

Proximate analysis and chewiness of hydrogen rich water modified sweet potato noodles

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Abstract. Wheat-based noodles have a high glycemic index, making them unhealthy for diabetics. Hydrogen rich water modified sweet potato noodles can be an alternative to wheat flour. This research aims to find the best proximate and chewiness analysis results. This study used the fixed variable pH hydrogen rich water 9, the ratio of wheat and sweet potato flour 1:1, the independent variable was the type of sweet potato, namely purple sweet potato and yellow sweet potato. The best noodles are obtained from yellow sweet potatoes modified with hydrogen rich water. Proximate value of yellow sweet potato as follows: water content 29.81%, ash 1.525% wb, fat 4.21% wb, total protein (Fk: 6.25) 9.025% wb, carbohydrates by difference 55.43% wb, crude fiber 0.64 % wb, calories 274.98(Cal/100 gr). The chewiness value was higher for yellow sweet potato at 2217.7 N. Yellow sweet potato noodles modified by hydrogen rich water had a higher chewiness value than noodles made from wheat.

1 Introduction

Noodles are people's favorite food. Noodles are basically made from flour. However, wheat has a glycemic index (GI) which is unhealthy for diabetics. Diabetics and obesity are advised to consume foods that have a low glycemic index [1]. The glycemic index (GI) is a measure of the speed at which a food increases glucose levels after consumption. This increase in glucose levels in the body results in metabolic disorders, obesity and diabetes. GI is used to determine food for diabetics. The GI value allowed for consumption by diabetics or people on a glucose diet is below 55. Factors that affect the glycemic index are monosaccharides in food, types of carbohydrates, food processing and other components such as fat, protein, fiber and organic acids. Glucose is a monosaccharide that can be directly absorbed by the body and processed into energy [2].

Local tubers are very diverse. The manufacture of various noodle products from local ingredients has been widely developed so far, with the aim of replacing imported flour. Therefore, alternative ingredients are needed to replace imported flour with flour from various local tubers.

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The role of tuber flour is very important because besides being able to be produced domestically and at a low cost in production it also has the potential to support food security and reduce dependence on wheat flour. Local food ingredients in Indonesia that have a low glycemic index and low gluten include purple and yellow sweet potatoes. The tubers have high fiber compared to wheat.

According to Shirahata (2012) [3], Hydrogen rich water (HRW) is water with a hydrogen ion content as an antioxidant of 0.55-0.65 mm and a higher pH value compared to other water [4]. HRW was used as a variable in this study because it is easy to obtain, the price is affordable, does not contain harmful chemicals and has benefits as a prevention of Alzheimer's and anti-cancer [5], [6]. Research on flour modification using hydrogen rich water includes potato starch [7], [8], pumpkin flour[9], and kimpul [10].

Several studies on making sweet potato noodles have been carried out, including: Nurdjanah, et al [11] processing purple sweet potato flour into low GI noodles, using partial gelatinization and retrogradation methods, Ginting and Yulifianti [12] studied noodles prepared from both 100% wheat flours and blended with 40% sweet potato paste had met the national standard quality for moisture and protein content, Astuti, et al [13] study about the sensory profile in different concentrations of sweet potato flour and rice bran with and without the addition of mushroom flour. The difference with this research is the flour modification process used, in this research hydrogen rich water was used.

The development of research on the manufacture of flour and food from sweet potato flour and mocaf has been carried out a lot. This study also supported responsible consumption and production (SDG 12). This study emphasizes the results of the proximate test on noodles made from purple sweet potato and yellow sweet potato modified with hydrogen rich water.

2 Material and Methods

2.1 Materials

The materials used in this study were 100 grams of purple and yellow sweet potatoes, CMC, wheat flour (for mixing), eggs, salt, hydrogen rich water. The tools used in this study include noodle grinders, ovens. Proximate and chewiness tests were carried out at the UGM Food and Agriculture Product Technology Laboratory.

2.2 Research Methods

Making wet noodles starts from making sweet potato flour with hydrogen rich water. Sweet potatoes that have been sliced into 100 grams chips are soaked in hydrogen rich water pH 9. Then drained and dried in the oven. After drying, grind and sift. After it becomes flour, it is then mixed with eggs, wheat flour in a ratio of 1:1, salt and spices. After the dough is smooth, it is printed using a noodle grinder. Sweet potato noodles were analyzed using a proximate test according to SNI 2987:2015 and chewiness value with Lloyd method. The method described on flow diagram research (Figure 1).

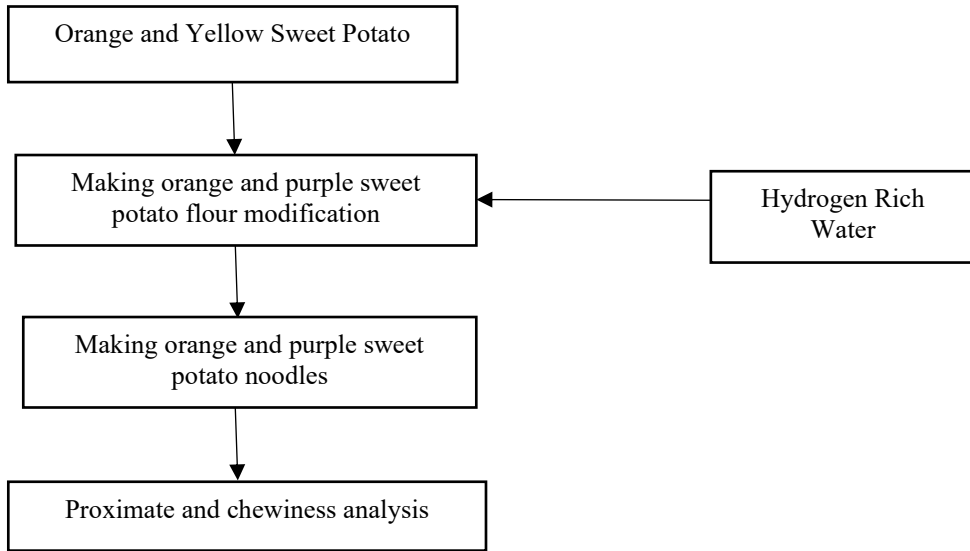


Fig. 1. Flow Diagram Research

3 Results and Discussion

The purple and yellow variants of sweet potato flour which have been made into noodle products are then analyzed with various analyzes including (Table 1).

Table 1. Proximate Test Results on Sweet Potato Noodles

Analysis	Sample	
	Yellow sweet potato noodles	Purple Sweet Potato Noodles
Water (%)	29.81	29.45
Ash (% wb)	1.56	1.90
Fat (% wb)	4.21	3.05
Total Protein, Fk: 6.25 (% wb)	9.03	7.3
Carbs by difference (% wb)	55.43	58.30
Calories (Cal/100 g)	274.98	267.74

Based on Table 1. the proximate test results obtained for yellow and purple sweet potato noodles, for water content analysis based on SNI 2987:2015 the maximum quality of wet noodles is 65%, while the results obtained for yellow sweet potato noodles are 29.81% and purple sweet potato noodles are 29.45%. This shows that the moisture content of the wet noodles produced in this study met the SNI values. From the results of the water content analysis, the best quality noodles were obtained, namely noodles made from purple sweet potato.

Analysis of the ash content according to SNI for the quality of wet noodles at a maximum of 3% in this study resulted in an ash content of 1.52% for yellow sweet potato noodles and 1.90% for purple sweet potato noodles. This shows that the results of the analysis of ash content in this study are still within the value limits of SNI 01-2897-1992. Noodles made from yellow sweet potato are the best quality noodles based on analysis of ash content.

Furthermore, for the analysis of fat content, the resulting value for yellow sweet potato noodles was 4.21% and purple sweet potato noodles was 3.05%, while it was known that the

fat content in wheat flour was 1.3% [14] [15]. The high fat content produced in this study was probably due to the addition of other ingredients in the form of eggs which contained a fat content of 10% [16]–[20]. So that according to the analysis of fat content, the best noodle product is obtained, namely noodles made from purple sweet potato.

Analysis of total protein content according to SNI the quality of wet noodles is at least 6% of the results obtained for yellow sweet potato noodles of 9.02% and purple sweet potato noodles of 7.3%. Thus the protein content produced in this study meets the value of SNI 2987: 2015. Therefore, it was found that the noodles made from yellow sweet potato were the noodles with the best quality based on the analysis of total protein content.

For analysis of the carbohydrate content obtained in yellow sweet potato noodles of 55.43% and purple sweet potato noodles of 58.30% while it is known that the carbohydrate value of total energy consumption is 60 - 70% [20]. Based on this difference, it can be said that the high carbohydrate content is found in purple sweet potato noodles because the more substitutes for purple sweet potato flour are added to the noodles, the higher the carbohydrate content will be [11].

Analysis of the crude fiber value produced in yellow sweet potato noodles was 0.64% and purple sweet potato noodles was 1.21%. Based on research conducted by Widodo 2014, it was stated that noodles made from wheat flour had a crude fiber value of 0.43%. Thus, from the results of the study, it was found that noodles made from yellow sweet potato were the noodles with the best quality based on crude fiber analysis.

For calorie analysis, the average value for yellow sweet potato noodles was 274.98 cal/100gr and purple sweet potato noodles was 537.48 cal/100gr. It was found that noodles made from yellow sweet potato were the best noodles based on calorie analysis. In general, the proximate test states that noodles made from yellow sweet potato are the noodles with the best quality.

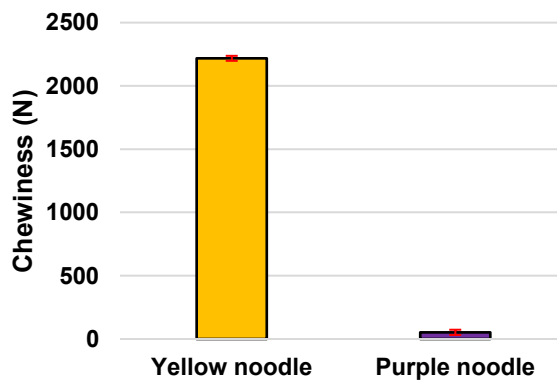


Fig. 2. Lloyd Texture Test Results

Chewiness or elasticity is one of the secondary parameters found in cohesiveness. In a study conducted by Rosalina, Suyanto, & Yusuf (2018) [21] stated that the chewiness in the Lloyd texture test is a combination of multiplication calculations between springiness, hardness and cohesiveness which affect the resulting elasticity value. Based on Figure 2 the result of Lloyd test yellow noodles 2231.7 N and 2203.7 N, purple noodles 67.11 N and 37.72 N. In the study, the average chewiness value for yellow yam noodles was 2217.7 N and for purple yam noodles was 52.4145 N (Figure 2). From the results, the chewiness values for the two had a much different difference. This could be due to the components of the materials used. In the yellow cassava noodle product, the 1:1 yellow cassava flour is mixed with wheat flour, while for the purple cassava noodle product, the ingredients used are 100% purple yam flour.

According to Tuhumury (2020) [22] stated that during the process of mixing wheat flour with water, wheat flour will form gluten. The gluten produced will affect the elasticity of noodle products, thus causing noodle products to not break easily during the cutting and cooking processes. Therefore, increasing the amount of sweet potato flour as a substitute for wheat flour when making noodles and decreasing the proportion of wheat flour will cause the gluten content to decrease. If the amount of gluten is lower, the resulting noodles will break easily and the level of elasticity and firmness of the noodles will decrease. Based on research conducted by Moore, Schober, Dockery, & Arendt (2004)[23] stated that the chewiness value for noodles made from wheat flour was 1042.91 N. Thus, from the results of the Lloyd texture test it was found that noodles made from yellow cassava were suitable as an alternative to wheat flour because they had a higher chewiness value.

4 Conclusion

Based on the research that has been done, it can be concluded that both sweet potato noodles meet SNI for wet noodles Number 2987: 2015. The best noodles are obtained from yellow sweet potatoes modified with hydrogen rich water. Proximate value of yellow sweet potato as follows: water content 29.81%, ash 1.525% wb, fat 4.21% wb, total protein (Fk: 6.25) 9.025% wb, carbohydrates by difference 55.43% wb, crude fiber 0.64 % wb, calories 274.98(Cal/100 gr). The chewiness value was higher for yellow sweet potato at 2217.7 N. Yellow sweet potato noodles modified by hydrogen rich water had a higher chewiness value than noodles made from wheat.

This research is a grant from the Ministry of Finance's LPDP and the Ministry of Research and Higher Education

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