An investigation on the effect of aging time on the physicochemical, rheological and textural properties of vegetable-based ice cream of soy and sesame

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Introduction: In the food industry, it is preferred to alter the formulations rather than modifying the legislations, so as to reduce the risk of facing consumer health. For instance, animal fats and oils could be replaced with vegetable oils to manufacture products with low cholesterol and saturated fatty acids. Application of vegetable-based products like vegetable-based milks as the sources which provide vegetable proteins and lipids in ice cream not only incorporates the nutritional values and health-promoting effects of vegetable compounds into ice cream, but also leads to the production of a novel product with specific properties such as lactose-free products, which could be attractive and useful for consumers. Soymilk is a vegetable-based milk with a suitable lipid and protein content. The main objective of this study was to investigate the aging time on physicochemical, rheological and textural changes of vegetable-based ice cream of soy and sesame, compared with the typical ice cream.

Materials and methods: Optimization of the vegetable-based ice cream was carried out by the textural parameters related to each other using RSM and the D-optimal design. The best soymilk: sesame milk ratio was found to be 55:45. Subsequently, all parameters including overrun, melting resistance, rheological properties and the textural variables during the aging times of 0, 2, 4, 6, 8 and 24 hours were examined for the evaluation of aging. The textural variables were measured in this method that after the 50-g samples of vegetable-based and typical ice creams were kept at ambient temperature for 5 min. A texture analyzer (Brookfield CT3-10kg, US) was employed to analyze their texture. To that end, a probe of 6 mm in diameter was selected to penetrate 15 mm into the sample at a rate of 2 mm/s. Rheological analysis was measured in this method that after 24 h of aging, the apparent viscosity of the ice cream mix samples was determined using a rotational viscometer (Bohlin Model Visco 88, Bohlin instruments, UK) equipped with a thermal circulator (Julabo, Model F12-MC, Julabo Labortechnik, Germany) with the shear rat of 51.8 1/s at 5±0.5°C.

Results and discussion: Investigation of the rheological and textural behavior of the samples showed that aging was significantly (p<0.05) effective on these properties in particular, viscosity, consistency coefficient and stiffness, as the slope of the changes was higher for the vegetable-based ice cream during aging. Also, overrun and melting resistance significantly (p<0.05) increased during aging so that the melting resistance of the vegetable-based ice cream was higher than that of the typical ice cream, contrary to overrun.

Conclusion: Overall, the best aging times of the vegetable-based and typical ice creams were 6 and 8 hours, respectively. The difference in the type and content of proteins, especially casein in the formulations was definitely the most important reason behind the changes in both types of the ice creams during aging.

Keywords: Aging, Vegetable-based ice cream, Soy, Sesame.

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