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Utilization of Durian Seed Flour in Making High Energy and Protein Cupcakes

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ABSTRACTS

Chronic energy deficiency is the cause of an imbalance between energy intake and expenditure. Efforts that can be made to overcome SEZ are by providing energy-rich foods. There must be innovative foods given to SEZ youth, such as cupcakes that use durian seed flour substitution. This study aims to determine the best formulation and acceptability and utilization of durian seed flour in the manufacture of high energy and protein cupcakes through proximate and fiber analysis. This research was conducted in March 2021. This study used an experimental research method with a non-factorial completely randomized design (CRD). The results of this study produced the selected cupcake, namely F2 with the formulation (75 g wheat flour and 75 g durian seed flour) and produced 328.92 kcal of energy (Per 100 g) of protein 12.23%, fat 12.60%, and carbohydrates 41, 65%. Further research is needed on the effect of giving durian seed flour cupcakes to KEK adolescents.

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1. Introduction

The most common nutritional problem experienced by adolescents, especially young women, is inadequate intake of nutrients resulting in chronic energy deficiency, chronic energy deficiency is the cause of an imbalance between intake to meet energy needs and expenditure. these problems will hurt the health level of adolescent girls(1,2). Poor nutritional status can interfere with various body processes and affect the body in various ways according to the type and severity of the lack of nutrients. Malnutrition, both in terms of quantity and quality, causes disturbances in the process of growth, energy production, body defense, brain structure and function, and behavior(3,4).

Riskesdas (2018) found quite good results because it managed to capture the decline in SEZ rates in women of childbearing age (WUS). Riskesdas 2013 recorded that WUS KEK pregnant was 24.2% and WUS KEK was not pregnant by 20.8%. Meanwhile, Riskesdas 2018 recorded 17.3% of pregnant SEZ WUS and 14.5% non-pregnant WUS KEK (5). Efforts that can be made to reduce SEZ problems in adolescents are spread both in cities and villages, including through the innovation of a food product. Cupcake is a food product in the form of a sponge cake made from wheat flour, sugar, and eggs using a cup-shaped mold, then given toppings with various variations and shapes that are quite attractive to the public. It is still necessary to increase the nutritional value of cupcakes so that they are more popular with the public (6). One way to increase the nutritional value of cupcakes is by substituting wheat flour with durian seed flour.

So far, durian seeds have only been discarded as waste, even though durian seeds have the potential to be developed into flour and can be applied to various foods. The nutritional content in durian seed flour is energy 388 kcal, protein 8.97 g fat 1.14 g, carbohydrates 85.4 g, calcium 98 mg, and phosphorus 13 mg (7). Changing the shape of durian seeds into flour will facilitate the use of durian seeds into flexible semi-finished materials because apart from being durable, they can also be used to diversify food processing (8). Durian seed starch has similarities with tapioca flour, namely, it has a starch content consisting of amylose and amylopectin, so it can be combined with tapioca flour (9). The amylose content of tapioca starch ranges from 20-27% and the amylose content of durian seed starch is around 26.607%. Amylose gives hard properties while amylopectin causes stickiness. Amylose plays a role in gel formation while amylopectin forms viscoelastic properties. Amin and Arsad (2009) reported that durian seed flour shows great potential as a news source that can be used in the food industry due to its high content of dietary fiber, low-fat content, and suitability as a dough thickening agent (10). This research aims to find the best formulation of high protein durian seed flour cupcakes.

2. Material and Methods

This research is a laboratory experiment in developing cupcake products using a completely randomized design (CRD) with the proportion of durian seed flour. Determination of the formulation and manufacture of cupcakes as well as acceptability tests will be carried out at the Laboratory of Food Technology Science, Department of Nutrition, Poltekkes, Ministry of Health, Palembang and laboratory tests, namely proximate analysis, will be carried out at the Laboratory of Chemistry and Microbiology of Agricultural Products, Sriwijaya University, Palembang.

2.1. Materials and Tools

The ingredients used in the process of making cupcakes include wheat flour, durian seed flour, margarine, baking powder, sugar, eggs, milk, and red beans. The materials needed for chemical analysis are $CuSO_4$, H_2SO_4, HCl, Na_2CO_3, petroleum ether, and NaOH.

Tools used to make cupcakes; dough basin, tablespoon, muffin pan, cupcake paper, mixer, digital scale, bowl, sieve, stirrer, and oven. Tool for proximate analysis (moisture, ash, fat, protein, and carbohydrate content). lats used for the proximate test: Erlenmeyer, distillation flask, bracket glass, funnel, Bucher funnel, burette, separating funnel, long neck volumetric flask, measuring cup, condenser, filler, measuring pipette, volumetric pipette, drip pipette, stirrer, tube reaction, spatula, desiccator, universal indicator, filter paper, tripod, wire gauze, test tube rack, tongs, stirrer, the crucible, evaporating dish, clamp and stand, heater, hot plate, oven, furnace, incubator.

2.2. Cupcake Making Process

The process of making this cupcake begins with mixing the ingredients, which consist of wheat flour, durian seed flour, margarine, baking powder, sugar, eggs, and milk then using the Hot Milk method then if the dough is homogeneous, the next process is printing. The printing of the dough is done by pouring the homogeneous dough into the cupcake, then proceeding with the addition of red bean topping at the very top of the cupcake. Next, arrange it on a muffin pan and then do the baking process for ± 16 minutes at a temperature of 180^{o}C (Aulia, 2019). The composition of the food ingredients used in making cupcakes is as follows.

Table 1. Durian Seed Cupcake Formulation

Ingredients	F0	F1	F2	F3
Flour (gram)	150 g	105g	75g	-
Durian Seed Flour (gram)	-	45g	75g	150g
Margarin (gram)	40g	40g	40g	40g
Baking Powder (gram)	5g	5g	5g	5g
Sugar (gram)	145g	145g	145g	145g
Eggs (gram)	110g	110g	110g	110g
Milk (ml)	60ml	60ml	60ml	60ml
Red Bean (gram)	100g	100g	100g	100g

2.3. Organoleptic Test

The organoleptic test is a hedonic test by a panel of 30 people. Panelists were asked to rate their preference for color, aroma, taste, and texture. The test criteria are 5 (like very much), 4 (like), 3 (like somewhat), 2 (dislike), and 1 (dislike very much). This organoleptic test was carried out at the Poltekkes campus of the Ministry of Health of Palembang, the Department of Nutrition, where the panelists consisted of a group of students who had received the subject matter of Food Technology Science (ITP). In this case, students are classified as moderately trained panelists because these panelists were not selected according

to the procedure for selecting a trained panel, but they were also not taken by ordinary people who are not familiar with sensory properties in organoleptic assessors.

2.4. Analyzed of nutrient's

Organoleptic test results data were analyzed descriptively based on the percentage of panelists' preference and the mode score of each treatment level. The percentage of panelists' preferences was calculated by adding up the percentages of panelists' preferences who stated that they strongly disliked (1), disliked (2), somewhat liked (3), liked (4), and liked (5) on the resulting cupcake.

2.5. Analysis Data

The results of the organoleptic test of cupcake substitution of durian seed flour and wheat flour were processed using the tabulation system calculation. Processing of data analysis using Microsoft Excel application. Data processing results obtained from organoleptic tests obtained the best formula, then examined the nutritional content in the form of energy, protein, fat, ash content, water content, and total carbohydrates. aroma and texture were analyzed using the Friedman Test statistical test.

4. Results and Discussion

Cupcake is a food favored by school children, especially teenagers. Cupcakes are energy-dense foods that can contribute 20% of daily energy needs (11). Cupcakes substituted with various ingredients can increase both macro and micronutrients (12). Cupcakes can also be used as additional food to improve nutritional status. Previous studies have shown that giving cupcakes to elementary school children can improve anemia status (13). Graph 1 shows that the type of formula most favored by the panelists from all aspects of the assessment is F2 with the use of 75g wheat flour, 75g durian seed flour, 40g margarine, 5g baking powder, 145g granulated sugar, 110g eggs, 60ml milk, and 100g red beans. These results indicate that the more durian seed flour is added, the more the cupcake receptivity will increase, which can be seen from the panelists' assessment of color, taste, aroma, and texture.

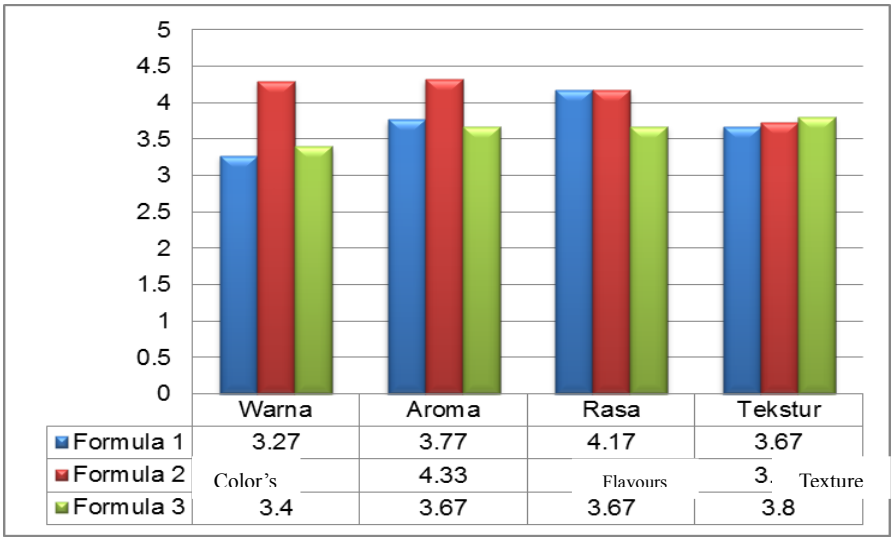

Figure 1. Average Value - Average Cupcake Durian Seed Flour

Based on Table 2, it is explained that there is a relationship between the acceptability of cupcakes in terms of color, aroma, and taste ($p<0.05$) while in terms of texture there is no relationship with the acceptability of cupcakes ($p>0.05$). Cupcake is a very popular food and is suitable as an additional food to improve nutritional status. Based on previous research, cupcake receptivity was good and liked by several groups from school children to the elderly (11,12,14). In addition, cupcakes have a soft and soft texture so they are liked by all ages(6).

Table 2. Cupcake Acceptance Relationship

Categories	p-Value
Color	0,000
Aroma	0,000
Flavour	0,003
Texture	0,910

Proximate analysis or chemical testing was carried out to determine the composition of macronutrients from durian seed flour cupcake products. The best acceptability results were in the F2 formulation with a ratio of 50% wheat flour and 50% durian seed flour. The chemical analysis carried out included checking the content of macronutrients (carbohydrates, fat content, protein content, water content, ash content). The results of research on the nutritional content of cupcakes can be seen in Table 3.

Table 3. Proximate Analysis of Durian Seed Flour Cupcakes Per 100 Grams

Parameter	Hasil (%)	Hasil (g)
Total Energy	328,92 kkal	328,92 kkal
Protein	12,23 %	10,05 g
Fat	12,60 %	4,6 g
Carbohydrate	41,65 %	34,24 g
Water	32,25 %	-
Abu	1,27 %	-

Based on table 3 the energy content of 328.92 kcal. This is much different from the previous research in which cupcake products were substituted with soybean flour, which was 216 kcal (14). The protein content of the durian seed cupcake is 12.23% or 10.05 g. This result is higher than the previous research which substituted cupcake with durian seeds of 7.37g and kluwih seeds which was only 6.245% (15,16). The content of carbohydrates and ash in durian seed cupcakes is lower than durian seeds which are processed into durian seed bread (17). The ash content of the durian seed cupcake has met the quality standard (SNI 01-3840-1995) which is a maximum of 3%. The water content in the durian seed cupcake has a water content of 32.25%. This is different from previous studies, namely cupcakes substituted with red beans which have a moisture content of 25.99%(18). Meanwhile, based on (SNI 01-3840-1995) that is max. 40%, so it can be concluded that the durian seed cupcake has met the SNI standard.

5. Conclusions

The results of the study of the relationship between the acceptability of the Durian Seed Flour Cupcake in terms of color, aroma, taste while in terms of texture there was no relationship between the acceptance of the Durian Seed Flour Cupcake). The best Durian Seed Flour Cupcake formulation according to the assessment of the organoleptic test was the F2 treatment with the addition of 50% durian seed flour, which was 75 grams. The results of the proximate analysis of the best durian seed flour Cupcake formulation were total energy 328.92 Kcal, protein 10.05 g, fat 4.6 g, carbohydrates 34.24 g per 100 g. Further research is needed on the effect of giving durian seed flour cupcakes to chronic energy deficiency in adolescents.

6. References

1. Ertiana D, Wahyuningsih PS. Asupan Makan Dengan Kejadian Kek Pada Remaja Putri Di Sman 2 Pare Kabupaten Kediri. J Gizi KH. 2019;1(2):102–9.
2. Widhiyanti F, Dewi YLR, Qadrijati I. Path Analysis on the Fad Diets and other Factors Affecting the Risk of Chronic Energy Deficiency among Adolescent Females at the Boarding School. J Matern Child Heal. 2020;5(3):251–64.
3. Lifshitz F. Nutrition and Growth - Review. J Clin Res Pediatr Endocrinol. 2009;1(4):157–63.
4. Chianese R, Coccurello R, Viggiano A, Scafuro M, Fiore M, Coppola G, et al. Impact of Dietary Fats on Brain Functions. Curr Neuropharmacol. 2017;16(7):1059–85.
5. Kementrian Kesehatan RI. Riset Kesehatan Dasar Indonesia. Badan Penelitian dan Pengembangan Kesehatan. 2018.
6. Rebecca LJ, Seshiah C, Sharmila D. Fortification of cupcakes with cereals and pulses. Int J Nov Res Life Sci [Internet]. 2016;3(3):1–6. Available from: https://www.researchgate.net/publication/303842975_Fortification_of_Cupcakes_with_Cereals_and_Pulses
7. Verawati B, Yanto N. SUBSTITUSI TEPUNG TERIGU DENGAN TEPUNG BIJI DURIAN PADA BISKUIT SEBAGAI MAKANAN TAMBAHAN BALITA UNDERWEIGHT
[Substitution of Wheat Flour with Durian Seed Flour in Biscuits as a Food Supplement of Under Five Children with Underweight]. Media Gizi Indonesia. 2019;14(1):106.
8. Si QNS, Mulyati AH, Si M, Widiastuti D, Sc M. Pemanfaatan Tepung Limbah Biji Durian Lokal (Durio Zibethinus L.) Sebagai Bahan Substitusi Tepung Terigu Dalam Pembuatan Mi Kering. Universitas Pakuan Bogor; 2015.
9. Wirawan Y, Rosyidi D, Widyastuti ES. Pengaruh Penambahan Pati Biji Durian (Durio zibethinus Murr) Terhadap Kualitas Kimia dan Organoleptik Bakso Ayam. J Ilmu Dan Teknol Has Ternak. 2016;11(1):52–7.
10. Amin AM, Arshad R. Proximate composition and pasting properties of durian (Durio zibethinus) seed flour. Int J Postharvest Technol Innov. 2009;1(4):367.
11. Isoldi KK, Dalton S, Rodriguez DP, Nestle M. Classroom "Cupcake" Celebrations: Observations of Foods Offered and Consumed. J Nutr Educ Behav. 2012 Jan;44(1):71–5.
12. Abdel Haleem AM. Producing of Gluten- Free and Casein Free (GFCF) Cupcakes for Autistic Children. J Food Nutr Disord. 2015;04(03).

13. M.S. Husse A, S. Mohamed R, Aly Fouda K, F. Salama M, M. Hussein M. Functional Cupcake for Preventing Vitamin A Deficiency and Correlated Anemia and Oxidative Stress. Pakistan J Biol Sci. 2021 Feb 15;24(3):366–73.
14. Machado J, Miyahira RF, Marques M, Moura-Nunes N, Guimarães RR, Zago L, et al. Development of muffins as dialysis snacks for patients undergoing hemodialysis: results of chemical composition and sensory analysis. J Nephrol [Internet]. 2021;34(4):1281–9. Available from: https://doi.org/10.1007/s40620-020-00831-z
15. Salsabila K, Ansori M, Paramita O. Eksperimen Pembuatan Cupcake Free Gluten Berbahan Dasar Tepung Biji Kluwih dengan Campuran Tepung Beras. TEKNOBUGA J Teknol Busana dan Boga. 2019;7(1):31–8.
16. Duha P. Analisis Mutu Fisik Dan Mutu Kimia (Karbohidrat, Protein, Kalsium)Cupcake Wortel Biji Durian Sebagai Bahan Pangan Fungsional [Internet]. Poltekkes Medan; 2018. Available from: http://repo.poltekkes-medan.ac.id/jspui/bitstream/123456789/1114/1/SKRIPSI FIX.pdf
17. Ryan Nathanael S RED. Penambahan Tepung Biji Durian (Durio zibethinus Murr) dalam Pembuatan Roti Tawar. JOM Faperta. 2016;3(2):1–15.
18. Gunawan A, Pranata FS, Swasti YR. KUALITAS MUFFIN DENGAN KOMBINASI TEPUNG SORGUM (Sorghum bicolor) DAN TEPUNG KACANG MERAH (Phaseolus vulgaris). J Teknol Has Pertan. 2021;14(1):11.