“Burlang”, Baby Porridge with Javanese grasshoppers (Valanga nigricornis) extract powder as a weaning food to decrease stunting prevalence in Blora, Central Java, Indonesia

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Abstract

Stunting still become one of the common health problem. Toddler stunting prevalence in Indonesia according to Indonesian Ministry of Health 2018 was 30,8 % that’s mean very high based on WHO categories. A serious effort is needed to reduce the stunting rate, one way is through complementary food. One of the factors in giving complementary food is the economy, concerning purchasing power and food availability. There for Innovation in weaning food in the form of “Burlang” become of alternative way to reduce stunting. The formulation with the best acceptance by panelists is formulation 1 (90%). Friedman test results of the statistical test p value <0.025 there is a significant difference between the formulations and indicates the giving of a Javanese Grasshopper powder influential on acceptance. “Burlang” can be functional food by determine the acceptability of Javanese Grasshopper for toddler by adding dry powder form of Javanese Grasshopper as the purpose of this research.

Keywords: Burlang, baby porridge, javanese grasshopper, Valanga nigricornis, javanese grasshoppers extract powder, weaning food, stunting, formulation

1. Introduction

Stunting still become one of the common health problem in the world. In 2017, 22.2% or around 150.8 million Toddler in the world are stunting. However, this figure has exceeded when compared with the figure in 2000 which was 32.6%. Stunting prevalence data according to World Health Organization (WHO), Indonesia is included in the third country with the highest prevalence in the Southeast Asia / South-East Asia Regional (SEAR) region. The average prevalence of stunting toddlers in Indonesia in 2005-2017 was 36.4% that’s mean very high based on WHO category (more than 20%) (Buletin Stunting, 2018). Toddler stunting prevalence in Indonesia according to Indonesian Ministry of Health 2018 was 30,8 %. Based on the stunting distribution map area, Central Java including the yellow area which means high prevalence that is 30% - <40%. The number of stunting in one region of central java, Blora reach 8.3%.

Stunting not only about short but affect the level of children intelligence and development. A serious effort is needed to reduce the stunting rate, one way is through complementary food. The best complementary food is made by approaching toward breast milk, high protein. One of the factors in giving complementary food is the economy, concerning purchasing power and food availability.

The condition of the region Blora is not vulnerable area, although far from the coastal area there can still be found other food sources of animal protein which are the main things in preventing stunting, namely from livestock products and ponds, new problems arise the price of animal protein is considered expensive and become an influential thing in complementary food, example food that become animal protein source, Tiger shrimp (Panaeneus Monodon), the price is ± Rp65000/kg and contain 9.842% protein/gram powder. With lower price and higher protein there is alternative for weaning food, Javanese Grasshopper.

Javanese Grasshopper that known as pest of rice plant can be consumed with rich nutrient. Javanese grasshoppers (Valanga nigricornis) is a popular food in some region in Indonesia especially in Blora, but is still assume as extreme food and only few people who consume. Because of the texture, Javanese Grasshoppers is limited to kids until adult consumption only. Need further processing so that grasshoppers can be consumed for babies (6-2nd years old) as complementary food. According to Kusmaryani’s (2005) Javanese Grasshopper powder contain 17.922% protein/gram powder, higher than Tiger Shrimp. Moreover, the availability of grasshoppers which are considered as pests in Blora is abundant, especially in the rainy season.
The use of Javanese Grasshoppers as an additional ingredient on complementary food is one of the good alternatives in one of the efforts to overcome stunting in Blora district by determining the acceptability of Javanese Grasshopper for toddler by adding dry powder form of Javanese Grasshopper as the purpose of this research.

2. Methods and Materials

Methods

This research was conducted in two stages, namely the stage of product development and organoleptic testing. The research conducted was a formulation in the form of adding Javanese Grasshopper powder to 9 months old complementary food which is shown in the table below.

Table 1. The Formulation baby porridge with variation level of dried Javanese grasshopper powder addition

<table>
<thead>
<tr>
<th>Ingredients</th>
<th>Control (80%)</th>
<th>Formulation 1 (90%)</th>
<th>Formulation 2 (100%)</th>
<th>Formulation 3 (110%)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Dried Javanese Grasshopper</td>
<td>0g</td>
<td>0.9g</td>
<td>2.7g</td>
<td>4.6g</td>
</tr>
<tr>
<td>Rice</td>
<td>100g</td>
<td>100g</td>
<td>100g</td>
<td>100g</td>
</tr>
<tr>
<td>Carrot</td>
<td>50g</td>
<td>50g</td>
<td>50g</td>
<td>50g</td>
</tr>
<tr>
<td>Chicken broth</td>
<td>250ml</td>
<td>250ml</td>
<td>250ml</td>
<td>250ml</td>
</tr>
</tbody>
</table>

The study was conducted in July - August 2019. The manufacturing process was carried out in the Processing Laboratory of the Faculty of Public Health, Airlangga University, while the laboratory testing was carried out at the Nutrition Organoleptic Laboratory of the Faculty of Public Health, Airlangga University.

Calculation of energy levels in this study using the 2007 Nutrisurvey software according to the needs of toddlers aged 9 months according to the Angka Kecukupan Gizi (AKG). The authors used an experimental research method organoleptic test with hedonic quality to measure sensory characteristics from the aroma, color, texture, and taste to measure acceptability. Testing to 6 trained panelists with inclusion requirements not having a history of food allergies and exclusion of people who had a disturbance in the taste and smell senses. The data processing of preference level to assess the acceptability of Burlang was analyzed using the Friedman test and further tests using the Wilcoxon signed Rank Test.

Materials

1. Javanese Grasshopper powder
   The main ingredients are dried Javanese Grasshopper powder that obtained through online shop purchases (shopee). First step is washing stage, the next stage is drying in 4-5 hours sunlight, then roasting stage is approximately 30 minutes or until the grasshoppers dry. The last step is refinement using blender or food processor.

2. Chicken Broth
   Other ingredients, chicken broth is made from 1 kg chicken claw with 1-liter water boiled 5 minutes to remove fat, then boiled again with 2 liters water boiled for 1 hour and produce 1.5 liter chicken broth.

3. Carrot
   Selected carrots are good quality carrots. After that carrots will be peeled, cut, then washed thoroughly then blanched and weighed according to the recipe. The carrot be blanched for 5 minutes to bring out the color and remove unpleasant smell.

4. Rice
   Rice is cooked using rice cooker, with comparison rice and water, 1: 1.5 and cook automatically.

5. Baby porridge with dried Javanese Grasshopper
Than blend Rice, carrot and half potion of the chicken broth (125ml) with blender. Making baby porridge with cook all prepared ingredients over low heat for 3-5 minutes. In 2nd minute add dried grasshopper according to the doses for each formulation and making the original one as a control.

3. Result and Discussion

Protein Content in baby porridge with dried Javanese Grasshopper formulation

Nutrient intake in Toddler is very important in supporting growth according to growth charts so that growth faltering does not occur which can cause stunting. In 2017, 43.2% of children under five in Indonesia experienced an energy deficit and 28.5% experienced a mild deficit. For protein adequacy, 31.9% of children under five have a protein deficit and 14.5% have a mild deficit. There for this research want to rich protein requirement from complementary food.

Grasshoppers have been used in previous research studies for example research by Asthami, Estiasih, & Maligan (2016) namely grasshopper formulation on instant noodles. Based on the search and the results obtained there are no grasshopper-based studies formulated into complementary food for infant 9 to 11 years, therefore this research was made and has the potential to be developed. An addition of 1 gram is sufficient for 90% of protein requirements, so little addition (0.9–4.6 gram) of Javanese grasshopper powder can meet the protein needs of infants through complementary food.

| Table 2. nutritional content of baby porridge with dried Javanese Grasshopper |
|----------------------------------|----------------|-------------|-------------|
| energy (kcal)       | protein (g) | carbo (g)  | fat (g)     |
| control           | 160.2       | 4.2        | 32.4        | 1.1        |
| formulation 1     | 160.2       | 4.8        | 32.5        | 1.1        |
| formulation 2     | 160.2       | 6          | 32.8        | 1.2        |
| formulation 3     | 160.2       | 7.2        | 33.2        | 1.3        |

Based on the calculation from Indonesia’s AKG and WHO (Guiding principel for complementary feeding of the breastfeed child) protein requirement is 18 gram. In this formulation want to meet the need of protein for 30%-35% which is 5.4 gram – 6.3 gram. The control menu fulfill 70% (4.2 gram), the first formulation fulfill 90% (4.8 gram), the second formulation fulfill 100% (6 gram), and the third formulation fulfill 110% (7.2 gram).

Organoeleptic quality of baby porridge (9-11 years old) with the addition of dried grasshoppers

Aroma
Aroma is one parameter of food choice. The aroma can arouse appetite but it can get rid of appetite. Winarno (2004) states that the aroma is a stimulus caused by olfactory nerves from the nose when food enters the mouth so that it can increase or even decrease one's appetite.

Figure 1. The chart of values relatives of Aroma for each formulation
Based on the descriptive analysis on the organoleptic test, appropriate results according to respondents were those that had a neutral or not fishy aroma. The average panelists chose formulations 1 and 2 as the best formulations with a less fishy aroma than formulations 3 and 4.

**Color**

According to Winarno (1997), a material that is assessed nutritious, tasty and very good texture. Something will not be eaten if the color is not unsightly or give the impression of being deviate from the color that should be.

![Figure 2. The chart of values relatives of Color for each formulation](image)

Based on the descriptive analysis on the organoleptic test, appropriate results (Baby porridge for 9-11 years old) according to respondents were those that had bright color. The color of dried Javanese Grasshopper is brown and the colour of control menu is bright orange from carrot dominant. The additional of dried grasshopper powder give color affect become darker. Formulation 1 (f1) is the closest formulation to F0 in terms of color, which is brighter compared to F3 and F4.

**Texture**

According to Winarno (1997), texture and the consistency of an ingredient will affect the flavor caused by these ingredients. From the studies carried out the change of texture and viscosity of the ingredients can change the taste and smell that arises because of can affect cell receptor stimulation olfactory and salivary glands.

![Figure 3.1. The chart of values relatives of texture 1 for each formulation](image)

The first texture is to cover the rough and smooth the additional of Javanese Grasshopper do not really affect the texture, except much addition (formulation 3). The best texture (smooth) is F0 as a control.
The addition makes the texture rougher or gritty. F1 is the closest formulation to F0 which has a smooth texture than F2 and F3.

**Figure 3.2. The chart of values relatives of texture 2 for each formulation**

The second texture about the viscosity for baby porridge aged 9-11 according to the respondent is semi solid. The certain amount can make the texture better, too much or no addition, make the texture too solid or too liquid. Formulation 1 (F1) is the best formula according to the panelist.

**Taste**

The taste is mix of tasting and smelling responses mixed by other impressions like vision, touch and hearing, when enjoy or taste food (Handayani and Aminah, 2011).

**Figure 4.1. The chart of values relatives of taste 1 for each formulation**

The first taste about pleasant and unpleasant, the second about the tasteful or not. From the taste known the formulation 1 do not go far from the control, too much addition (formulation 2 and 3) make affect, unpleasant taste that describe by figure 4.1. From the figure 4.2 the most tasteful is formulation 2 with mean score 5.5.
Acceptability is one of the studies related to the level of liking or dislike for a food product Suhardjo (2003). Friedman test results of the statistical test p value <0.025 there is a significant difference between the formulations and indicates the giving of a Javanese Grasshopper powder influential on acceptance and the continued Wilcoxon signed rank test to see the difference between the two formulas shows the difference between the control formula and substitution. There is no difference between control (f0) and formulation 1 (F1). There is a difference between F0 and F2 and F3. There are significant differences f1 and f2, f2 and f3 but there is no difference between F2 and F3.

**Conclusion**

The result according to the research the nutrient content from addition of dried Javanese Grasshopper can meet protein requirements. From the organoleptic test the result is the addition of dried Javanese Grasshopper does not really affect in aroma, except the formulation 3. In colour the addition of Javanese Grasshopper more addition can make baby porridge more darker, in texture the certain doses can make right texture (semi solid). The addition of Javanese Grasshopper does not really affect the texture (smooth or rough), except formulation 3. For the taste too much addition (formulation 3) cause unpleasant feeling, other addition (formulation 1 and 2) do not affect the feeling. Addition of Javanese Grasshopper make baby porridge tasteful, mostly in formulation 2. The formulation with the best acceptance by panelists is formulation 1 based on the average score that comes closest to control is f1 in terms of aroma, color and texture, while based on panelists in terms of the most tasteful taste is f2. Friedman test results of the statistical test p value <0.025 there is a significant difference between the formulations and indicates the giving of a Javanese Grasshopper powder influential on acceptance and the continued Wilcoxon signed rank test to see the difference between the two formulas shows the difference between the control formula and substitution. There is no difference between control (f0) and formulation 1 (F1). There is a difference between F0 and F2 and F3. There are significant differences f1 and f2, f2 and f3 but there is no difference between F2 and F3.

The addition of Javanese Grasshopper can be good alternative when formulate with right doses. The selection of companion material needs to be considered because the selection of ingredients such as the chicken broth and carrots is very influential both in terms of color and taste with each strong characteristic. Javanese grasshopper has potential to be added to other recipes and other preparations such as finger food, chips, pasta, or traditional basis food.

**Reference**


