

Chemical Characteristic of Steamed Pumpkin Brownies Premix Flour

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Abstract Brownies are kind of cake that contain flour, fat, sugar, and egg. Generally, brownies are characterized with brown colour and do not need leavening agent. The objective of this study was to analyze the chemical content of steamed pumpkin brownies premix flour with various formulation. The pumpkin flour was manufactured by using food dehydrator machine. Pumpkin flour manufacturing condition were immerse in metabisulfite solution for 23,05 minutes and dried for 11, 4 hours at 85⁰C. The pumpkin flour substitution level were 0%, 20%, 40%, 60%, 80% dan 100%, by wheat flour portion. The result showed that pumpkin flour substitution on the steamed pumpkin brownies premix flour formulation had significantly effect on its chemical characteristic. The result showed that steamed pumpkin brownies premix flour had 6.47% - 7.26% moisture content, 3.06% - 6.02% ash, 4.78% - 8.4% fat, 5.95% - 8.78% protein, and 72.54% - 78.49% of carbohydrate.

1. Introduction

Brownies are kind of cake made from wheat flour, eggs, sugar, and fat. Brownies regarded as food that contain less of nutritional value. one solution to increase brownies value is to use flour substitution. The vitamin and mineral content of pumpkin was quite diverse, including beta carotene, vitamin B1, vitamin C, calcium, phosphorus, iron, potassium and sodium [1]. Many studies showed that pumpkin can substituted into bread, cake and another kind of food. For this purpose pumpkin was processed into flour. pumpkin can be made into a powder that can enrich nutrients in biscuits, bread, noodles, cakes as well as natural coloring agent [2]. [3] reported that pumpkin flour was significantly affect the physical properties and cellular structure of enriched bread. The redness and yellowness of bread's crumb increased in line with the level of pumpkin flour enrichment. Comparison of the nutritional content of pumpkin flour and wheat flour, pumpkin flour had 328 kcal of energy, 77.6 g carbohydrates, 5 g protein, 0.5 g fat and 180 SI / g β -carotene, while wheat flour was 365 kcal energy, 77.3 g carbohydrates, 8.9 g protein, 1.3 g fat and 0 SI / g β -carotene [4]. Pumpkin can substituted into bakery premix flour, including premix flour of steamed brownies.

In Indonesia, especially in Jember, the used of pumpkin still very low. People generally process it into traditional food processes such as kolak and dodol. The food processing industry processes them into thickening sauces, jams, sweets, syrups, jelly, and flour. The pumpkin flour potential to be processed into bakery premix flour, including steamed brownies. Brownies that are produced on a household or industrial scale still use wheat as a source of carbohydrates. Flour contains gluten which can cause allergies and is not suitable for consumption by infants and the elderly.

Premix flour is a dry matter formulation that is put together and combined by consumers in the processing [5]. Premix is flour that is made to providing convenience and saving time in the production process. In this study, pumpkin as raw materials were made flour and mixed onto premix flour before analyzed. The pumpkin flour substitution on the wheat flour was carried out to bring out the pumpkin smell and characteristics. The substitution of pumpkin flour to wheat flour in this study

was 0%, 20%, 40%, 60%, 80%, 100%. The study aimed to evaluate the chemical characteristic of steamed pumpkin brownies premix flour formulation.

2. Material and Methods

2.1 Materials

The premix flour materials were pumpkin purchased from jember local market, wheat flour from Bogasari with medium protein content, sugar from gulaku factory, and baking powder. The raw materials for chemical analysis needed were, vasetin, NaOH 50%, K₂S₄ 4%, H₂SO₄, selenium, HgO₂, hexan and aquades. The equipment were food dehydrator, oven, kjeldahl glass, soxhlet, and beaker glass.

2.2 Premix flour preparation

Pumpkin peeled and immersion in metabisulfite solution for 23.05 min, Then dried in food dehydrator. Drying temperature of 85°C and drying time of 11.40 h [6]. Dried pumpkin ground then shifted through an 100 mesh sieve. After that pumpkin flour mixed with wheat flour, sugar and baking powder. Premix flour will used for proximate analyze.

2.3 Research Design

This study was conducted by randomized block design. Substitution pumpkin flour with 6 levels were 0%, 20%, 40%, 60%, 80%, and 100% with 2 replication.

2.4 Chemical Analysis

The chemical parameters of premix flour steamed brownies instant was determined by proximate analyzed. The chemical characteristic of premix flour including moisture, protein, fat, carbohydrate and ash content. Moisture content of the sample was determined in an oven at 105°C for 3 h [6]. The oven was used for ash content [7], micro kjeldahl was used for protein content, mikro soxhlet was used for fat content [7], by difference was used for carbohydrate content.

2.5 Statistical Analysis

Statistical analysis was performed using SPSS (version 16.0). One way ANOVA test was used to obtain the significant difference between each factor. Duncans multiple range test (DMRT) at p .0.05 was performed to compare means between sample.

3. Results and Discussion

The result showed that substitution of pumpkin flour significantly affected the proximate content of flour premix of steamed brownies. The result of proximate analyzed at five different levels of pumpkin flour were shown in Table 1.

Table 1. Chemical content of steamed pumpkin brownies premix flour at any levels substitution

Parametric (%)	Wheat Flour : Pumpkin Flour (%)					
	100 : 0	80 : 20	60 : 40	40 : 60	20 : 80	0 : 100
Moisture content	7.96 ±0.33 ^c	7.47±0.43 ^{bc}	7.26±0.35 ^{abc}	6.65±0.12 ^{ab}	6.47±0.19 ^a	6.77±0.49 ^{ab}
Ash content	3.52 ±0.83 ^a	3.11 ±0.3 ^a	3.06 ±0.08 ^a	4.06 ±0.29 ^{ab}	4.69 ±0.23 ^{ab}	6.02 ±1.83 ^b
Fat content	7.89±0.59 ^b	8.11±0.74 ^{bc}	4.78±0.37 ^a	7.47±0.77 ^{bc}	6.48±0.24 ^{ab}	8.4±1.15 ^c
Protein content	6.45±1.57 ^{ab}	8.78±0.14 ^b	6.41±0.94	7.96±0.16	7.37±0.30	5.95±1.35 ^a

			ab	ab	ab	
Carbohydrate content	74,18±1.47 ^a	72,54±0.14 ^a	78,49±1.04 ^b	73,85±1.35 ^a	74,93±0.5 ^a	72,85±0.17 ^a

Values presented in table are the mean of the two replications ± Standard Deviation. Values presented in column with different letters imply statistically differences (p<0.05), as determined by DMRT test.

The moisture content of steamed pumpkin brownies premix flour had a significant different (p<0.05). The increased of pumpkin flour substitution in steamed pumpkin brownies premix flour decrease its moisture content. Furthermore, The moisture content of pumpkin flour can be influenced by the drying temperature. The moisture content of yellow pumpkin flour with drying temperature in 60°C was 12,75% while in 80°C was 5,83% [8]. A similar trend also reported by [9] mention that drying temperature was influenced to purple sweet potatoes flour process. The higher temperature makes the lower moisture content result.

Ash content of steamed pumpkin brownies premix flour also had a significant different (p<0.05). The result showed that the highest concentration pumpkin flour substitution in flour premix of steamed pumpkin brownies premix flour, the higher its ash content. The increasing of ash content influenced by the highest mineral and vitamin of pumpkin flour. Pumpkin are the source of carotenoids, ascorbic acid, minerals and vitamins among coloured vegetables, and these nutrients have a major role as an antioxidant and precursor of vitamin A in human health [10]. [11] reported that the higher level of ash content in steamed pumpkin cake was contributed by a high ash content in pumpkin pasta.

The pumpkin flour substitution had significantly effect to steamed pumpkin brownies premix flour. It can decreased fat content (Tabel 1). That condition happened because the fat content of pumpkin flour lower than wheat flour. the result showed that fat content of pumpkin flour was 0,28 % and fat content of wheat flour was 1.3% [12]

The increasing of pumpkin flour portion on the formulation decreased protein content. It because the wheat flour has higher protein than pumpkin flour. [13] report that the lower of substitution pumpkin flour to wheat flour, the higher protein content of donut. A similar trend also reported in steamed cake by [11] that the increasing substitution of pasta pumpkin can decrease protein content.

The result of proximat analyze showed that substitution of pumpkin flour had significantly effect to increase carbohydrate content of steamed pumpkin brownies premix flour (p<0.05). The increased of carbohydrate content conduct because of high carbohydrate content of pumpkin flour than wheat flour. The result of proximat analyzed showed that carbohydrate content of pumpkin flour was 85,32%. The carbohydrate content of wheat flour was 72,3% [12].

4. Conclusion

Substitution of pumpkin flour had significantly effect to chemical characteristic of steamed pumpkin brownies premix flour. The Increasing of pumpkin flour substitution can increase ash and carbohydrate content of steamed pumpkin brownies premix flour. The steamed pumpkin brownies premix flour had 6.47% - 7.26% moisture content, 3.06% - 6.02% ash, 4.78% - 8.4% fat 5.95% - 8.78% protein and 72.54% - 78.49% carbohydrate content.

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