

EFFECT OF HONEY AND STEVIA AS SUGAR SUBSTITUTE ON SENSORY EVALUATION OF CHIFFON CAKE

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ABSTRACT

This research contributes to sugar substitution as a sweetener. Honey and stevia are natural sugar substitutes in various food products. The purpose of this research is to recognize the difference in appearance, flavour and texture of chiffon cake using sugar, honey and stevia. The research used an experimental method. This research used descriptive analysis technique of observation and interviews with reference to a comparison that is a sensory evaluation of chiffon cake characteristic, which includes appearance, flavour and texture. The results show that panellists prefer chiffon cake using sugar as a sweetener in terms of appearance and texture. However, chiffon cake using honey as a sugar substitute is preferable to panellists in terms of flavour and overall aspects.

KEYWORDS: Food product experiment, Chiffon Cake, Honey, Stevia

INTRODUCTION

Chiffon cake is one of the famous cakes in Indonesia, well known as delicious and easy to produce ones (Arjanti, 2013). The sweetener used for making chiffon cake is sugar made from sugarcane. However, the use of sugar cane is often considered as a trigger for various kinds of diseases. Suprayogi (2016) stated that the adverse effects of consuming sugar are increasing body weight, tooth harming and other health problems.

Further, Kartika (2013) said that consuming sugar could cause obesity, heart damage, belly fat, and decreasing brain function. Therefore, it is necessary to substitute sugar cane as food sweetener, especially for cake production. Honey and stevia are natural sweeteners that can substitute sugar (Jasmine, 2016; Pratiwi, 2017).

Chiffon cake was invented by Henry Baker in 1927, an insurance sales representative in California (Suas, 2009; Labensky, et al., 2016). Baker kept the secret of the recipe for more than two decades and just made the cake only for Hollywood stars and famous restaurant called Brown Derby (Suas, 2009). Until 1947, Baker decided to sell the recipe for General Mills, later than published the

recipe in the packaging of flour as a promotion in May 1948 (Labensky, et al., 2016).

The method used in making chiffon cake is called chiffon mixing method (The Culinary Institute of America, 2016). This method is very easy to apply and produce soft and moist with strong and stable structure. Labensky, et al. (2016) said that chiffon cake is baked in unlined and ungreased cake form, in order to maintain the dough stick to the cake form, in addition, after the chiffon cake has been baked, it must be removed from the oven immediately and then reversed until the cake is cold in order to prevent the cake shrink (Suas, 2009). The texture of chiffon cake according to The Culinary Institute of America (2016) is a soft, moist and it has good structure and stability. Suas (2009) also said that texture of chiffon cake is moist, soft, light and high in volume, buttery rich but it has a chewy texture like a sponge cake. According to Labensky, et al. (2016) texture of chiffon cake is high, light and fluffy, moist and richer compared to angel cake. Chiffon cake has golden yellow colour. Meanwhile, traditional Chiffon cake has a lemon or orange flavour (Labensky, et al., 2016).

Honey has an anti-bacterial agent (Jasmine, 2016). In addition, Dina (2017) said that the use of honey in food production would improve nutrition, appearance and taste. Regarding calories content, the advantage of using stevia is that it has no calories to the diet, while honey despite its natural ingredients: it has higher calories compared to sugar cane (Cloe, 2013). Honey contains 33 calories higher than sugar; in 1 tablespoon honey has 64 calories if compared to sugar that only has 48 calories (Shieh and Shieh, 2012).

Stevia also is known as *Stevia Rebaudiana* is an ingredient, which can be used as a natural sweetener. The stevia plant has a sweet taste as it contains glycosides (Retnani and Anggraeni, 2005). The Extracts of stevia contain 200-300 % higher sweetness level compared to sugar (Depuydt, 2002). Stevia has zero glycemic indexes, while honey has 30 until 58 glycemic indexes and sugar has a glycemic index of approximately 58 (Cloe, 2013). It concludes that stevia is very suitable for the diabetics. According to Cloe (2013), the number of carbohydrates in honey and sugar are almost equal. Honey is more nutritious than sugar as it contains mineral and vitamin, including pantothenic acid, riboflavin, niacin, folate, vitamin B-6, magnesium and zinc. However, stevia contains no minerals and vitamins. It concluded that honey and stevia could be used as sugar substitute.

The purpose of this research is to recognize the difference in appearance, flavour and texture of chiffon cake using sugar, honey and stevia.

METHODOLOGY

Materials

Pure natural honey was purchased from Sumbawa. Stevia powder. Flour was using commercial medium flour with 11%-12.5% protein, 0.64% ash and 14.3 % moisture, 58% absorption and 26.5% wet gluten. Water. Double acting baking

powder. Fresh lemon, fresh egg, salad oil, vanilla extract, cream of tartar and sugar were purchased from a local supermarket.

Preparation of Chiffon Cakes

In this research, chiffon cake was using three kinds of sweeteners that were sugar, honey and stevia. The comparator product was a chiffon cake using sugar as a sweetener. The first experimental product was a chiffon cake using honey as a sweetener; the second one was chiffon cake using stevia as a sweetener. Sugar was replaced by honey and stevia with experimental design as shown in the table below:

Table 3: Experimental Design

Sweetener	<i>Chiffon cake 1</i>	<i>Chiffon cake 2</i>	<i>Chiffon cake 3</i>
Sugar	100%		
Stevia		100%	
Honey			100%

Recipes used in this research using Suas's recipe (2009) as described in the table below:

Table 4: Recipe Formulation for Chiffon Cake

Ingredients	<i>Control Chiffon Cake(%)</i>	<i>Stevia Substitution Chiffon Cake(%)</i>	<i>Honey Substitution Chiffon Cake(%)</i>
Flour	100	100	100
Baking Powder	3.03	3.03	3.03
Sugar (1)	86.36	-	-
<i>Lemon Zest</i>	Each	Each	Each
Oil	50.25	50.25	50.25
Egg Yolk	50.00	50.00	50.00
Water	57.32	57.32	43.49
Vanilla Extract	2.53	2.53	2.53
Egg white	100.52	100.52	100.52

Sugar (2)	42.93	-	-
<i>Cream of tartar</i>	0.51	0.51	0.51
Stevia (1)	-	2.16	-
Stevia (2)	-	1.07	-
Honey (1)	-	-	64.5
Honey (2)	-	-	31.5
Baking Soda			1.02
Total	493.44	367.44	447.35

The method was described by Suas (2009) for making chiffon cake. Sift together the flour, baking powder, and first sugar (add stevia: for stevia substitution cake); add the lemon zest in a bowl. In a separate bowl whisk the liquid ingredients (included honey for honey substitution cake); add the dry ingredients slowly to make a smooth batter. Whip the egg whites, second sugar (or add stevia: for stevia substitution cake; or add honey: for honey substitution cake), and cream of tartar to medium peaks. Fold the meringue into the batter in three stages until there are no streaks. Deposit the batter into ungreased, papered pans. Bake at 335°F (168°C) in a convection oven for about 30 minutes or until done (reduce 25°F for honey substitution cake). Invert the cakes when cool and remove from the pans when completely cool.

Sensory Evaluation

In the descriptive analysis, chiffon cakes were observed by the researcher and served to seven panellists who highly trained to differ chiffon cake in specific sensory evaluation. The panellists were interviewed to compare each chiffon cake sample and described their judgment about appearance, texture and flavour. After each test of sensory evaluation, panellists need to rinse their mouth with water to prevent carryover flavour during the tasting. Afterwards, panellists were asked which one is most preferred in terms of appearance, texture, flavour and overall aspect.

RESULT AND DISCUSSION

The appearance of Chiffon Cake

From the observation results, obtained from each chiffon cake, it had different colour. Control chiffon cake and stevia substitution chiffon cake had a bright yellow colour, while honey substitution chiffon cake had a brown colour due to the use of basic ingredients of honey, which having browning effect. All chiffon cakes have the same shape, adjusting to the shape of the chiffon form. However,

stevia substitution chiffon cake and honey substitution chiffon cake had cracked surfaces while control chiffon cake had a smooth surface. All chiffon cakes have the same size and adjusted to the shape of the chiffon form but it had different height. Control chiffon cake had a height of 9 cm, stevia substitution chiffon cake had a height of 6 cm and honey substitution chiffon cake had an 8.5 cm in height. Visual texture of control chiffon cake had the same texture with honey substitution chiffon cake but had a different surface. Meanwhile, the visual texture of stevia substitution chiffon cake was heavy and dense.

From the result of the interview, it can be concluded that the appearance of control chiffon cake had a good crumb, bright yellow colour, and rise properly. The appearance of the stevia substitution chiffon cake had a yellow colour, brighter but slightly more yellow than control chiffon cake, heavy and dense, had large holes and did not rise properly. While the appearance of the honey substitution chiffon cake had a brown colour than the control sample, had large holes fluffy and did not rise properly.

Flavour Chiffon Cake

From the observation results, it was obtained that basic taste of s chiffon cake was similar with basic sweet taste. A smell from control chiffon cake and stevia substitution chiffon cake was the same, which is having a vanilla and lemon scent. While honey substitution chiffon cake had a vanilla and lemon scent. It also had a distinctive aroma of honey. Control chiffon cake and honey substitution chiffon cake have no aftertaste. Meanwhile, stevia substitution chiffon cake had a slightly bitter taste and sweet aftertaste.

From the interview results, it can be concluded that flavour of control chiffon cake had a sweet, vanilla-lemon flavour taste. The flavour of stevia substitution chiffon cake had less sweet in flavour, with vanilla and lemon as well as having a bitter aftertaste and little bit sweet. While flavoured honey substitution chiffon cake had a sweet taste, it also had a lemon, vanilla and honey aroma.

Texture Chiffon Cake

From the observation, it can be concluded that control chiffon cake and honey substitution chiffon cake had a soft, light, tender, moist, and fluffy texture. However, honey substitution chiffon cake had a dense and heavy texture. Besides, control chiffon cake and honey substitution chiffon cake had a high, moist, light, having good in volume. However, stevia substitution chiffon cake tended to have a visual evaluation, which was not too high, a little bit moist, rather dense, less in volume. There were no pitched sounds all chiffon cakes.

From the interview results, it can be concluded that texture of control chiffon cake had a very soft texture, light, moist and fluffy. Meanwhile, the texture of the stevia substitution chiffon cake had solid texture and dense. Meanwhile, honey substitution chiffon cake had a moist texture and very soft.

From the interview results, it can be found out that, for the appearance, five panellists like sugar control chiffon cake and two panellists prefer stevia

substitution chiffon cake. Thus it can be concluded that panellists prefer control chiffon cake in their appearance. While in flavour, seven panellists like a honey substitution chiffon cake. In terms of texture, six panellists like control chiffon cake and one panellist like honey substitution chiffon cake. Therefore, in terms of texture, it can be sum up that panellist likes the control chiffon cake. Overall, panellists like the honey substitution chiffon cake.

CONCLUSION

Honey and stevia can be used as a sugar substitute in the making of chiffon cake. However, the amount of honey and stevia needs to be recalculated both of them have different sweetness level. The amount of water in the chiffon cake using honey should be reduced considering the liquid characteristics of honey and it is different from solid sugar. The addition of baking soda is also needed for honey chiffon cake to reduce acidity levels and also in order to increase the volume of chiffon cake. Besides, a reduction in oven temperature is required to honey substitution chiffon cake to prevent from burning. There are differences in appearance, flavour and texture of each chiffon cake products. The appearance of honey chiffon cake had the same characteristic with sugar chiffon cake but different in the brown colour.

Meanwhile, the appearance of stevia chiffon cake had a more yellowish colour when compared to sugar chiffon cake. Batter volume of stevia substitution chiffon cake is less when compared to control chiffon cake due to less amount of stevia use. Hence, the final product of chiffon cake became shorter when compared to control chiffon cake. Stevia and honey chiffon cake had cracking surface, and control chiffon cake has a flat cake surface. The flavour of the stevia substitution chiffon cake had similar characters with control chiffon cake that had a sweet taste as well as vanilla-lemon scent.

Meanwhile, the flavour from honey substitution chiffon cake had a distinctive honey smell. Honey substitution chiffon cake did not have aftertaste just like control chiffon cake, while, stevia substitution chiffon cake had a slightly bitter taste and sweet aftertaste. The texture from the honey substitution chiffon cake had a similar characteristic with control chiffon cake, such as soft, light and high volume; however, honey substitution chiffon cake was moister. While the texture of stevia chiffon cake was heavier and denser when compared with honey substitution and control chiffon cake. In appearance and texture, panellists like the control chiffon cake. However, in flavour, panellists like honey substitution chiffon cake. Meanwhile, from overall aspects, panellists preferred the honey substitution chiffon cake.

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