The 9th Engineering International Conference  
IOP Conf. Series: Earth and Environmental Science 700 (2021) 012068  
doi:10.1088/1755-1315/700/1/012068

The addition of moringa leaf powder into instant porridge as an effort to improve organoleptic quality and nutritional content for the elderly

A Hestiyawati, Wahyuningsih, S Fathonah  
Universitas Negeri Semarang, Indonesia  
wahyuningsih@mail.unnes.ac.id

Abstract. Research objectives: 1) to find result of different percentage Moringa leaf flour addition by 0%, 5%, 10%, 15%. 2) to find the energy content, protein and iron in the instant porridge with Moringa leaf flour addition. 3) to find out the elderly’s acceptability of instant porridge with Moringa leaf flour addition. The experimental design used was the One short case study. The data analysis method used was the single classification variant analysis method followed by the Tukey test, while the elderly’s acceptability was analysed by using preference test. The study results are: 1) The tenderness texture of Moringa leaf instant porridge is different and the after taste is bitter. 2) The energy content test result of 0% to 15% Moringa leaf powder addition is ranging from 228.7 to 456.1 kcal. The protein content of instant porridge with 0% to 15% Moringa leaf powder addition ranges from 9.0 -19.8 grams and the iron content of instant porridge with 0% to 15% Moringa leaf powder addition ranges from 4.5 to 5.1 mg. 3) The elderly’s acceptability of the sample with 0%, 5% and 10% Moringa leaf powder addition belongs to “like” criteria while for the sample with 15% Moringa leaf powder addition belongs to the criteria “average” criteria. Conclusion: 1) Differences are found in the normal porridge and instant porridge with Moringa leaf flour addition. 2) the highest nutrient content is found in the sample with 15% Moringa leaf flour addition. 3) the highest acceptance of elderly is found in the sample with 0% Moringa leaf flour addition. Based on the research result, it is suggested to use moringa leaves which are often harvested periodically and add salt in the boiling leaves to get rid the bitterness.

1. Introduction

Elderly’s nutritional status is one indicator that reflects the level of community welfare and development success of a country [1]. One of the main problems of health faced by various developing countries is the nutritional problem, which is the malnutrition, which affects growth and development. The body needs nutrients because in addition to being used as a source of energy, it also has a role to support body growth such as helps regenerate cells, maintain body tissues, regulate metabolism and act as antioxidants and antibodies for the body [2].

Elderly is a period where a person reaches the age of 60 years and above [3]. Elderly is an important period and needs to be focused on because during this period, the tissue's ability to repair, replace and maintain its normal function has slowly decreased so that the body is vulnerable to infection [4].

According to the Ministry of Health [5], the number of elderly in Indonesia was 7.59% of all the population, with the highest percentage belongs to the special region of Yogyakarta, which was at
13.4%, and the lowest was in Papua, at 2.8%. The diseases that the elderly mostly experienced are non-contagious diseases [6]

Based on list disease experienced by the elderly, one of the countermeasures is to pay attention to nutrient intake, so that the elderly’s nutritional status and life quality can be improved. The food consumed by the elderly should be served warm, soft and in small portions [7].

According to Nugroho [8], the food diet for elderly should be started by providing soft-textured foods such as porridge. The porridge should contain sufficient amount of all nutrient elements in accordance with their body weight and physical activity. However, most porridge does not contain balanced nutrients so that it often causes constipation, thus it is necessary to add food material that contains a lot of nutrients, one of which is Moringa leaf. Moringa leaf, aside from being abundant, also has many benefits for health. Moringa leaves are even widely used for treating inflammation, liver and kidney disease [9]. In addition, moringa leaves can be used as an anti-biotic, anti-hypertensive, anti-inflammatory and hypoglemic [10].

Based on a pre-experiment, the combination of moringa leaf flour and rice flour as much as 15%, 30% and 45% produce a rotten taste, and they produce bitter taste at the percentage of 30% and 45%. It can be concluded that by adding too much moringa leaf flour, the porridge will produce a unpleasant and bitter taste. Therefore, the percentage of Moringa leaves is reduced.

Based on the pre-experiment result, the production of this instant puree product by adding 0%, 5%, 10% and 15% of Moringa leaves as an alternative for instant porridge processing, aside from being practical, also provides a lot of nutrients.

The research objectives are: 1) to know the difference in the addition of Moringa leaf flour with different percentages of 0%, 5%, 10%, 15%. 2) to know the content of energy, protein and iron in the instant porridge with the addition of moringa leaf flour. 3) to determine the elderly’s acceptance capability of instant porridge with the addition of Moringa leaf flour.

2. Method

The object of this research was instant porridge with the addition of Moringa leaf flour. The experimental design used in this study was Posttest-Only Design [11].

This study used three types of variables. The first one was the independent variable, which was is the use of different Moringa leaves, at 0%, 5%, 10% and 15%. The dependent variable was the sensory quality, the nutrients include energy, protein and iron content and the acceptability of the elderly. The control variable in this study was the type and amount of ingredients according to the recipe.

There were 2 data collection methods used, which were subjective evaluation and objective evaluation [12]. Subjective assessment is a sensory test using quite trained panellists totalling 18 people using the scoring test. For the sensory test results, the collected data was then analyzed using the Single Classification Variant Analysis followed by the Tukey test. The objective assessment is the assessment of nutrient content tests including energy using the combustion method, the assessment of protein using the spectro method and the assessment of iron using the automatic absorption spectrophotometric method. Subjective assessment for the elderly’s acceptance test used 80 untrained panellists. The result of the acceptance test was analyzed using averages.

2.1. The Making of Moringa Leaf Instant Porridge

Moringa leaf flour, rice flour, salt and sugar were mixed with chicken broth and then boiled to a temperature of 100°C. The mixture was then cooled down, and wrapped in a plastic wrap and put in the freezer for 3 days and 3 nights. The frozen porridge was thawed until it reached room temperature and then poured into a thin pan. The porridge was then dried using a dryer for 24 hours at a temperature of 60°C. The dried porridge was then blended and sieved using an 80 mesh strainer. The recipe can be seen in the following Table 1.
### 3. Result and Discussion

Sensory test data on the overall aspect shows that the best quality product of the four samples is the sample of 5% Moringa leaf flour addition followed by the sample of 0% Moringa leaf flour addition, the sample of 10% leaf flour addition and the sample of 15% leaf flour addition respectively. The sensory test result can be seen in the following Table 2.

#### Table 2. Sensory Test Result

| Moringa Leaf (%) | Value | Avg | Criteria |
|------------------|-------|-----|----------|
|                  | 1     | 2   | 3       | 4     | 5     | 6     | 7     |     |
| 0                |       |     |        | 1     | 2     | 4     | 7     | 21   | 39   | 26   | 48   | 2     | 4     | 5.4   | Good   |
| 5                |       |     |        | 0     | 1     | 2     | 11    | 17   | 20   | 8    | 15    | 34    | 63    | 6.4   | Very Good |
| 10               |       |     |        | 0     | 0     | 0     | 0     | 0    | 6    | 11   | 12    | 11    | 78    | 3     | 6     | 3     | 6    | 5.1   | Moderate |
| 15               |       |     |        | 0     | 0     | 0     | 0     | 0    | 7    | 13   | 31    | 57    | 15    | 28    | 1     | 2     | 0     | 4.2   | Moderate |

Based Table 2, it can be seen that the average range produced was from 4.2-6.4 where there were 2 samples which the assessment result was below neutral, they were the sample of 0% by 2%, and the sample of 15% by 13%. The highest score in the sample of 10% and the sample of 15% are 4 and 5 respectively. Both samples also fall into the same criteria which is average (quite good).

Based on sensory tests on the green color aspect, the highest sample was the sample of 15% then followed by the sample of 10%, sample of 5% and sample of 0%. The percentage of green color aspect can be seen in the following Table 3.

#### Table 3. The Sensory Test of Green Color Aspect

| Moringa Leaf (%) | Value | Avg | Criteria |
|------------------|-------|-----|----------|
|                  | 1     | 2   | 3       | 4     | 5     | 6     | 7     |     |
| 0                |       |     |        | 1     | 2     | 4     | 7     | 21   | 39   | 26   | 48   | 2     | 4     | 4.5   | Neutral |
| 5                |       |     |        | 0     | 0     | 0     | 0     | 0    | 4    | 7     | 12    | 22    | 19    | 35    | 19    | 35    | 6     | Moderate |
| 10               |       |     |        | 0     | 0     | 0     | 0     | 0    | 0    | 0     | 8     | 15    | 29    | 54    | 17    | 31    | 6.2   | Bright |
| 15               |       |     |        | 0     | 0     | 0     | 0     | 0    | 0    | 7     | 13    | 25    | 46    | 22    | 41    | 6.3   | Bright |

Based on the table above, there is 1 assessment where the result shows below neutral. Samples of 5% Moringa leaf flour addition, sample of 10% Moringa leaf flour addition and sample of 15% Moringa leaf flour addition on a score of 7 produce a percentage value that is not much different from 31-41%. The sample of 10% Moringa leaf flour addition and sample of 15% Moringa leaf flour addition have almost the same mean, that are 6.2 and 6.3. Both samples fall into the same criteria, which is bright.

The highest result of sensory test on savory aspect was found in the sample of 0% Moringa leaf flour addition, then followed by the sample of 5% Moringa leaf flour addition, sample of 10%
Moringa leaf flour addition and sample of 15% Moringa leaf flour addition respectively. The percentage can be seen in the following Table 4.

**Table 4. The Sensory Test Result of Savory Aspect**

| Moringa Leaf (%) | Value | Avg | Criteria |
|------------------|-------|-----|----------|
|                  | 1     | 2   | 3   | 4   | 5   | 6   | 7   |     |
| 0                | 0     | 0   | 0   | 0   | 0   | 2   | 4   | 8   | 15  | 11  | 20  | 33  | 61  | 6.4 | Very Strong |
| 5                | 0     | 0   | 0   | 0   | 0   | 3   | 6   | 7   | 13  | 32  | 59  | 12  | 22  | 6   | Strong     |
| 10               | 0     | 0   | 0   | 0   | 0   | 10  | 19  | 38  | 70  | 4   | 7   | 2   | 4   | 5   | Moderate   |
| 15               | 0     | 0   | 0   | 0   | 0   | 5   | 9   | 36  | 67  | 8   | 15  | 3   | 6   | 2   | 4   | Neutral   |

Based on the table above, there is 1 sample below neutral, that is the sample of 15% with 9% percentage. The percentage results on the score of 5 for each sample produces a percentage value ≥ 15% where the highest value is in the sample of 10% which is by 70%, while in the sample of 0% and the sample of 15% have the same percentage as in the sample of 15%. The highest percentage result of the sample of 10% and the sample of 15% are found in score 4 and 5. Each sample produces decreasing mean value respectively.

For the softness aspect, the highest score is found in the sample of 15% which is 6.6, followed by the sample of 10%, sample of 5% and sample of 0%. The four samples produce softness textures respectively from neutral to very soft. The percentage can be seen in the following Table 5.

**Table 5. The Sensory Test Result of Softness Aspect**

| Moringa Leaf (%) | Value | Avg | Criteria |
|------------------|-------|-----|----------|
|                  | 1     | 2   | 3   | 4   | 5   | 6   | 7   |     |
| 0                | 0     | 0   | 0   | 0   | 0   | 45  | 83  | 9   | 17  | 0   | 0   | 0   | 0   | 4.2 | Neutral |
| 5                | 0     | 0   | 0   | 0   | 0   | 0   | 0   | 45  | 83  | 6   | 11  | 3   | 6   | 5.2 | Moderate |
| 10               | 0     | 0   | 0   | 0   | 0   | 2   | 4   | 7   | 45  | 83  | 3   | 6   | 5.9 | Soft   |
| 15               | 0     | 0   | 0   | 0   | 0   | 0   | 0   | 5   | 9   | 6   | 11  | 43  | 80  | 6.6 | Very Soft |

Based on the Table 5, there is no sample below neutral. Sample of 0%, Sample of 5% and Sample of 10% produce the same percentage which is 83%. Whereas the sample of 15% produces a percentage of 80%. The sensory test result for rotten aspect shows that the sample of 0% is the highest, which then followed by the sample of 5%, sample of 10% and sample of 15% respectively. The percentage can be seen in the following table 6.

**Table 6. The Sensory Test Result of Rotten Aspect**

| Moringa Leaf (%) | Value | Avg | Criteria |
|------------------|-------|-----|----------|
|                  | 1     | 2   | 3   | 4   | 5   | 6   | 7   |     |
| 0                | 0     | 0   | 0   | 0   | 0   | 3   | 6   | 8   | 15  | 8   | 15  | 35  | 65  | 6.4 | Very Unclear |
| 5                | 0     | 0   | 0   | 0   | 0   | 1   | 2   | 10  | 19  | 32  | 59  | 11  | 20  | 6   | Unclear    |
| 10               | 0     | 0   | 0   | 0   | 0   | 12  | 22  | 34  | 63  | 3   | 6   | 5   | 9   | 5   | Moderate   |
| 15               | 0     | 0   | 0   | 0   | 7   | 13  | 39  | 72  | 4   | 7   | 1   | 2   | 3   | 6   | 4.1 | Neutral   |

Based on Table 6, there is 1 sample below neutral, which is sample of 15% with a percentage of 13%. In the score 5, each sample gives a percentage value ≥ 7%, where the highest percentage value is in the sample of 10% Moringa leaf flour addition, which is 63%.

In the bitter after taste aspect, the highest sample is found in the sample of 0%, then followed by the sample of 5%, 10% and the sample of 15%. The percentage can be seen in the following table.
Table 7. The Sensory Test Result of Bitter Aftertaste Aspect

| Moringa Leaf (%) | 1 | 2 | 3 | 4 | 5 | 6 | 7 | Avg | Criteria |
|------------------|---|---|---|---|---|---|---|-----|---------|
|                  | n | % | n | % | n | % | n | % | n | % | n | % | n | % | n | % | n | % | n | % |
| 0                | 0 | 0 | 0 | 0 | 0 | 0 | 1 | 2 | 7 | 13 | 9 | 17 | 37 | 69 | 6.5 | Very Unclear |
| 5                | 0 | 0 | 0 | 0 | 0 | 0 | 2 | 4 | 8 | 15 | 33 | 61 | 11 | 20 | 6 | Unclear |
| 10               | 0 | 0 | 0 | 0 | 0 | 0 | 11 | 20 | 34 | 63 | 8 | 15 | 1 | 2 | 5 | Moderate |
| 15               | 0 | 0 | 0 | 0 | 1 | 2 | 39 | 72 | 8 | 15 | 1 | 2 | 5 | 9 | 4.4 | Moderate |

Based on the table above, there is one sample that is below neutral, which is the sample of 15% percentage Moringa leaf flour addition, by 2% on the score of 5, each sample gives a percentage value ≥ 13% where the highest value is found in the sample of 10% Moringa leaf flour addition, which is 63.

The data of the sensory test results will then be analyzed using $F_{\text{count}}$ dan $F_{\text{table}}$ to look for differences. More details can be seen in Table 8.

Table 8. The Calculation Result of $F_{\text{count}}$ and $F_{\text{table}}$ in Instant Porridge

| Indicator          | $F_{\text{count}}$ | $F_{\text{table}}$ | Description        |
|--------------------|--------------------|--------------------|--------------------|
| Overall            | 81.603             | 3.91               | There are differences |
| Green color        | 187.474            | 3.91               | There are differences |
| Savory             | 79.624             | 3.91               | There are differences |
| Texture            | 191.466            | 3.91               | There are differences |
| Rotten taste       | 82.345             | 3.91               | There are differences |
| Bitter After taste | 77.351             | 3.91               | There are differences |

The table above shows that $F_{\text{count}} > F_{\text{table}}$ which means that there are real differences in each indicator. A follow-up test was then carried out using tukey test. The test aims to find out the magnitude of the difference in the sample pairs. The overall aspect tukey test results revealed that there was no difference in the sample pairs of 0% to 10%, while there were differences in other sample pairs.

The inexistent difference in the overall aspects is influenced by the amount of Moringa leaf flour addition which is not much different. The same thing happened in Zakaria's study [13] about the use of Moringa leaf flour in the formulation of supplementary food making for malnourished children. The results of the tukey test can be seen in the following Table 9.

Table 9. Tukey Test Result of Overall Aspect

| Pair                | Difference in average and comparison score | Description        |
|---------------------|-------------------------------------------|--------------------|
| 0% – 5%             | 1.00 < 0.57                               | There are differences |
| 0% – 10%            | 0.30 < 0.57                               | No Difference      |
| 0% – 15%            | 1.20 < 0.57                               | There are differences |
| 5% – 10%            | 1.30 < 0.57                               | There are differences |
| 5% – 15%            | 2.20 < 0.57                               | There are differences |
| 10% – 15%           | 0.90 < 0.57                               | There are differences |

The result of the tukey test on the green aspect shows that there are three pairs with no difference, which are the pair of sample 5% with sample 10%, pair of sample 5% with 15% and the pair of sample 10% with 15%, while the other three pairs have differences. This differences are influenced by the different addition amount of Moringa leaf flour (5%, 10%, 15%). Moringa leaf flour contains chlorophyll compounds. This compound is found in all types of dark green plants such as spinach and
lettuce. This compound plays a role in the healing process of the respiratory tract and detoxification [14]. The results of the tukey test can be seen in the following Table 10.

**Table 10. The Tukey Test Result on Green Aspect**

| Pair         | Difference in average and comparison score | Description          |
|--------------|--------------------------------------------|-----------------------|
| 0% – 5%      | 1.50 < 0.61                                | There are differences |
| 0% – 10%     | 1.70 < 0.61                                | There are differences |
| 0% – 15%     | 1.80 < 0.61                                | There are differences |
| 5% – 10%     | 0.20 < 0.61                                | No Difference         |
| 5% – 15%     | 0.30 < 0.61                                | No Difference         |
| 10% – 15%    | 0.10 < 0.61                                | No Difference         |

The result of the tukey test above indicates that the pair of sample 0% with 5% has no difference, while the other sample pairs have differences. The difference between samples was due to the addition of Moringa leaf flour. The basic aroma of Moringa leave is rotten so that the more Moringa leaf flour is added, the rotten smell is increasing and it can reduce the savory aroma of instant porridge [15]. The results of the tukey test can be seen in the following Table 11.

**Table 11. The Tukey Test result on Savory Aspect**

| Pair         | Difference in average and comparison score | Description          |
|--------------|--------------------------------------------|-----------------------|
| 0% – 5%      | 0.40 < 0.41                                | No Difference         |
| 0% – 10%     | 1.40 < 0.41                                | There are differences |
| 0% – 15%     | 2.10 < 0.41                                | There are differences |
| 5% – 10%     | 1.00 < 0.41                                | There are differences |
| 5% – 15%     | 1.70 < 0.41                                | There are differences |
| 10% – 15%    | 0.70 < 0.41                                | There are differences |

On the softness texture, each pair has differences. This is influenced by the amount of Moringa leaf flour added. The more Moringa leaf flour is added, the water content in the instant porridge increases so that the softness texture of the porridge increases because the moisture content of Moringa leaf is 81% w.b [16], while the rice flour contains 12 grams of water [27]. In the study of the respondents' preference at the diversification of side dishes from Moringa leaves produce softer texture cracker dough [15]. It can be seen in the following table 12.

**Table 12. The Tukey Test Result on Softness Texture**

| Pair         | Difference in average and comparison score | Description          |
|--------------|--------------------------------------------|-----------------------|
| 0% – 5%      | 1.00 < 0.58                                | There are differences |
| 0% – 10%     | 1.80 < 0.58                                | There are differences |
| 0% – 15%     | 2.40 < 0.58                                | There are differences |
| 5% – 10%     | 0.80 < 0.58                                | There are differences |
| 5% – 15%     | 1.80 < 0.58                                | There are differences |
| 10% – 15%    | 0.60 < 0.58                                | There are differences |

For the rotten taste indicator, there is no difference in the pair of sample 0% and 5%. The same situation also occurred in the mixing of Elephan Foot Yam flour and Moringa flour in the production of wet noodles [17]. Other sample pairs have differences. This difference is due to the addition of Moringa leaf flour. The basic taste of Moringa leaves is rotten so the more Moringa leaves flour is added, the more rotten is tasted. The rotten taste of the instant porridge with Moringa leaf flour addition is due to lipoxidase enzym in Moringa leaves. This enzyme is found in green vegetables by hydrolyzing or decomposing fat into rotten compounds [15]. Test results can be seen in table 13.
Table 13. The Tukey Test Result on Rotten Taste Aspect

| Pair       | Difference in average and comparison score | Description       |
|------------|-------------------------------------------|-------------------|
| 0% – 5%    | 0.40 < 0.50                               | No Difference     |
| 0% – 10%   | 1.40 < 0.50                               | There are differences |
| 0% – 15%   | 2.30 < 0.50                               | There are differences |
| 5% – 10%   | 1.00 < 0.50                               | There are differences |
| 5% – 15%   | 1.90 < 0.50                               | There are differences |
| 10% – 15%  | 0.90 < 0.50                               | There are differences |

The result shows that there are differences in each pair, which is influenced by the addition of Moringa leaf flour. The more Moringa leaf flour is added, the bitter after taste in the instant porridge increases. The bitter after taste is caused by alkaloid compounds. This compound is found in leaves that have bitter taste [26]. The results can be seen in the following Table 14.

Table 14. Tukey Bitter After Taste

| Pair       | Difference in average and comparison score | Description       |
|------------|-------------------------------------------|-------------------|
| 0% – 5%    | 0.50 < 0.45                               | There are differences |
| 0% – 10%   | 1.50 < 0.45                               | There are differences |
| 0% – 15%   | 2.10 < 0.45                               | There are differences |
| 5% – 10%   | 1.00 < 0.45                               | There are differences |
| 5% – 15%   | 1.60 < 0.45                               | There are differences |
| 10% – 15%  | 0.60 < 0.45                               | There are differences |

The preference test result is a value obtained from untrained panelists consist of 80 elderly people which shows that the preference level of each criteria for Moringa leaf instant porridge has differences. The most preferred sample by the elderly is the sample with 0% addition so it shows a low acceptance. The same thing also applies to the acceptability of Moringa jelly candy. The acceptability value declines along with the addition of Moringa leaf according to the formula [18]. This is in line with a research by Evivie et al. [19] which states that the addition of different levels of moringa leaf powder affects the acceptability of the product. Moringa is a bit bitter, so the elderly clearly feel the bad difference. The added porridge has a relatively thicker texture than the one without the Moringa leaf flour addition. The same thing happened to the addition of Moringa leaf flour to yogurt where the more Moringa leaf flour is added, the thicker the yogurt [20]. The preference test result can be seen more clearly in Table 15.

Table 15. The Preference Test Result

| Indicator         | Sample 0% | 5% | 10% | 15% |
|-------------------|-----------|----|-----|-----|
| Overall           | 5.45      | 5.41| 5.35| 5.25|
| Green color       | 5.39      | 5.39| 5.47| 5.36|
| Savory            | 5.59      | 5.62| 5.47| 5.65|
| Texture Softness  | 5.77      | 5.65| 5.67| 5.65|
| Rotten Taste      | 5.54      | 5.05| 4.91| 4.49|
| After taste       | 4.91      | 5.12| 5.10| 5.09|
| Criteria          | Like      | Like| Like| Average |

Based on Table 15, the sample that is mostly chosen by the elderly is the one with 0% Moringa leaf flour addition with an average of 5.45 and followed by the sample of 5%, sample of 10% and sample of 15% addition. The preference test chart can be seen in Figure 1 below.
The data analysis result energy, protein and iron content in Moringa Leaf instant porridge was carried out in the Laboratory of Chemistry, Faculty of Mathematics and Natural Science. More details can be seen in Table 16 below.

| Sample | Energy  | Protein | Iron  |
|--------|---------|---------|-------|
| 0%     | 228.7 kcal | 9.0 gram | 4.5 mg |
| 5%     | 304.5 kcal | 18.4 gram | 4.7 mg |
| 10%    | 380.3 kcal | 19.1 gram | 4.9 mg |
| 15%    | 456.1 kcal | 19.8 gram | 5.1 mg |

Based on the test result of nutrient content, it can be seen that the sample that has the highest nutrient content is the sample with 15% addition. However, the sample received by the consumers is the one with 5% Moringa leaf flour addition.

The energy test is carried out using a combustion method. The addition of Moringa leaf flour can make the energy in instant porridge increase because Moringa leaf flour has 205 kcal energy [21]. The energy adequacy rate for the male elderly is 1,900 kcal while it is 1,550 kcal for the female elderly. Therefore, to meet the breakfast energy needs (20% of the RDA), male elderly needs 380 kcal of energy while the female elderly needs 310 kcal of energy [22]. According to the packaging, instant porridge with a net weight of 50 grams in a sample of 0%, it can contribute 114.4 kcal of energy for breakfast.

Protein is an important nutrient for our body because it has a function as a builder. Builder is a substance that forms new tissues [23]. Based on a research, the addition of Moringa leaf extract for yogurt’s quality produces high protein because the more moringa leaf flour is added, the protein content in yogurt becomes higher [20].

In a protein content test using spectro method, the result ranges between 9.0-19.8 grams. Moringa leaf flour has 27.1 grams of protein [24]. Moringa leaf has a high quality protein [25]. Recommended protein intake for male elderly is 65 grams, while for female is 57 grams. Therefore, it requires 13 grams of protein for male elderly to meet their breakfast needs (20% of the RDA), while the female elderly needs 11.4 grams [22]. As written on the package, 50 grams net weight of instant porridge of 0% sample can contribute 4.5 grams of protein for breakfast.

The addition of Moringa leaf flour can increase iron in instant porridge. This is in line with a research on the addition of Moringa leaves to bread that can increase iron significantly [26]. The recommended iron intake needed by male elderly is 13 mg and 12 mg for female elderly [22]. An iron test using automatic absorption spectrophotometric method shows result ranges from 4.5 to 5.1 mg. Therefore to meet the needs of iron breakfast (20% of the RDA), male elderly needs 2.6 mg and female elderly needs 2.4 mg of iron. As written on the package, 50 grams net weight of instant porridge of 0% sample can contribute 2.3 mg of iron for breakfast.
4. CONCLUSION
There found some differences in the softness texture and the bitter after taste for Moringa leaf instant porridge. The result of the test of energy, protein and iron in 0% Moringa leaf flour addition sample shows 228.7 kcal, 9.0 grams and 4.5 mg respectively. For the 5% sample, it shows 304.5 kcal, 18.4 grams and 4.7 mg respectively. The 10% sample sows 380.3 kcal, 19.1 grams and 4.9 mg respectively. The 15% sample shows 456.1 kcal, 19.8 grams and 5.1 mg respectively. The elderly’s acceptability in the 0% Moringa leaf flour addition sample shows a score of 5.45 (like), 5.41 (like) for 5% sample, 5.35 (like) for 10% sample and 5.25 (average) 15% sample.

5. SUGGESTION
It is recommended to use 5% Moringa leaf flour for the instant porridge it is the most preferred by the elderly and has the best criteria in its color, softness texture, rotten taste and bitter after taste. For it does not taste bitter, it is suggested to choose Moringa leaves which are often harvested and add salt when boiling it.

REFERENCES
[1] Sunaryo, Wijayanti, Kuhu MM et al. 2015 Asuhan Keperawatan Gerontik (Yogyakarta: Andi)
[2] Longkumer, T 2012 Physical Growth and Nutritional Status Among Ao Naga Children of Nagaland Northeast India Journal of Anthropology 1 1-6
[3] Efendi 2009 Keperawatan Kesehatan Komunitas: Teori dan Praktek dalam Keperawatan Jilid 1 (Jakarta: Salemba Mendika)
[4] Muhith A 2009 Pendidikan Keperawatan Gerontik (Yogyakarta: Andi)
[5] Anonymous 2015 Profil Kesehatan Kesehatan Indonesia (Jakarta: Ministry of Health)
[6] Anonymous 2013 Laporan Nasional Riset Kesehatan Dasar 2013 (Jakarta: Ministry of Health)
[7] Maryam R S 2008 Mengenal Usia Lanjut dan Perawatanya (Jakarta: Salemba Medika)
[8] Nugroho 2008 Keperawatan Gerontik dan Geriatrik (Jakarta: EGC)
[9] Adeyemi E 2014 Moringa oleifera Supplemented Diets Prevented Nickel-Induced Nephrotoxicity in Wistar Rats Journal of Nutrition and Metabolism 4 1-8
[10] Singh Y 2013 Moringa Oleifera Leaf as Functional Food Powder: Characterization and Uses Journal of Agriculture and Food Science Technology 4 317-324
[11] Sudjana 2005 Metoda Statistika (Bandung: Tarsito)
[12] Kartika and Bambang 1988 Pedoma Uji Iderawi Bahan Pangan (Yogyakarta: Universitas Gajah Mada)
[13] Zakaria 2012 Penambahan Tepung Daun Kelor Pada Menu Makanan Sehari-Hari Dalam Upaya Penanggulangan Gizi Kurang Baik Pada Anak Balita Media Bina Ilmiah 6 42-50
[14] Kurniasih 2016 Khasiat dan Manfaat Daun Kelor (Yogyakarta: Pustaka Baru)
[15] Rosyidah F 2016 Studi Tentang Tingkat KesuakanResponden terhadap Pengemakaragaman Lauk Pauk Dari Daun Kelor (Moringa Oleifera) e-Journal Boga 5 17-22
[16] Ali MA, Yusof YA, China NL, Ibrahim MN, Basra SMA 2014 Drying Kinetics and Colour Analysis of Moringa oleifera Leaves Agriculture and Agricultural Science Procedia 2 394 – 400
[17] Ekawati GA, Ina PT, Pratiwi DPK 2016 Aplikasi Tepung Suweng (Amorphophallus campanulatus BI) Pregelatinisasi dengan Tepung Kelor (Moringa Oleifera) pada Pembuatan Mie Basah. Jurnal Media Ilmiah Teknologi Pangan 3 62-70
[18] Rahmawati 2016 Daya Terima dan Zat Gizi Permen Jeli dengan Penambahan Bubur Daun Kelor (Moringa oleifera) Jurnal Media Gizi Indonesia 11 86-93
[19] Evivie S E, Ebadhamiegehebho PA, Imaren JO, Igene JO 2015 Evaluating the Organoleptic Properties of Soy Meatballs (BEEF) with Varying Level of Moringa Oleifera Leaves Powder Journal Application Science Environment Management 19 649-656
[20] Diantoro, Rohman M, Budiarti R, Palupi HT 2015 Pengaruh Penambahan Ekstrak Daun Kelor (Moringa Oleifera) terhadap Kualitas Yogurt Media Bina Ilmiah 6 59-66
[21] Gopalakrishnan L, Doriya K, Kumar DS 2016 Moringa oleifera: A review on nutritive importance and its medicinal application Food Science and Human Wellness 5 49-56
[22] Anonymous 2013 Angka Kecukupan Gizi yang dianjurkan Bagi Bangsa Indonesia (Jakarta: Ministry of Health)
[23] Winarno FG 2004 Kimia Pangan Dan Gizi (Jakarta: Gramedia Pustaka Utama)
[24] Mune MAM, Nyobe EC, Bassogog CB, Minka SR 2016 A comparison on the nutritional quality of proteins from Moringa oleifera leaves and seeds Cogent Food & Agriculture 2 1213618
[25] Mouminah H S 2014 Effect of Dried Moringa Oleifera Leaves on the Nutritional and Organoleptic Characteristics of Cookies Alexandria Science Exchange Journal 36 297-302
[26] Bolarinwa LF 2017 Nutritive Value and Acceptability of Bread with Moringa Powder Journal of the Saudi Society of Agricultural Sciences 1 1-6
[27] Mahmud MK and Zulfianto NA 2009 Tabel Komposisi Pangan Indonesia (TKPI) Persatuan Ahli Gizi Indonesia (Jakarta: Media Komputindo)