SENSORY AND NUTRITION CHARACTERISTICS OF BROWN SEAWEED EXTRACT ADDITION (*Sargassum Sp*) FOR ICE CREAM MAKING AS A FUNCTIONAL FOOD

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ABSTRACT

This research was motivated by the lack utilization of brown seaweed which obtained from the coast of Nirwana in West Sumatera on food processing. Brown seaweed contains alginate, fucoxantin and secondary metabolites, called fucoidan, which has some beneficials to human health. In addition, alginate can improve the sensory quality of food products as a thickening and stabilizer agent. This study was aimed to analyze the effect of brown seaweed extract addition to the quality of ice cream, in terms of color, aroma, texture and taste. The type of this research was a pure experiment, using a complete randomized design method of one factor, namely the addition of brown seaweed extract as much as: 0 %, 1,5%, 3%, 4.5%, 6% dan 7.5%. Sensory analysis was conducted for evaluating the product acceptance. Total phenolic compounds, antioxidant activity, the content in carbohydrate, fat, protein, ash, moisture were measure for determined the quality of most acceptable ice cream. The addition of brown seaweed extract improved the functionality of ice cream that indicated by increasing of total phenolic compound, antioxidant activity, the content of carbohydrate, fat, protein and ash. The utilization of wild brown seaweed at the coast of Nirwana in West Sumatera is promising in developing of diversity functional food such as ice cream and others product.

Keywords *: Brown seaweed extract, ice cream, functional food, quality.*

INTRODUCTION

Ice cream is one of the foods favored by many people ranging from toddlers, children, adults, to seniors. Ice cream is a frozen food product that has existed since 1200 AD. Usually consumed as a snack (Padaga et al., 2005: 1). The composition of ice cream in general is fat, solids of non fat milk, sugar, stabilizers and emulsifiers. Stabilizers are useful to prevent the formation of larger ice crystals, provide a soft texture and prevent ice cream from melting quickly when it served (Aviani, 2012: 104). The stabilizers commonly used in the manufacture of ice cream are gelatin, jelly powder, gum, furcelaran, lecithin, pectin and Carboxy Methyl Cellulose (CMC). This type of material includes the type of synthetic stabilizer and is difficult to obtain, plus the type of stabilizer is also doubted. One type of stabilizer that has not been used is alginate, which is widely found in brown seaweed.

Kartika (2011: 7) told that "Brown seaweed is one group of algae that is generally brown or blonde". Brown seaweed (*Sargassum sp*) is one of the natural resources of

the sea which is very abundant and grows naturally in Indonesian waters, but this potential has not been utilized optimally. Brown seaweed is widespread in Indonesian waters. One of the spreads of brown seaweed is in West Sumatra, precisely on the beach of Nirwana, which is located in Padang at Bungus area, a rocky beach that is a place for growing and developing brown seaweed. The amount is very large and easily found on the shore because it is carried by the waves. People call this seaweed *jeromun*. In addition, many brown types of seaweed are scattered on the beach so that they are often regarded as garbage by the surrounding community, even though there are many benefits from brown seaweed (Budianto, 2017).

The result of extracting brown seaweed in the form of alginate can be applied as a gel-forming or stabilizer and emulsion texture. Alginate compounds are widely used in dairy products and frozen foods to prevent the formation of ice crystals (Isnani, 2009). According to Sosiawan (1996) in Wiwin (2008) the chemical compositions of brown seaweed are: water (7.54%), protein (7.77%), fat (0.46%), minerals (62.80), Vitamin C (15%), Fiber (30-40%) and carbohydrates (21.33%). Based on the explanation above, adding brown seaweed extract to the manufacture of ice cream is to stabilize the texture of the ice cream when it served. Therefore the aims of this research were to analyze the effect of the addition of brown seaweed extract by 0%, 1.5%, 3%, 4.5%, 6% and 7.5% on the sensory characteristics thus to analyse the chemicals compounds of the ice cream as a functional food.

METHODE

Material

Brown seaweed was obtained from Nirwana beach coastal region, West Sumatera, Indonesia. Other ingredients such as UHT milk, sugar, cornstarch, egg yolk, vanilla essences etc were purchased as commercial products from traditional market. The reagents for quality measurement were use as analytical grade from various suppliers.

Preparation

Brown seaweed were collected by hand, washed with deionized water and dried by sun rise. Then they were blended and put in light protected glass bottles and kept in the refrigerator. Water-soluble extracts were prepared as described by Lemhadri et al (2017), with some modifications. Twenty five grams of dried brown seaweed were homogenized with 375 mL of distilled water in a boiled chamber and boiled at 100 °C for 20 min. The extracts were then filtered and evaporated by rotary evaporator until volume of extract was about 50 mL. The obtained water extract used immediately for making the product.

Making of Ice Cream

A recipe for making ice cream was adapted from traditional recipe as shown in Table 1. The experimental ice cream were manufactured by adding 0%, 1,5%, 3%, 4,5%, 6% dan 7,5% of brown seaweed water extract. Each treatment was repeated 3 times.

Sensory Evaluation

The samples were homogenously sliced and each panelist was provided with filtered water and asked to cleanse their palate between testing. Sensory evaluation was conducted with 30 untrained panelists, between 18–25 years of age. Panelists indicated their sensory evaluation by anchored with 0 = none, 1 = dislike, 2 = dislike

moderately, 3 = like moderately and 4 = like. The sensory attributes were divided into four groups corresponding to shape, color, brown seaweed flavor springiness/ texture and taste.

Chemical Analysis

In order to characterize the best product based on sensory evaluation, chemical analyses such as the content in carbohydrate, fat, protein, ash, moisture were done according to Association of Official Analytical Chemists procedures. The total phenol content (TPC) was determined according to the Folin-Ciocalteu method. The anti-oxidant activity was determined according to DPPH (*2,2-Diphrnyl-2-picrylhydrazyl*) radical-scavenging activity method.

Statistical analysis

Data from sensory evaluation were analyzed with one-way ANOVA to determine the differences among treatments. If differences were found, then further analysis was performed with Duncan's multiple range test. The best result was analyzed for chemical compounds.

HASIL DAN PEMBAHASAN

Sensory Evaluation

The result graph of sensory attributes showed that the different levels of brown seaweed were generally accepted (Fig.1). The addition of the water soluble extracts of brown seaweed seemed to affect products characteristics. The presence fucoxanthin and alginate in brown seaweed were affected to the characteristic of treated ice cream. Significant differences were found between control and the other trials for ice cream. The mean scores increased with increase in the extracts of brown seaweed concentrations in color, flavor and springiness attributes tested. As expected, the 7,5% extracts of brown seaweed was significantly different among trial samples. It was thought that the addition of brown seaweed resulting the strong color, flavor and springiness scores. The expectation in increment of brown color and springiness was becoming the key value of the use brown seaweed in product development of ice cream. Moreover, the addition of the water soluble extracts of brown seaweed seemed not to affect product shape and taste uniformity (Table 2). Due to overall acceptability of ice cream that was markedly for of 7,5% brown seaweed, it indicated that the presence of brown seaweed in products could enhance the consumer impression of ice cream.

Chemical Analysis

Table 2 indicates the chemicals composition of control and the most acceptable ice cream by sensory evaluation with addition of 7,5% water extract of brown seaweed. The carbohydrate, lipid and moisture content of ice cream were not significantly different to control. In the other hand, protein and ash content indicated significantly different result compare to control. The increasing of ash content which indicating the minerals and protein is an expected condition due to the characteristic of brown seaweed that contains high primary compounds and minerals. However, in the case of carbohydrate and lipid content, it seemed the addition of brown seaweed water extract was not affected to carbohydrate and lipid content in the product. It can be suggested that carbohydrate and lipid was not presence in brown seaweed water

extract due to lack to of water solubility of each compound. Therefore, when extraction process, water as extraction solvent might be cannot withdraw the brown seaweed's contained carbohydrate and lipid as well. The absence of carbohydrate and lipid increment due to brown seaweed water extract addition, it could become an interesting since the product with low calorie and fat is also desired.

Since TPC and antioxidant activity are known as the basic indicator to recognize the beneficial influence of natural extract in many foodstuffs, next we also evaluated the TPC and antioxidant activity of control ice cream and the most acceptable ice cream. The TPC of ice cream was determined and calculated using gallic acid while the antioxidant activity was represent as IC50 values of ice cream (IC50 value is the concentration of the sample required to inhibit 50% of radical). The TPC of acceptable ice cream and control were 360 mg g^{-1} and 301.5 mg $g^{-1}$of gallic acid in fresh weight sample (FW), respectively. Meanwhile, the IC50 of acceptable ice cream and control were 3.2 mg L^{-1} and 2.7 mg L^{-1}, respectively. Since the antioxidant activity is responsible to TPC, our result indicated a similar pattern of TPC and antioxidant activity of the ice cream contain 7,5% water extract of brown seaweed compare to control.

CONCLUSION

The use of wild brown seaweed as an additive ingredient of food such as ice cream is promising to optimize the utilization of natural resources in the production of functional foods. Our results demonstrated that with appropriate levels of addition of brown seaweed could lead the change in color, flavor and springiness of ice cream. Altogether, the 7,5% of the water extract brown seaweed addition showed the highest score of overall acceptability which also indicated higher nutritional values such as the content of protein, ash, TPC and antioxidant activity. Moreover, due to large variety of nutritional compound in brown seaweed that might be not extracted well by water, therefore, the optimization of extraction efficiency of brown seaweed nutrient by several solvent should be considered further.

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