Indonesian Journal of Global Health Research
Volume 4 Number 2, May 2022
e-ISSN 2715-1972; p-ISSN 2714-9749
http://jurnal.globalhealthsciencegroup.com/index.php/IJGHR

ACCEPTABILITY OF MORINGA LEAVES FLOUR MIX FOOD AS COMPLEMENTARY FOOD SUPPLEMENT FOR BREASTMILK

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ABSTRACT
Moringa leaf flour is well consumed as daily food supplement to overcome malnutrition on infants because has rich nutrient as a result of proteins, β carotene, calcium, iron and magnesium. This study aimed to recognize the acceptability of mixed food ingredients flour on Moringa leaves as complementary supplement of breast milk. This was quasi experimental research with nonequivalent control group design. We prepared a mixed food formula with red rice flour, breast milk or formula and olive oil. Then, determining the content of nutrients, food safety and acceptance of food complementary to mixed food ingredients formulation with 4 treatment of moringa flour consisted of (5 gram, 6 gr gram, 7 gram and 8 gram). The results revealed that the highest scores of all aspects (taste, texture, aroma and color) then formula one (F1) with the amount of addition of 5 gr of moringa flour is at the first sequence. The most formula contained was Calcium, Carbohydrate and protein that was in formula 1 with the amount of calcium by 8915.04 µg/g, carbohydrate by 18.57% and protein by 4.25%. on the other hand, formula 3 contained lots of fats by 2.25%.

Keywords: food supplement; mixed food ingredients formula; moringa leaf flour

First Received	Revised	Accepted
10 Maret 2022	19 April 2022	20 May 2022
Final Proof Received		**Published**
13 May 2022		28 May 2022

How to cite (in APA style)
Pawenrusi, E. P., Kamariana, K., & Ernayulianti, E. (2022). Acceptability of Moringa Leaves Flour Mix Food as Complementary Food Supplement for Breastmilk. *Indonesian Journal of Global Health Research*, *4*(2), 419-424. https://doi.org/10.37287/ijghr.v4i2.1172.

INTRODUCTION

The results of the 2015 Nutritional Status Monitoring (PSG) stated that 3.8% of children under five had malnutrition (Romadhon & Purnomo, 2020). The nutritional status of children under five according to the Weight Per Age Index (BW / U), obtained the results: 79.7% good nutrition, 14.9% under nutrition, 3.8% malnutrition and 1.5% over nutrition. The nutritional status of toddlers according to the Height per Age Index (TB / U) showed 71% normal and 29.9% short and very short toddlers. Nutritional status of toddlers according to the Index Weight per Height (BW / TB), the results showed 82.7% Normal, 8.2% thin, 5.3% fat and 3.7% very thin (Kemenkes RI, 2019). The national coverage of toddler complementary feeding for more than 6 months in 2013 was 54.3%, decreased in 2014 by 52.3%. Based on the province in Indonesia, in 2014 the highest was West Nusa Tenggara at 84.7% while the lowest was West Java Province at 21.8% (Hardhana B, Siswanti T, et al, 2018). The results of modern scientific research prove that Moringa leaves are a source of vegetable food that is rich in nutritional content (Mensaj JK, 2020). The results of research by Zakaria, et al. (2012) state that Moringa leaf flour of the South Sulawesi variety has rich nutritional content as shown in the analysis, namely protein, β carotene, calcium, iron and magnesium, so it is good to be used as a daily food additive to overcome nutritional deficiencies in toddler (Ibrahimiyah NA, 2014).

METHOD

This type of research was used a quasi-experimental with the nonequivalent control group design method (West SG, Biesanz JC, Pitts SC, 2020). This research prepared a mixed food ingredient formulation (BMC) with brown rice flour, breast milk or formula milk and olive oil. Then determine the nutritional content, food safety (bacteriological test and food security) and the acceptability of Complementary Food Supplement for Breastmilk to BMC formulations with 4 additional treatments of Moringa leaf flour consisting of (5 gram, 6 gram, 7 gram, and 8 gram) (King T, Cole M, Farber JM, Eisenbrand G, Zabaras D, Fox EM, et al, 2017). The tools used to make Moringa Leaf Flour Porridge are a pot, gas stove, spoon, bowl and the ingredients used are Moringa leaf flour, brown rice flour, formula milk. Procedure for making the team porridge procedure as follows; (1) dissolve first the brown rice flour and Moringa leaf flour into formula milk, then mix well; (2) heat over low heat, then add the olive oil and stir gently until thick, popping and cooked; (3) remove, stir until the heat is reduced and pour into the baby bowl. Test of Nutritional Content, Bacteriological Test and Food Resistance using Laboratory Analysis Test and to accept complementary food supplement for breastmilk using a questionnaire. Each was assessed by a hedonic test according to the panelist's level of preference with a scale transformed into a numeric scale with the following numbers; very like = 5; like = 4; somewhat like = 3; dislikes = 2; very dislike = 1.

RESULTS

Based on research conducted in July – September 2017 for nutritional content tests, bacteriological tests and food security were carried out at the Makassar City Health Laboratory Center and for acceptance carried out around the Maccini Sawah Puskesmas area, the following results were obtained:

Table 1.
Analysis Results of Formula 1 Nutrient Content in 100 g BMC form Moringa Leaf Flour

Parameter	Unit	Check-up result
Calcium (Ca)	µg/g	8915.04
Carbohydrate	%	18.57
Protein	%	4.25
Fat	%	1.88

The composition of BMC formula 1 moringa leaf flour, such as 5 g moringa leaf flour, 50 g brown rice flour, 250 ml formula milk and 2 ml olive oil and the results of the analysis of the nutrient content of formula 1 showed that the amount of Calcium (Ca) in the team porridge was 8915.04 g, Carbohydrates as much as 18.57%, Protein as much as 4.25% and Fat as much as 1.88%.

Table 2.
Analysis Results of Formula 2 Nutrient Content in 100 g BMC Moringa Leaf Flour

Parameter	Unit	Check-up result
Calcium (Ca)	µg/g	2643.67
Carbohydrate	%	16,97
Protein	%	3,84
Fat	%	1,41

The composition of BMC formula 2 moringa leaf flour, such as 6 g moringa leaf flour, 50 g brown rice flour, 250 ml formula milk and 2 ml olive oil and the results of the analysis of nutrient content in formulation 2 showed that the amount of Calcium (Ca) in the team porridge was 2643.67 g, Carbohydrates as much as 16.97%, Protein 3.84%, and Fat is 1.41%.

Table 3.
Analysis Results of Formula 3 Nutrient Content in 100 g BMC Moringa Leaf Flour

Parameter	Unit	Check-up result
Calcium (Ca)	µg/g	6322.18
Carbohydrate	%	16.77
Protein	%	3.25
Fat	%	2.15

The composition of BMC formula 3 moringa leaf flour, such as 7 g moringa leaf flour, 50 g brown rice flour, 250 ml formula milk and 2 ml olive oil and the results of the analysis of nutrient content in formulation 3 showed that the amount of Calcium (Ca) in the team porridge was as much as 6322.18 g, Carbohydrates as much as 16.77%, Protein as much as 3.25%, and Fat as much as 2.15%.

Table 4.
Analysis Results of Formula 4 Nutrient Content in 100 g (MP ASI) BMC Moringa Leaf Flour

Parameter	Unit	Check-up result
Calcium (Ca)	µg/g	3161
Carbohydrate	%	18.31
Protein	%	3.75
Fat	%	2

The composition of BMC formula 4 moringa leaf flour, namely 8 g of Moringa leaf flour, 50 g brown rice flour, 250 ml formula milk and 2 ml zaitun oil and the results of the analysis of nutrient content in formulation 4 showed that the amount of Calcium (Ca) in the team porridge was as much as 3161 g, Carbohydrates as much as 18.31%, Protein as much as 3.75% and Fat as much as 2%. The results of the food security analysis on complementary foods with breast milk (MP ASI) show that the team porridge can last 7 - 8 hours until the taste, texture and aroma change.

Table 5.
Analysis Results of the Acceptability Analysis of BMC

Formula	Mean				
	Taste	Texture	Aroma	Color	Overall
Formulasi 1	4.02	3.81	3.76	3.29	3.90
Formulasi 2	3.64	3.79	3.55	3.55	3.52
Formulasi 3	3.38	3.55	3.98	3.36	3.50
Formulasi 4	3.29	3.62	3.69	3.62	3.26

Based on Table 5, the analysis of acceptability results of BMC from the four formulations show that:

a. Taste

The average taste score on MP ASI was the highest in formula 1 with the amount of 4.02 with the addition of 5 g of Moringa leaf flour, this shows that many panelists like formula 1 because the dominant taste is brown rice flour and not too much Moringa leaf flour taste.

b. Texture

The average score from the texture aspect of MP ASI was the highest in formula 1 with the amount of 3.81 with the addition of 5 g of Moringa leaf flour, this indicates that the panelists preferred formula 1 because of its less composition of Moringa leaf flour.

c. Aroma

The average score from the aroma aspect of MP ASI was the highest in formula 3 with the amount of 3.98 with the addition of 7 g of Moringa leaf flour, this shows that the panelists like formula 3 because the aroma is quite strong compared to formula 1 and formula 2, while for formula 4 the aroma is very strong.

d. Color

The average score from the color aspect of MP ASI was the highest in formula 4 with the amount of 3.62 with the addition of 8 g of Moringa leaf flour, this indicates that the panelists prefer formula 4 from the color aspect because the composition of Moringa leaf flour is more compared with another formula so that the color is green.

e. Whole

The average score from the overall aspect (taste, texture, aroma and color) on MP ASI that most panelists liked was formula 1 with the amount of 3.90 with the addition of 5 grams of Moringa leaf flour.

Table 6.
Results of the Acceptance Analysis of BMC from the taste aspect

Acceptability Analysis of BMC	f	%
Taste		
Very dislike	4	2.4
Do not like	20	11.9
Kind of like it	43	25.6
Like it	76	45.2
Really like	25	14.9
Texture	f	%
Do not like	10	6
Kind of like it	48	28.6
Like it	94	56
Really like	16	9.5
Aroma	f	%
Do not like	14	8,3
Kind of like it	29	17,3
Like it	111	66,1
Really like	14	8,3
Color	f	%
Do not like	32	19
Kind of like it	43	25,6
Like it	78	46,4
Really like	15	8,9

Organoleptic test (favorite) BMC Moringa leaf flour as a complementary food supplement for breast milk from the Organoleptic test, the following results were obtained:

1. Taste

The results of the assessment analysis for all formulas from the aspect of taste of the panelists showed who gave a very dislike of 4 people (2.4%), 20 people (11.9%) who did not like it,

and 43 people (25.6%) who liked it somewhat), 76 people (45.2%) like it and 25 people (14.9%) really like it.

2. Texture

The results of the assessment analysis for all formulas from the texture aspect of the panelists showed who gave a dislike of 10 people (6%), 48 people (28.6%) who chose to like a little (28.6%), 94 people (56%) who gave a dislike Very like assessment of 25 people (14.9%).

3. Aroma

The results of the assessment analysis for all formulas from the aspect of aroma panelists showed who gave dislike were 14 people (8.3%), 29 people (17.3%) chose to like them, 111 people (66.1%) voted), and the panelists who voted very much like 14 people (8.3%)

4. Color

The results of the analysis of the assessment for all formulas from the color aspect of the panelists showed who gave a dislike of 32 people (19%), 43 people (25.6%) chose to like a little, 78 people (46.4%) chose to like them. 15 panelists who voted very much (8.9%).

5. Overall

The results of the assessment analysis for all formulas from the overall aspects (taste, texture, color and aroma) of panelists showed who chose to dislike were 14 people (8.3%), 56 people (33.3%) chose to like as many as 90 people (53.6%) and the panelists who voted very much like 8 people (4.8%).

DISCUSSION

Mixed food ingredients (BMC) were a mixture of several food ingredients with a ratio of certain nutrient levels in order to obtain a higher nutritional value (Dickinson E, 2013). The consideration of choosing food ingredients in the BMC formula (Moringa leaf flour, brown rice flour, formula milk and olive oil) was intended so that the nutritional contents interact with each other and complement the advantages and disadvantages of each food ingredient (Yameogo CW, Bengaly MD, Savadogo A, Nikiema PA, Traore SA, 2011). Moringa leaf flour was chosen as an addition in making BMC formulas because it was based on several studies that gave positive value to the growth of toddlers with high macro and micro nutrient content, namely containing 40 essential nutrients (Zongo U, Zoungrana SL, Savadogo A, Traoré AS, 2013). The addition of 3-6 grams of Moringa leaf flour to the BMC formula was based on the results of research which concluded that with the addition of 3-5 g of Moringa leaf flour to food or drinks for malnourished children under five can trigger children's appetite so that the portion of food they consume could increasing thereby impacting on the child's weight gain (Shakir A, Morley D, 1974 and Anwar F, Latif S, Ashraf M, Gilani AH, 2007).

CONCLUSION

Based on the results of the study of the BMC study of Moringa leaf flour as a complementary food supplement for breast milk, it could be concluded that the four formulas was contained the most calcium (Ca), carbohydrates and protein, namely formula 1 with the amount of Calcium (Ca) 8915.04 ug / g, carbohydrates as much as 18.57%, and protein as much as 4.25%. And the one that contains the most of fat in formula 3 is 2%. The results of the food security analysis on complementary foods with breast milk (MP ASI) showed that the team porridge can last 7 - 8 hours until the taste, texture and aroma change. Based on the highest scoring score from all aspects (taste, texture, aroma and color), formula one (F1) with the addition of 5 gram of Moringa leaf flour was in first place.

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