanilla flavoured coconut soft ice cream	37.3	9.32	30.6	0.27
Sri Lankan Standard, 223:1989	32 (minimum)	8 (minimum)	-	-

4. CONCLUSIONS

Coconut milk based soft ice cream was produced by replacing dairy milk with coconut milk and the produced coconut milk based soft ice cream contained 37.3% total solids and 9.32% fat which were in the acceptable limits of Sri Lankan standards. Therefore, coconut milk based soft ice cream has fulfilled standard specifications of ice cream set out by Sri Lanka and can be categorized as a premium ice cream. The well accepted coconut ice cream with its smooth creamy texture, pleasant coconut flavour and aroma can be successfully used commercially to cater to children and other consumers of different age groups who are vegans.

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