Processed Food For Anemia Prevention From Biscuit Diversification Of Mango Seed Flour *(Mangifera Indica L.)* And Moringa Leaves Powder *(Moringa Oleifera)*

Rini Tri Hastuti[1], Youstiana Dwi Rusita[2] , Nur Rachmat

[1,2, 3] *Health Polytechnic Of Surakarta*
Corresponding author : josicanme@gmail.com

Background: Anemia is a health problem throughout the world, especially in developing countries, where an estimated 30% of the world's population suffers from anemia. The incidence of anemia in Central Java in 2013 reached 57.1%. Moringa leaves are rich in nutrients and are a source of beta carotene, vitamin C, iron, and potassium. The mango seed flour without going through the sulfurization stage contains 20.00% carbohydrates, 14.83% fat, and 4.84% protein. The manufacture of biscuits made of the main ingredients, namely Moringa leaf flour and mango seed flour, can be useful for preventing anemia.
Purpose: This study aims to produce alternative products and biscuit food innovations to prevent anemia, by knowing the results of the organoleptic test, hedonic test, and nutritional content.
Methods: This is descriptive research. The stages of making biscuits include mixing mango seed flour and Moringa leaves. Processed biscuits are then tested for organoleptic, hedonic test, and nutritional content. There are 30 respondents on the hedonic test in this study.
Result: Organoleptic test results found F1 = round shape, strong green color of moringa leaves, savory and bitter taste (typical of moringa), and distinctive aroma of moringa; F2 = round shape, green color of Moringa leaves, savory and distinctive taste of Moringa, and distinctive aroma of biscuits; F3 = round shape, light green color of moringa leaves, savory taste and distinctive aroma of biscuits. The hedonic test results, namely 30 responses, showed F1 as many as 27 respondents (90%) did not like, formula 2 as many as 23 respondents (76.7%) liked, and formula 3 as many as 22 respondents (73.3%) liked.The nutritional content test of the biscuits was selected at F2 with the result that the water content was 4.1%; ash content 1.38% (b / b); protein content 18.1%; fat content 30.2%, and iron content 37.2 mg
Conclusion: The formula that meets the requirements for the organoleptic test, hedonic test, and nutritional content with proximate analysis is formula 2.

Keyword: : Anemia, Mango seeds, Moringa leaves, Biscuits.

BACKGROUND

Anemia is a health problem throughout the world, especially in developing countries, where an estimated 30% of the world's population suffers from anemia. Anemia occurs in many people, especially adolescents and pregnant women. Anemia in young women is still quite high. According to the World Health Organization (WHO, 2016), the prevalence of anemia in the world ranges from 40-88%. The total population of adolescents (10-19 years) in Indonesia is 26.2%, which consists of 50.9% male and 49.1% female (Kementerian Kesehatan, 2014). According to data from the 2013 Riskesdas, the prevalence of anemia in Indonesia is 21.7%, with anemia sufferers aged 5-14 years of 26.4% and 18.4% of patients aged 15-24 years. The 2012 Household Health Survey (SKRT) data states that the prevalence of anemia in toddlers is 40.5%, pregnant women are 50.5%, postpartum mothers are 45.1%, adolescent girls aged 10-18 years are 57.1% and aged 19, 45 years at 39.5% (Sukartiningsih & Amaliah, 2018). Women have the highest risk of developing anemia, especially in young women (Kaimudin et al., 2017). The incidence of anemia in Central Java in 2013 reached 57.1%. Anemia is a condition in which the components in the blood, namely hemoglobin (Hb) in the blood, are less than normal levels. Young women are ten times more likely to suffer from anemia than young men. This is because young women experience menstruation every month and are in their infancy so they need more iron intake. The determination of anemia can also be done by measuring the hematocrit (Ht), which on average is equivalent to three times the hemoglobin level. The limit of Hb level for adolescent girls to diagnose anemia is if the Hb level is less than 12 gr/dl (wartonah dan tarwoto, 2015)

Moringa leaves are rich in nutrients and are a source of beta carotene, vitamin C, iron, and potassium. The results of the analysis of Fe content in Moringa leaves at the Research Institute for Spices and Medicines in 2014 shows quite good results, namely 1 kg of Simplicia can produce an iron content of 54.92 mg (Hamzah & Yusuf, 2019; Utami et al., 2020; Waramontri, 2020; Wiyani et al., 2020; Wulansari et al,. 2020). Iron (Fe) is a micromineral that is very important in the body because it functions in the formation of red blood cells. Iron (Fe) in the formation of red blood cells in the synthesis process of hemoglobin (Hb) and can also activate several enzymes, one of which is the enzyme that forms antibodies. (Hamzah & Yusuf, 2019). Moringa leaf extract contains Fe 5.49 mg / 100 g, sitosterol 1.15% / 100 g, and stigmasterol 1.52% / 100 g (Kristina, N.N., Syahid, SitiFatimah., 2014). Carbohydrate, fat, and protein content obtained from mango seed flour without going through the sulfurization stage: 20.00% carbohydrates, 14.83% fat, and 4.84% protein. Protein has an important role in the absorption of iron in the body. less then iron absorption is inhibited and causes iron deficiency. These results are in line with other studies that suggest that protein intake is associated with iron deficiency anemia in urban areas. Young women with less protein intake have a greater chance of developing anemia (Sari, 2016)(Yamin, 2012)(Pratiwi, 2016)(Akib & Sumarmi, 2017). With this background, the idea emerged to make biscuits made from the main ingredients, namely Moringa leaf flour and mango seed flour, which are useful for preventing anemia.

OBJECTIVE

The purpose of this study was to determine the proper and correct method of making biscuits, to determine the level of acceptability, and to determine the nutritional content of the main ingredients based on references. The output of this study was a biscuit product to prevent anemia. The hope is that this product can provide knowledge for the public. that mango seed flour and moringa leaf flour can be used as an alternative for biscuit preparations high in carbohydrates, protein, and iron.

METHODS

results on the biscuits will be displayed and presented in narrative or table form. There are 3 formulas that we use including the ratio of the amount of mango seed flour and Moringa leaf powder, namely F1 (30: 70); F2 (50:50); F3 (70: 30). One formula can produce several 45-50 biscuits weighing one 3 gram biscuit. The tools used in this study were basin, mixer, spoon, bowl, glass, oven, baking sheet, blender, mold, 80 mersh sieve, material scales, analytical scales, basin, saucer, beaker, mold, stirrer, milling, dryer. (blower), desiccator, Kjeldahl flask, furnace, socxhlet, oven, burette, clamp, Erlenmeyer, measuring cup, and texture analyzer. The materials used in this research are mango seed flour and Moringa leaves, wheat flour, margarine, eggs, refined sugar, powdered milk.

The process of making mango seed flour and Moringa leaf powder

1. Take 3-5 mango seeds then cut into small pieces and oven at 50 ° C for 38 hours then mash and sift with 80 mess,
2. Moringa leaves that have been dried first at 45 ° C for approximately 24 hours, then mashed and sifted with 80 mess

The process of making mango seed flour and Moringa leaf powder

1. Take 3-5 mango seeds then cut into small pieces and oven at 50 ° C for 38 hours then mash and sift with 80 mess,
2. Moringa leaves that have been dried first at 45 ° C for approximately 24 hours, then mashed and sifted with 80 mess

Biscuit making process

1. Weigh 175 grams of margarine, 2 eggs, 30 grams of powdered milk, 125 grams of refined sugar.
2. Then homogenize the eggs, margarine, powdered sugar, until it expands solid.
3. Then add the powdered milk, wheat flour, mango seed flour and Moringa leaf flour (according to the construction of each formula)
4. After the dough is mixed with smoothness, do the dough molding and arrange it on a baking sheet.
5. Then bake the biscuits in the oven at 100oC for 15 minutes.
6. After that, drain the biscuits, if they are cold put them in a container for storage

Biscuit testing process

1. Organoleptic testing, Several biscuits were subjected to organoleptic tests including shape, color, taste, and aroma
2. Hedonic Testing, Description of acceptance (hedonic impression) of adolescents as respondents to biscuits
3. Nutritional content with proximate analysis includes water content, ash content, protein content, fat content, carbohydrate content, and iron content

RESULTS

The following table is a table 1, shows test results on biscuits

Table 1. Mamoco Biscuit Test Results

No.	TEST	RESULT
1.	Organoleptic Test	F1 = round shape, strong green color of Moringa

		leaves, savory and bitter taste (typical of Moringa), and distinctive aroma of Moringa F2 = round shape, green moringa leaf color, taste Savory (typical of Moringa), and a distinctive aroma of biscuits F3 = Round shape, light green color of moringa leaves, savory taste and distinctive aroma of biscuits.
2.	Hedonic Test	Of the 30 responses showing that in formula 1, 27 respondents (90%) disliked it, 23 respondents (76.7%) liked formula 2, and 22 respondents (73.3%) liked formula 3.
3.	The nutritional content of the biscuits was tested by performing a proximate analysis including moisture content, ash content, protein content, fat content and iron content.	Water content 4.1%; ash content 1.38% (w / w); protein content 18.1%; fat content 30.2%; carbohydrate content of 78.3% and iron content of 37.2 mg

DISCUSSION

Biscuits are small snacks that are usually made from wheat flour or other types of flour. Usually, in the process of making biscuits, fat or oil is added which functions to soften or make them crispy, so they become more delicious (Rudianto, Aminuddin Syam, 2013).

The process of making mango seed flour is to take 3-5 mango seeds then cut into small pieces and oven at 50 ° C for 38 hours then mash and sift with 80 mess. While the process of making Moringa leaf powder, namely Moringa leaves that have been dried first at 45 ° C for approximately 24 hours, then mashed and sieved with 80 mess. The process of making biscuits in this study was to prepare mango seed flour and moringa leaf flour. There are 3 formulations used in this research, namely F1 (70% mango seed flour and 30% Moringa leaf flour); F2 50% mango seed flour and 50% Moringa leaf flour); F3 30% mango seed flour and 70% Moringa leaf flour). In making biscuits also add flour. The results of the biscuit making were then tested for the organoleptic, hedonic test, and nutritional content based on references.

Organoleptic tests were carried out on the taste of mango seed flour and Moringa leaf flour biscuits because here we want to see the level of consumer acceptance of the product because we know that consumers accept a product only in terms of taste, so an organoleptic test is carried out on the level of taste preference. The most important factor to determine the panelist's acceptance of a product, both food, and beverage, (Puspitarini & Rahayuni, 2012).

Taste is the most important thing in determining whether a panelist accepts or rejects a food ingredient. In this study, the taste is also one of the tests to get the desired results because the essence of this research is to get the best results that have been tested by several panelists. The results of the organoleptic test on taste aimed to determine the level of response of the panelists regarding their preference for the biscuits produced in each treatment. The taste of food is one of the determining factors for food ingredients. Food that tastes good and is attractive will be liked by consumers (Rudianto, Aminuddin Syam, 2013).

The water content in biscuits will affect consumer acceptance, especially in the texture attribute (crunchiness). Biscuits with high water content tend not to be crispy, so the texture is less favorable. The water content of the biscuits produced is 4.1%. The quality requirements for biscuits based on SNI 01-2973-1992 state that the maximum moisture

content in biscuits is 5% (bb). The water content of the biscuits produced was still below the SNI requirements, so it could be said that the water content of the biscuits with the substitution of Moringa flour and wheat flour met the quality requirements of biscuits based on SNI. Ash content is a mineral element as the residue left after the material is burned until it is free of carbon elements. Ash content can also be interpreted as a non-volatile component, which remains in the combustion and annealing of organic compounds.

The ash content of a food material shows the residual inorganic material remaining after the organic matter in the food is deconstructed The ash content is not always equivalent to the mineral material, because some minerals are lost during volatilization or the interaction between constituents The high ash content in foodstuffs, in some cases can give clues to the possibility of adulteration. Ash content in the material food can be grouped into water-soluble and acid-soluble ash and water / acid-insoluble ash. The high acid insoluble ash content in foodstuffs is a measure of the amount of sand and silica present in foodstuffs. Biscuit quality requirements are based on SNI 01-2973- 1992, the maximum ash content in biscuits was 1.5% (bb). The ash content of the biscuits produced in this study was 1.38%. The ash content of the biscuits met the SNI biscuit quality requirements. The high and low ash content of the biscuits produced is thought to be due to the addition of Moringa leaf flour and mango seed flour.

The fat content of the biscuits produced in this study was 30.2%. The value has met the standard according to Standarisasi Nasional Indonesia (SNI) 01-2973, 2011 those above 9.5% (minimum 9.5%). This is thought to be due to the addition of Moringa leaf flour, mango seed flour, wheat flour, margarine, and milk where the margarine contains 25% - 30% fat respectively. This is in Sunaryo's opinion, that in this dough the gluten expands fully because the added water allows expansion which results in a change in its final shape, shrinkage in length after molding and baking. Usually, the final product has certain cryspinetic properties with a fat content of 25% - 30% (Sunaryo, 1985)

The protein content of the biscuits produced in this study was 18.1%. This value has met the standards according to SNI No. 01-2973-92 which is at least 9%. This is because the portion of carbohydrates is replaced by the supplemented material, namely Moringa leaf flour (Rudianto, Aminuddin Syam, 2013).

Materials that are a source of carbohydrates in making biscuits include wheat flour, sugar, and milk. The carbohydrate content in biscuits is calculated by determining the carbohydrate content roughly using the by difference method. The analysis showed that the carbohydrate content of the biscuits using the formulation of 50% Moringa leaf flour and 50% mango seed flour was 78.3% (bb). When compared with the minimum requirements for the carbohydrate content of wheat biscuits listed in the SNI (70%). This is in accordance with the research of Agustyn et al. That the carbohydrate content shows that the highest carbohydrate content is owned by arumanis mango seed flour of 52.74%.(Augustyn et al., 2016).

From the analysis process, it was found that there was 37.2 mg of iron in the biscuits. This shows that the Fe content in these products is very high so that the mango seed flour and Moringa leaf flour biscuits can be consumed to meet one's nutritional needs. By paying attention to diet, it is hoped that the iron needs of each individual can be met as needed. According to Kartono and Soekatri, the iron requirement per person per day for infants (0-11 months) is 0.5-7 mg, children aged 1-9 years are 8-10 mg, men 10-12 years is 13 mg, men ages 13-15 years is 19 mg, men ages 16-18 years is 15 mg, men ages 19-65 years is 13 mg, women ages 10-12 years is 20 mg, women ages 13-49 years is 26 mg, women ages 50- 65 years and over is 12 mg, for pregnant women plus 9-13 mg of normal needs, while for breastfeeding women plus 6 mg of normal needs (Supriasa, 2012)

CONCLUSION

Products that are suitable as alternative food preparations, which are preferred by respondents and with nutritional content based on SNI, namely in formula 2 with a combination of mango seed flour and Moringa leaf powder (50: 50).

CONFLICTS OF INTEREST

The results of this study can produce biscuits with various nutritional content, this happens based on the content of each material which is much influenced by the planting place, temperature, soil quality.

REFERENCES

Akib, A., & Sumarmi, S. (2017). Kebiasaan Makan Remaja Putri yang Berhubungan dengan Anemia : Kajian Positive Deviance Food Consumption Habits of Female Adolescents Related to Anemia: A Positive Deviance Approach. *Amerta Nutrition*. https://doi.org/10.20473/amnt.v1.i2.2017.105-116

Augustyn, G. H., Breemer, R., & Lekipiouw, I. (2016). ANALISA KANDUNGAN GIZI DUA JENIS TEPUNG BIJI MANGGA (Mangifera indica L) SEBAGAI BAHAN PANGAN MASYARAKAT KECAMATAN MOLA, KABUPATEN MALUKU BARAT DAYA. *AGRITEKNO: Jurnal Teknologi Pertanian*, *5*(1), 26. https://doi.org/10.30598/jagritekno.2016.5.1.26

Hamzah, H., & Yusuf, N. R. (2019). Analisis Kandungan Zat besi (Fe) Pada Daun Kelor (Moringa oleifera Lam.) Yang Tumbuh dengan Ketinggian Berbeda di Daerah Kota Baubau. *Indo. J. Chem. Res.*, *6*(2), 88–93. https://doi.org/10.30598//ijcr.2019.6-has

Kaimudin, N., Lestari, H., & Afa, J. (2017). Skrining Dan Determinan Kejadian Anemia Pada Remaja Putri Sma Negeri 3 Kendari Tahun 2017. *Jurnal Ilmiah Mahasiswa Kesehatan Masyarakat Unsyiah*, *2*(6), 185793.

Kementerian Kesehatan, Peraturan Menteri Kesehatan Republik Indonesia Nomor 41 tentang Pedoman Gizi Seimbang (2014). https://doi.org/10.1007/s13398-014-0173-7.2

Kristina, N.N., Syahid, SitiFatimah., B. (2014). Penelitian dan Pengembangan Tanaman Industri Volume 20 No.3Pemanfaatan tanaman kelor untuk (Moringa oleifera) meningkatkan produksi air susu ibu. *Penelitian Dan Pengembangan Tanaman Industri*, *20*.

Pratiwi, E. (2016). AKTOR-FAKTOR YANG MEMPENGARUHI ANEMIA PADA SISWI MTS CIWANDAN CILEGON-BANTEN TAHUN 2015. *E-Jurnal Akuntansi*. https://doi.org/.1037//0033-2909.I26.1.78

Puspitarini, R., & Rahayuni, A. (2012). KANDUNGAN SERAT, LEMAK, SIFAT FISIK, DAN TINGKAT PENERIMAAN ES KRIM DENGAN PENAMBAHAN BERBAGAI JENIS BEKATUL BERAS DAN KETAN. *Journal of Nutrition College*. https://doi.org/10.14710/jnc.v1i1.399

Rudianto, Aminuddin Syam, S. A. (2013a). Studi Pembuatan Dan Analisis Zat Gizi Pada Produk Biskuit Moringa Oleifera Dengan Subtitusi Tepung Daun Kelor. *Journal of Chemical Information and Modeling*, *53*(9), 1689–1699. https://doi.org/10.1017/CBO9781107415324.004

Rudianto, Aminuddin Syam, S. A. (2013b). Studi Pembuatan Dan Analisis Zat Gizi Pada Produk Biskuit Moringa Oleifera Dengan Subtitusi Tepung Daun Kelor. *Journal of Chemical Information and Modeling*. https://doi.org/10.1017/CBO9781107415324.004

Sari, D. (2016). Anemia Gizi Besi pada Remaja Putri di Wilayah Kabupaten Banyumas. *Jurnal Kesmas Indonesia*, *8*(1), 16–31.

Standarisasi Nasional Indonesia (SNI) 01-2973. (2011). *Mutu dan Cara Uji Biskuit*.

Sukartiningsih, M. C. E., & Amaliah, M. (2018). Faktor Yang Berhubungan Dengan

Kejadian Anemia pada Remaja Putri di Wilayah Kerja Puskesmas Kambaniru Kabupaten Sumba Timur. *Jurnal Kesehatan Primer*, *3*(1), 16–29. https://doi.org/https://doi.org/10.31965/jkp

Sunaryo. (1985). *Pengolahan Produk Sereal dan Biji-Bijian*.

Supriasa. (2012). Penilaian Status Gizi Edisi Revisi. In *Penerbit Buku Kedokteran: EGC*.

Utami, R., Iswati, S., Sumartono, C., Glorino, M., & Pandin, R. (2020). Management of Parenting Preparedness at Home in COVID- 2019 Pandemic based on Individual and Family Self- Management Theory (IFSMT): A Systematic Review. 11(7), 626–635.

Waramontri, R. (2020). Impact of Emotional Intelligence of Service Providers and Customers Satisfaction in Air Transport : Case Study of Pharmacists. 11(12), 1029–1031.

Wiyani, L., Aladin, A., & Juniar, M. E. (2020). Antioxidant activity of Virgin Coconut Oil and Virgin coconut Oil Emulsion. 11(12), 973–976.

Wulansari, D. P., Sugianto, I., Yunus, M., Hasyim, R., Hidayati, N., & Hardiana, S. N. (2020). The hard tissue lesions associated with impacted teeth. Systematic Reviews in Pharmacy, 11(12), 16–18. https://doi.org/10.31838/srp.2020.12.3

wartonah dan tarwoto. (2015). kebutuhan dasar manusia dan proses keperawatan. In *Salemba medika*. https://doi.org/10.1039/c2dt32191b

WHO. (2016). *Micronutrient deficiencies. Iron deficiency anaemia*. World Health Organization.

Yamin, T. (2012). *Hubungan pengetahuan, asupan gizi dan faktor lain yang berhubungan dengan kejadian anemia pada remaja putri di SMA Kabupaten Kepulauan Selayar Tahun 2012*.