

# THE ACCEPTANCE OF BAKED *GETUK* (CASSAVA CAKE) WITH RICE BRAN AND RED BEANS SUBSTITUTION AS HIGH FIBER SNACK FOR ELDERLY

Ali Iqbal Tawakal<sup>1\*</sup>, Annis Catur Adi<sup>1\*</sup>, Dominikus Raditya Atmaka<sup>1</sup>

<sup>1</sup>Department of Nutrition, Faculty of Public Health, Universitas Airlangga, Surabaya, Indonesia

\*E-mail: ali.iqbal.tawakal-2016@fkm.unair.ac.id

## ABSTRACT

Rice bran and red beans are one of food items that contain high dietary fiber and can be processed into traditional snacks such as baked *getuk* (cassava cake). Elderly needs enough fiber to support their metabolism. This study aims to analyze the effect of rice bran and red bean substitution of *getuk* toward its acceptance and dietary fiber contents. This study was an experimental study with a completely randomized design. There were four treatments of rice bran and red beans substitution (F0 = 0% rice bran, 0% red beans); (F1 = 10% rice bran, 13% red beans); (F2 = 13% rice bran, 10% red beans), (F3 = 17% rice bran, 7% red beans). This study further involved 30 untrained elderly and pre-elderly panelists (45–80 years). Acceptance was measured using a hedonic questionnaire on a scale of 1 to 6. Statistical analysis of acceptability differences was completed using Kruskal-Wallis and Mann-Whitney test with  $\alpha \leq 0.05$ . In results, there were significant differences between F1, F2, F3, and F0 on all characteristics (color, aroma, texture, taste) with  $p = 0.001$ , and the acceptance rating from highest to lowest was F3, F2, F1, respectively. The organoleptic test results further showed that the panelists mostly preferred the F3 formula (17% rice bran and 7% red beans). There was no significant difference in dietary fiber content between each formula, F1 contains 9.250 grams of dietary fiber (30.8% RDA), F2 contains 9.242 grams of dietary fiber (30.8% RDA), and F3 contains 9.235 grams of dietary fiber (30.7% RDA). This study proved that rice bran and red beans substitution to *getuk* improves its fiber content and also having good acceptability.

**Keywords:** acceptance, dietary fiber, elderly, red beans, rice bran

## INTRODUCTION

An elderly is someone who has reached the age of 60 years or above (Indonesia Ministry of Health, 2016), while a pre-elderly is someone whose age between 45–59 years old (Ramdhani, 2015). Based on the results of the BPS report in 2019, it was found that 51.08% of the elderly had health complaints, in which 26.20% of them experienced illnesses, while the rest were assumed to be healthy (Statistics Indonesia, 2018). The most common diseases affecting elderly aged 65–74 years based on their prevalence are hypertension (63.22%), stroke (45.30%), joint disease (18.63%), diabetes mellitus (6.03%), and heart disease (4.60%) (Indonesia Ministry of Health, 2018).

Hypertension is one of the leading health problems in Indonesia, with a national prevalence of 34.11% in 2018 in people aged 18 years or above (Indonesia Ministry of Health, 2018). This prevalence, moreover, was higher when compared to the majority in 2013, which was only 25.8 % and 31.7% in 2007 (Indonesia Ministry of Health,

2013). In East Java, the incidence of hypertension in 2018 was 22.71% in people aged 18 years or above (East Java Provincial Health Office, 2019). Basic Health Research in 2018 recorded that 69.53% of hypertension cases occurred to people aged 75 years old or above, 63.22% cases happened to those aged 65–74 years old, and 55.23% cases among 55–64 years old. These reports further indicated that the prevalence of hypertension depends on age increasement and mostly occurs in the elderly (Indonesia Ministry of Health, 2018).

Hypertension or high blood pressure is an increased systolic blood pressure over 140mmHg and/or diastolic blood pressure over 90 mmHg on two occasions with five minutes interval with enough rest (Indonesia Ministry of Health, 2014). Persistent increase of blood pressure, at last, can cause damages to kidneys (kidney failure), heart (heart disease), and brain (stroke) if not detected early and receive adequate treatment (Indonesia Ministry of Health, 2014).

Adequate dietary fiber intake caused a modest reduction in diastolic blood pressure (Bazzano et al., 2013). Based on a prior cross-sectional study, it was revealed that total dietary fiber intake is associated with a lower risk of hypertension in American adults. The risk of hypertension tends to decrease gradually when the total fiber intake is increased to reach 0.35 g/kg/day. The selection of foods with high dietary fiber, thus, is suitable for preventing and controlling high blood pressure (Sun et al., 2018).

An adequate intake of dietary fiber is highly recommended to prevent high blood pressure. Based on several previous studies, dietary fiber has the potential to reduce high blood pressure. Rice bran and red beans are good sources of dietary fiber for controlling blood pressure. Both of them have a higher level of dietary fiber than cassava, which is the main component of *getuk* (cassava cake) to be substituted. Rice bran (100 g) contains 20 g of dietary fiber (USDA, 2019), while red beans (100 g) contain 26.3 g of dietary fiber. On the other hand, cassava (100 g) only contains 2.9 g of dietary fiber (Indonesia Ministry of Health, 2017). Besides that, bioactive compounds derived from rice bran have therapeutic potential against cellular oxidative stress (Saji et al., 2019). Red beans, moreover, have a high content of omega-3 fatty acids (David et al., 2019); omega-3 fatty acids significantly can reduce high blood pressure (Naini et al., 2015).

*Getuk* is one of the traditional Indonesian foods made from cassava (Lilly, 2015). Based on SNI 01-4299-1996, *getuk* is categorized as semi-wet food with a maximum water content of 40% (BSN, 1996). Because it is included in the category of semi-wet foods, *getuk* has a soft texture; thereby, it can be consumed easily by the elderly. Additionally, the ingredients for making baked *getuk* are relatively easy to obtain. Based on the background, hence, the authors aim to develop baked *getuk* formula that contains high dietary fiber from rice bran and red beans to help relieve high blood pressure.

## METHODS

This study was an experimental research with a completely randomized design. Four formulas

were further developed in this study involving rice bran and red beans substitution treatments (F0 = 0% rice bran, 0% red beans); (F1 = 10% rice bran, 13% red beans); (F2 = 13% rice bran, 10% red beans), (F3 = 17% rice bran, 7% red beans). The percentage of each formula was based on the addition and reduction of the rice bran and red beans composition, F1 has highest red beans composition and F3 has highest rice bran composition. The number of percentages was determined to find the substitution material with the highest acceptability. The untrained panelists for organoleptic test in this study were 30 untrained panelists of elderly (age 60 years and over) and pre-elderly (age 45–59 years) in Gadel, Tandes, Surabaya. Before tested on untrained panelists, each formula was tested by trained panelists to test its feasibility. Trained panelists in this study consisted of lectures and alumni of the nutrition study program, Faculty of Public Health, Universitas Airlangga. Trained panelists were also asked to describe the organoleptic characteristics of each formula. The dietary fiber content from developed formula was tested at the Laboratory of Biochemistry and Nutrition Analysis of Public Health, Universitas Airlangga, Surabaya.

The sample in this study was *getuk* with rice bran and red beans substitutions. The sample size served to the panelists was 12 to 13 g for each baked *getuk* formula. The sample for the organoleptic test was taken randomly by doing four repetitions of four different treatments. Each sample was given a random number code (987 = F0; 875 = F1; 112 = F2; 701 = F3) so that panelists could not estimate the proportion effect of rice bran and red beans on organoleptic test results. Laboratory test samples were taken randomly from 100 g *getuk*.

The assessment carried out in this study was acceptability test and dietary fiber content evaluation. The sensory evaluation of hedonic qualities (color, aroma, texture, and taste) was obtained from the appraisal of untrained panelists using a preference test questionnaire by seeing, smelling, touching, and tasting the food samples. At the same time, the evaluation for dietary fiber content was assessed based on the amount of dietary fiber content in each formula using analytical analysis.

The panelists assessed the sample presented with a favorite test questionnaire value including color, aroma, texture, and taste with 6 rating *Likert* scales: 1 for very much dislike, 2 for dislike moderately, 3 for dislike slightly, 4 for like slightly, 5 for like moderately, and 6 for like very much (Meilgaard, 1999). After the data was collected, the mean rank was performed to determine the hedonic rank. The results were then processed and analyzed to determine the formula with the highest acceptable value. Kruskal-Wallis test  $\alpha \leq 0.05$  was used to determine the differential effect of rice bran and red bean substitution on the acceptability of baked *getuk*. Mann-Whitney test  $\alpha \leq 0.05$ , meanwhile, was used to determine the acceptability differences in each formula. The baked *getuk* recipe, moreover, was tested for dietary fiber content in the laboratory using the residue weighing analysis method developed by The Association of Official Analytical Chemists (AOAC).

Ingredients used in making baked *getuk* with rice bran and red beans substitution included rice bran flour, red beans flour, sugar, coconut, margarine, and palm sugar. The reason for choosing the percentage of substitution ingredients in this formula was to find out which formula is more preferred, with more rice bran or more red beans formula. The formula is presented in Table 1.

Rice bran and red bean were the substitutes for cassava as a mixture in making baked *getuk*. The basis for the substitution of two ingredients was because both components have higher levels of dietary fiber than cassava.

**Table 1.** Baked *Getuk* Formula

Composition	Formula (%)			
	F0	F1	F2	F3
<b>Main Ingredient</b>				
Cassava	68	44	44	44
Sugar	13	13	13	13
Coconut	13	13	13	13
Margarine	3	3	3	3
Palm Sugar	3	3	3	3
<b>Substitution Ingredient</b>				
Rice bran flour	0	10	14	17
Red beans flour	0	14	10	7
<b>Total (%)</b>	<b>100</b>	<b>100</b>	<b>100</b>	<b>100</b>

The process of making baked *getuk* consisted of two stages, namely preparation and processing. The preparation began with peeling and steaming cassava, roasting coconut, and weighing all the ingredients according to the proportions of each formula. The processing process, however, was carried out by mixing the ingredients according to the proportions of each recipe and grinding dough until smooth using a mincer. The dough was then weighed 12 g and formed in a cake shape before baked at 150° C for 15 minutes, and then cooled.

This study has been approved by the Health Research Ethics Commission, Faculty of Dentistry, Universitas Airlangga, Surabaya (Reg No. 136/HRECC.FDOM/ III/2020).

## RESULTS AND DISCUSSION

The Kruskal-Wallis test results of the organoleptic assessment affirmed that there were differences in color, aroma, texture, and taste significantly between formula F0, F1, F2, and F3 ( $p < 0.05$ ). The assessment results of the sensory level (color, aroma, texture, and taste) completed by 30 untrained panelists are shown in Table 2 and depicted in Figure 1.

**Table 2.** Value of Mean Rank and Kruskal-Wallis Test Results

Parameter	Mean Rank				<i>p-value</i>
	F0	F1	F2	F3	
Color	5.60	4.30	4.67	5.10	0.001*
Aroma	5.60	4.37	4.73	5.17	0.001*
Texture	5.67	4.33	4.76	5.30	0.001*
Taste	5.67	4.27	4.63	5.20	0.001*

\*) significantly different at  $\alpha < 0.05$

**Table 3.** Mann Whitney Test Results

<i>p-value</i>	Parameter			
	Color	Aroma	Texture	Taste
F0-F1	0.001*	0.001*	0.001*	0.001*
F0-F2	0.001*	0.001*	0.001*	0.001*
F0-F3	0.025*	0.028*	0.019*	0.019*
F1-F2	0.146	0.140	0.081	0.124
F1-F3	0.004*	0.003*	0.001*	0.001*
F2-F3	0.076	0.055	0.061	0.024*

\*) significantly different at  $\alpha < 0.05$

Table 2 displayed the distribution of the untrained panelists' ratings of color, aroma, texture, and taste for each baked getuk formula. For each parameter category, F3 was the more preferred formula than F1 and F2.

Based on the Mann-Whitney statistical test on organoleptic assessment, most of the color, aroma, texture, and taste of each formula compared had significant differences. The test results are further presented in Table 3.

Table 3 showed that the most of the formulas which compared in organoleptic characteristics (color, aroma, texture, and taste) had significant differences. This data was obtained from organoleptic characteristics value comparison between each formula.

### Color

Color is one of the indicators of the acceptability rating of the panelists' preference. According to the organoleptic characteristics' description of trained panelists, the control formula had a bright yellow appearance, while the modified formulas had a brown appearance. The modified formulas (F1, F2, and F3) tended to be brown due to the effect of rice bran and red bean substitution. Between all modified formulas, F3 with 17% rice bran and 7% red bean was the most preferred formula by the elderly because its color tended to be brighter than the colors of the other formulas.

Based on the results of the untrained panelists' assessment, there was a significant effect ( $p=0.001$ ) of rice bran and red bean flour substitution on the color of baked getuk. The modified baked getuk formula has a dark brown color which was the effect of red bean flour substitution. In other words, it can be argued that the more the red beans, the browner the color produced. Moreover, this was in line with research on the substitution of red bean flour in another food products; the more the red bean flour, the darker color of the food products (Verawati, 2015). The same theory, apparently, also applies to formulas that were substituted with rice bran; the more the rice bran used, the browner the food product will be. Prior research regarding this issue also affirmed that the more proportion of rice bran substitution was used, the browner the color will be (Fauziyah, 2011).

### Aroma

The aroma is an odor caused by chemical stimuli that are smelled by olfactory nerves in the nasal cavity (Fauziyah, 2011). This parameter is one of the crucial parameters in organoleptic assessment. The aroma of baked getuk expected to appear in this study was the fragrant aroma that comes from margarine to disguise the distinctive aroma of rice bran and red bean flour, which was rather unpleasant and tended to be less familiar to panelists' taste buds. To reduce the aroma of rice bran and red bean flour, roast and cook it with water first could be an option since those steps could remove the two's original aroma.

Based on the results of the assessment, it was shown that there was a significant effect ( $p=0.001$ ) of rice bran and red bean flour substitution on the aroma of baked getuk. The results further revealed that the F3 formula was quite favorable, where F3 contained quite a lot of rice bran with the proportion of 17% rice bran flour and 7% red bean flour. All the modified formulas were substituted with rice bran flour and red bean flour so that the margarine aroma was covered by the distinctive smell of the two ingredients despite the handling of both the material before processing. Rice bran has a musty aroma, but the formula produced does not smell musty because it has been anticipated by roasting the rice bran flour first with direct heat. Roasting process with direct heat can inactivate lipoxygenase enzyme so that it can reduce musty aroma (Tobing, 2010).

### Texture

Based on SNI 01-4299-1996, getuk is categorized as semi-wet food with a moisture content of 40% (BSN, 1996). Because it is included in the semi-wet food category, getuk has a soft texture. Based on assessment results, it can be further seen that the modified formula with the most preferred texture was F3, which contained highest percentage of rice bran flour (17%) and lowest percentage of red bean flour (7%).

Baked getuk went through the oven process tended to be drier. In this study, however, the *getuk* had a soft texture although it was also baked in the oven. This result, thus, was not in line with previous research which revealed that

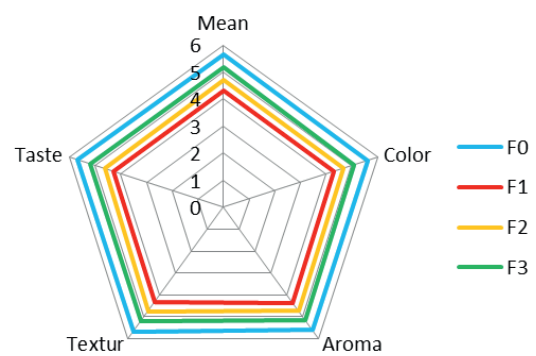
the texture of baked getuk would become hard because the water in the food is hydrolyzed during the oven process (Misnani, 2011). There are still many reasons behind the difference such as the differences in temperature setting and oven time. Low temperature setting and short oven time result in a soft texture of the getuk because the water in it is not completely hydrolyzed.

The results of the assessment disclosed that there was a significant effect ( $p=0.001$ ) of rice bran and red bean flour substitution on the texture of baked getuk. In other words, F0 tended to have a considerable difference to the respective textures of the modified formulas (F1, F2, and F3). Moreover, there was no significant difference between F1-F2 and F2-F3 texture comparison. Between F1-F3, on the contrary, there was a considerable difference, which was related to the proportion of rice bran and red beans substituted. F1, furthermore, had quite a lot of red bean flour content, while F3 has quite a lot of rice bran content. These results further implied that the formula containing higher red bean flour tends to have a different texture when compared to the formula that has higher rice bran content.

### Taste

Taste is an essential indicator in evaluating food products. The taste of baked getuk usually tends to be sweet because it is made using sugar (Oktavianawati, 2017). Although rice bran has a distinctive sweet taste of rice bran, it also has a slightly bitter aftertaste. Meanwhile, red beans have a unique savory flavor and a somewhat unpleasant and painful taste at the same time. The taste of rice bran flour tends to be slightly sweeter and less bitter than red beans flour. This taste, then, could affect the panelists' preferences.

The results of the assessment indicated that there was a significant effect of rice bran and red bean flour substitution on the taste of baked getuk ( $p=0.001$ ). Based on the organoleptic test of taste assessment, the taste of the modified formula most preferred by untrained panelists was the F3 formula, which contained quite a lot of rice bran with a proportion of 17% rice bran flour and 7% red bean flour. The results further implied that the formula with more rice bran flour substitution (F3) tended to be preferred to the recipe with added



Description of the scale:  
 1 = dislike very much  
 2 = dislike moderately  
 3 = dislike slightly  
 4 = like slightly  
 5 = like moderately  
 6 = like very much

**Picture 1.** Panelists Preferred Level Diagrams

red bean flour substitution (F1). This argument was indicated by the mean taste preference value of the F3 formula (5.20), which tended to be higher when compared to the F1 formula (4.27). These results, besides, were in line with previous research, which testified that products with more rice bran substitutions tend to have a more pungent distinctive taste of rice bran (Fauziyah, 2011).

Table 4 below shows the results of dietary fiber analysis per 100 g of baked getuk. Based on the results of the laboratory test showed that the best modification formula with good acceptance was F3, which had fulfilled the criteria for the claim of high dietary fiber food. Additionally, it contained a total dietary fiber of more than 6 g per 100 g of food weight: 9.235 g per 100 g of food weight. Furthermore, the control formula (F0) had met the claim criteria for the source of dietary fiber because it contained a total dietary fiber of more than 3 g per 100 g of food weight, which was 3.619 g per 100 g of food weight.

**Table 4.** Dietary Fiber Content Based on Laboratory Test Results

Dietary Fiber Content (g)	F0*	F1**	F2**	F3*
Soluble Fiber	0.300	1.143	1.142	1.141
Insoluble Fiber	3.319	8.107	8.100	8.094
Total Fiber	3.619	9.250	9.242	9.235

\* Laboratory Test

\*\* The approach was based on the results of laboratory test

Total dietary fiber intake is associated with a lower risk of hypertension. In other words, the risk of hypertension tends to decrease gradually as total fiber intake is increased. The selection of high dietary fiber (soluble or insoluble fiber) foods is useful for preventing and controlling hypertension (Sun et al., 2018). There has been a decrease in the need for several types of nutrients in the elderly and pre-elderly. Based on Recommended Dietary Allowances (RDA), the necessity of dietary fiber in the elderly and pre-elderly further ranges from 20 to 30 g, depending on gender and age group (Indonesia Ministry of Health, 2019). In this case, baked getuk formula can meet one-third to half of the dietary fiber needs of the elderly or pre-elderly in a day

## CONCLUSION

The substitution of rice bran and red bean flour affects the receptivity of baked getuk and dietary fiber contents. Moreover, there was a significant differences between F1, F2, F3, and F0 on all characteristics (color, aroma, texture, taste) with  $p = 0.001$ , and the acceptance rating was F3 (rank 1), F2 (rank 2), F1 (rank 3), respectively. The organoleptic test results further showed that the panelists mostly preferred formula with 17% rice bran and 7% red beans. There was no significant difference in dietary fiber content between each formula, F1 contains 9.250 grams of dietary fiber (30,8%), F2 contains 9.242 grams of dietary fiber (30,8%), and F3 contains 9.235 grams of dietary fiber (30,7%). The best formula composition, thus, was F3, which has highest acceptance rating value. It is also necessary to develop the organoleptic tests of this formula with a broader consumer panelist to improve the acceptability before being commercialized.

## ACKNOWLEDGEMENT

We would like to thank the elderly panelists in Gadel, Tandes, Surabaya and Rumah Inovasi Natura Surabaya.

## REFERENCES

- BPS - Statistics Indonesia. (2018). *Indonesian Elderly Population Statistics 2018*. Indonesia Central Statistics Agency. <https://www.bps.go.id/publication/2019/12/20/ab17e75dbe630e05110ae53b/statistik-penduduk-lanjut-usia-2019.html>
- BSN. (1996). *SNI 01-4299-1996: Getuk*. <http://bsn.go.id/produk/detail/4664-sni01-4299-1996>
- Bazzano, L. A., Green, T., Harrison, T. N., & Reynolds, K. (2013). Dietary approaches to prevent hypertension. *Current Hypertension Reports*, 15(6), 694–702. <https://doi.org/10.1007/s11906-013-0390-z>
- David, I., Orboi, M. D., Simandi, M. D., Chirilă, C. A., Megyesi, C. I., Rădulescu, L., Drăghia, L. P., Lukinich-Gruia, A. T., Muntean, C., Hădărugă, D. I., & Hădărugă, N. G. (2019). Fatty acid profile of Romanian's common bean (*Phaseolus vulgaris* L.) lipid fractions and their complexation ability by  $\beta$ -cyclodextrin. *PLoS ONE*, 14(11), 1–25. <https://doi.org/10.1371/journal.pone.0225474>
- East Java Provincial Health Office. (2019). *East Java Health Profile 2018*. East Java Provincial Health Office. [https://dinkes.jatimprov.go.id/userfile/dokumen/BUKU\\_PROFIL\\_KESEHATAN\\_JATIM\\_2018.pdf](https://dinkes.jatimprov.go.id/userfile/dokumen/BUKU_PROFIL_KESEHATAN_JATIM_2018.pdf)
- Fauziyah. (2011). *Analysis of the potential and nutritional use of rice bran in making cookies* [IPB (Bogor Agricultural University)]. [https://repository.ipb.ac.id/jspui/bitstream/123456789/47303/5/BAB\\_II\\_Tinjauan\\_Pustaka\\_I11afa.pdf](https://repository.ipb.ac.id/jspui/bitstream/123456789/47303/5/BAB_II_Tinjauan_Pustaka_I11afa.pdf)
- Indonesia Ministry of Health (2019). *Minister of Health Regulation Number 28 of 2019 Concerning Nutritional Adequacy Rate for Indonesian People*. [http://hukor.kemkes.go.id/uploads/produk\\_hukum/PMK\\_No\\_28\\_Th\\_2019\\_ttg\\_Angka\\_Kecukupan\\_Gizi\\_Yang\\_Dianjurkan\\_Untuk\\_Masyarakat\\_Indonesia.pdf](http://hukor.kemkes.go.id/uploads/produk_hukum/PMK_No_28_Th_2019_ttg_Angka_Kecukupan_Gizi_Yang_Dianjurkan_Untuk_Masyarakat_Indonesia.pdf)
- Indonesia Ministry of Health. (2013). *Basic Health Research 2013*. <https://doi.org/10.1517/13543784.7.5.803>
- Indonesia Ministry of Health. (2014). Hypertension. In *InfoDATIN (Issue Hypertension)*. infoDATIN. <https://doi.org/10.1177/109019817400200403>
- Indonesia Ministry of Health. (2016). *The Situation of Elderly People in Indonesia*. infoDATIN. [https://www.kemkes.go.id/resources/download/pusdatin/infodatin/infodatin\\_lansia\\_2016.pdf](https://www.kemkes.go.id/resources/download/pusdatin/infodatin/infodatin_lansia_2016.pdf)
- Indonesia Ministry of Health. (2017). *Indonesian Food Composition Table*. panganku.org

- Indonesia Ministry of Health. (2018). *Basic Health Research 2018*. [http://labdata.litbang.kemkes.go.id/images/download/laporan/RKD/2018/Laporan\\_Nasional\\_RKD2018\\_FINAL.pdf](http://labdata.litbang.kemkes.go.id/images/download/laporan/RKD/2018/Laporan_Nasional_RKD2018_FINAL.pdf)
- Indonesia Ministry of Health. (2019). *Hypertension, the most common disease in Indonesian society*. <https://www.depkes.go.id/article/view/19051700002/hipertensi-penyakit-paling-banyak-diidap-masyarakat.html>
- Lilly. (2015). *Beautiful Delivery Creations from Cassava Getuk*. Gramedia.
- Meilgaard, M. C. (1999). *Sensory Evaluation Techniques Fourth Edition* (4th ed.). CRC Press.
- Misnani. (2011). *Baked Getuk Talas with Sesame Substitution as a Traditional Snack*. Thesis. Sebelas Maret University.
- Naini, A. E., Keyvandarian, N., Mortazavi, M., Taheri, S., & Hosseini, S. M. (2015). Effect of Omega-3 fatty acids on blood pressure and serum lipids in continuous ambulatory peritoneal dialysis patients. *Journal of Research in Pharmacy Practice*, 4(3), 135–141. <https://doi.org/10.4103/2279-042X.162356>
- Oktavianawati. (2017). *Original Indonesian Traditional Snacks*. Badan Pengembangan dan Pembinaan Bahasa. [http://badanbahasa.kemdikbud.go.id/lamanbahasa/sites/default/files/22\\_Isi\\_dan\\_Sampul\\_Jajanan\\_Tradisional\\_Asli\\_Indonesia.pdf](http://badanbahasa.kemdikbud.go.id/lamanbahasa/sites/default/files/22_Isi_dan_Sampul_Jajanan_Tradisional_Asli_Indonesia.pdf)
- Ramdhani, M. (2015). Knowledge and Risk Factors for Osteoporosis among Pre-elderly. *Althea Medical Journal*, 2(4), 608–614.
- Saji, N., Francis, N., Schwarz, L. J., Blanchard, C. L., & Santhakumar, A. B. (2019). Rice bran derived bioactive compounds modulate risk factors of cardiovascular disease and type 2 diabetes mellitus: An updated review. *Nutrients*, 11(11). <https://doi.org/10.3390/nu11112736>
- Sun, B., Shi, X., Wang, T., & Zhang, D. (2018). Exploration of the association between dietary fiber intake and hypertension among U.S. adults using 2017 American college of cardiology/ American heart association blood pressure guidelines: Nhanes 2007–2014. *Nutrients*, 10(8), 1–11. <https://doi.org/10.3390/nu10081091>
- Tobing, H. A. L. (2010). *Modern Indonesia chef : everything about eating*. Jakarta Dian Rakyat.
- USDA. (2019). Food Data Central: Nutrients of Rice bran. <https://fdc.nal.usda.gov/fdc-app.html#/food-details/396831/nutrients>
- Verawati. (2015). *The Effect of Red Beans Flour Substitution on Pie Skin Quality*. Universitas Negeri Padang.