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Quality Characteristics of Puffed Rice Muffin SAFETY from Gluten in Republic of KOREA

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Abstract

Purpose; CD(Celiac Disease) is a genetic disease caused by gluten, which is one of the most common diseases among modern people. The only way to prevent this is by eating gluten-free foods. Our rice, which is a main food, is a popular food. It is thought that it is appropriate to use this rice for the development of gluten - free food because it is made from such high. In this study, we tried to measure muffin quality, texture, color and sensory evaluation by using puffed rice. For the preparation of puffed rice muffins, first add the puffed rice flour, baking powder, sugar and salt, water was added and mixed at low speed to complete the dough(23 ± 1 °C). The puffed rice muffin was prepared by placing 70 g of dough in a muffin cup (7.5×4 cm) and baking in a preheated oven at 200 °C and 200 °C for 20 minutes. After cooling, it was used for the experiment. The hardness of the muffins added with puffed rice was significantly lower than that of the muffins prepared with wheat flour. The chewiness and hardness were significantly lower as the amount of puffed rice was increased, and the number of muffins prepared with puffed rice was the lowest among the samples. The results of the color measurement of muffins showed that the lightness decreased significantly with the increase of the amount of expanded rice. The sensory evaluation showed that PM2 produced by adding 50% puffed rice flour and 50% wheat flour was the best, and the taste of muffin was PM1 added with puffed rice 25% were significantly higher than the other samples. Therefore, PM2 with 50% puffed rice flour and 50% wheat flour were most preferred.

Therefore, it has been found that the preparation of muffins by adding puffed rice is preferable to consumers' preference, and it is thought that it will be useful for the development of gluten free products, and various products using puffed rice should be developed.

[Keywords] ***Safety, Gluten, Muffin, Puffed Rice, Sensory Evaluation***

1. Introduction

CD(Celiac Disease) is a genetic disorder caused by gluten contained in wheat, barley, rye, oats, etc.[1], inflammation of the small intestine is not absorbed nutrients properly, And skin diseases. Gluten is found in bread, which is a typical convenience for modern people. In addition, it contains a lot of foods such as confectionery, beer, and cereal which are common to us. The only way to treat gluten is by eating gluten-free foods. Rice is known to be the most suitable raw material for the development of gluten-free foods with excellent nutrition[2], and there have been various studies on rice flour milling methods for producing breads and confectionery[3][4][5][6].

Puffing rice was made by putting rice in a container with high pressure and sealing it and heating it to bloom rice flour several times. During this process, the tissues of rice become porous and the starch is split into dextrin and digested well even when it is eaten as it is, and it is marketed as flour. Puffed rice is widely used for *making makgeolli*, and related researches are very limited such as yogurt[7], rice porridge[8], bread[9][10], and pound cake[11].

At present, the market for gluten-free foods is reported to have a high growth potential[12]. Therefore, it is urgent to develop a product suitable for various consumer's preferences

using puffed rice, and it is desirable to apply it to the development of a baked product rather than a product such as bread which does not have much gluten. Therefore, this study aims to contribute to the development of gluten-free foods by developing a simple-type expanded puffed rice flour muffin suitable for consumers' preference using the rice puffiness.

2. Experimental Methods

2.1. Texture measurements

After sugaring of the puffed rice muffin, its Hardness and chewiness were measured using Texture analyzer(TA-XT Express, Stable Micro Systems, UK) with 70 mm cylinder probe(Pre-test speed: 3 mm/s, Test speed : 2 mm/s, Post-test speed: 3 mm/s, Distance: 1.5 mm, Time: 3 sec, Trigger Force: 5 g).

2.2. Lightness measurements

The lightness was measured using color meter(Color meter, JC-801, Color Techno Co, LTD, Japan); the puffed rice muffin was put into cylindrical container(35×10 mm); each sample was measured five times and its average was used.

2.3. Sensory evaluation

The sensory evaluation items were measured on a 5-point scale with flavor, taste, texture, and overall preference. 5 points were most preferred

2.4. Statistical methods

The results of puffed rice muffin Hardness, chewiness, lightness and sensory evaluation were analyzed using ANOVA, and the significance test was done through Duncan's multiple test at $p<0.05$. The analysis used SPSS WIN program 20.0.

3. Results and Discussion

3.1. Texture of puffed rice muffin

<Table 1> shows the results of the texture measurements of puffed rice muffins.

The hardness of puffed rice muffins prepared with 100% of wheat flour was 1689.66 g/cm^2, which was significantly higher than other samples. The PM1 added with 25% of expanded wheat flour was 1409.38g/cm^2, the PM2 added with 50% expanded wheat flour was 1256.63 g/cm^2, PM4 was 1129.80 g/cm^2 and 990.80 g/cm^2, and the hardness of muffin was significantly decreased as the amount of puffed rice flour was increased

The chewiness of muffins was 1124.96 g/cm^2, which was significantly higher than those of the other samples. The chewiness of muffins was significantly lower(710.07 g/cm^2 - 944.61 g/cm^2) as the proportion of added loaf increased.

Therefore, it was found that the hardness and chewiness were significantly decreased with the addition of the loosening lotion as a result of adding the loosening lotion to the puffed rice flour and preparing the muffins.

Table 1. Texture of puffed rice muffin(g/cm^2).

	Hardness	Chewiness
Control[1)]	[2)]1689.66±23.70[a4)]	1124.96±38.01[a]
PM1	1409.38±81.33[b]	944.04±61.91[b]
PM2	1256.63±38.60[cd]	867.43±16.98[b]
PM3	1129.92±92.24[cd]	836.53±11.31[b]
PM4	990.80±8.89d	710.07±12.81[c]
F - Value	135.023[***3)]	81.943[***]

Note: [1)]Control , PM1, PM2, PM3, PM4, PM5 Flour: Puffed Rice flour; 100:0, 75:25, 50:50, 25:75, 0:100

[2)]Mean±S.D.

[3)]*** $p<0.001$

[4)]a-d Means in a row by different superscripts are significantly different at the $p<0.05$ by Duncan's multiple range test.

3.2. Lightness of puffed rice muffin

<Table 2> shows the results of measuring the degree of Lightness of muffins by added with Puffed Rice flour.

The lightness of the muffins made only with wheat flour was 82.64, which was the most lightness compared to the other samples. PM1 and PM2 added 75% and 75% of PM1 and PM2 with 76% and 75% respectively. PM3 added with 75% of puffed rice was 73.17 and 71.25 was added with 25% added puffed rice. As the amount of puffed rice increased, the lightness of muffin gradually dimmed.

Table 2. Lightness of puffed rice muffin.

	Lightness
Control[1)]	[2)]82.64±0.00[a4)]
PM1	76.53±0.02[b]
PM2	76.52±0.03[b]
PM3	73.17±0.00[c]
PM4	71.25±0.02[d]
F - Value	19205.505[***3)]

Note: [1)]Control , PM1, PM2, PM3, PM4, PM5 Flour: Puffed Rice flour; 100:0, 75:25, 50:50, 25:75, 0:100

[2)]Mean±S.D.

[3)]***$p<0.001$

[4)]a-d Means in a row by different superscripts are sig- nificantly different at the $p<0.05$ by Duncan's multiple range test.

3.3. Sensory evaluation of puffed rice muffin

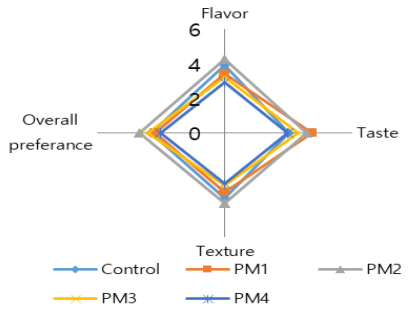
The results of the sensory evaluation of the muffins added with Puffed Rice flour were shown in <Figure 1>.

As shown in the <Figure 1> PM2 produced by adding 50% Puffed Rice flour and 50% wheat flour were the best evaluated. The muffin taste was 25% PM1 added, and the texture was 50%. The added PM 2 was found to be the most favorable compared to other samples. Therefore, PM2 with 50% Puffed Rice flour and 50% wheat flour were most preferred.

Cho Sook-ja(1998) also reported that breads with 10-50% Puffed Rice flour were evaluated favorably, suggesting a similar tendency to this study[10].

As a result of the sensory evaluation of the muffins, it is considered to be a preferable method to prepare by adding the Puffed Rice flour, Cho Sook-ja(1994) also reported that Puffed Rice flourbread was preferred to wheat flour bread by adding Puffed Rice flour, which was similar to the results of this study[9].

Figure 1. The sensory evaluation of puffed rice muf QDA.



4. Summary and Conclusion

This study was carried out to investigate the quality characteristics of the prepared puffed Rice muffin.

(1)Results of hardness and chewiness measurement as the amount of puffed rice added increased, the hardness and chewiness decreased significantly.

(2)Results of color measurement as the amount of puffed rice added increased, the lightness decreased significantly.

(3)Sensory evaluation showed that the flavor, taste, texture, and overall preference of muffins added with puffed rice were highly preferred. Therefore, we think that it is possible to develop gluten-free confectionery product by adding puffed rice.

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