



REVIEW FOOD ENGINEERING HEALTHY FOOD *Centella asiatica* TO PREVENT STUNTING IN TODDLERS

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Abstract

Background: WHO ranked Indonesia as the third country with the highest prevalence of stunting in Asia. In Indonesia, 1 in 3 children under five is potentially stunted (26.6%). Stunting is a chronic nutritional problem caused by a long lack of nutritional intake. In Indonesia, *Centella asiatica* is easy to find because it grows well in tropical climates. Besides being a source of plant-based protein, it also acts as an antioxidant, anti-inflammatory, neuroprotective agent, and supports brain function. It helps improve concentration and memory, and may help prevent stunting. Preliminary studies show that 8 out of 10 children enjoy healthy processed foods such as brownies, nuggets, crackers, and seaweed candies enriched with *Centella asiatica*. Accounting nutritional facts from the healthy food *Centella* is the purpose study. **Method:** This exploratory study analyzed the nutritional content of *Centella asiatica*-based brownies with five toppings: almond slices, mixed nuts, white chocolate chips, choco chips, and shredded cheese. Tests were conducted at Pasundan University's Food Engineering Laboratory, measuring moisture, fat, protein, carbohydrates, and calories using standard methods. The study aimed to evaluate the potential of these brownies to prevent stunting in children. This research is an advanced study of exploratory study with a pre-experimental approach model one shoot case study. At this stage, this study used a laboratory test in the form of nutritional facts tests. Some of these tests will be conducted at the food engineering laboratory of Pasundan University Bandung. All of kind of brownies have been measured in nutritional facts. **Result:** The results show that the nutritional content in 1 cupcake brownie with 5 variants of toppings (choco chips, almonds, cheese, nuts, white chips) shows the content of Kkal/ 100 grams range from 319.97-322.44 Kcal, and the percentage of Calories Nutritional Rate Adequacy is 100 grams range from 16.00 - 16.19%. **Conclusion :** Therefore, *Centella*'s innovation as a healthy snack to overcome stunting growth in toddlers can be developed as a healthy natural product as one of the characteristics of Indonesian food.

keyword : *Centella asiatica*, stunting, toddlers

INTRODUCTION

WHO ranked Indonesia as the third country with the highest prevalence of stunting in Asia. In 2017, more than half of the world's stunted toddlers were from



Asia (55%). In Indonesia, 1 in 3 children under five has the potential to be stunted (26.6%)(Prendergast & Humphrey, 2014).

Stunting is a chronic nutritional problem caused by a long lack of nutritional intake. The cause of stunting growth is generally caused by food intake that is not by following per under nutritional needs (First 1000 Days of Birth), low access to nutritious foods, low intake of vitamins and minerals, and exposure to free radicals consumed in food. For example, vegetables that contain pesticides and chemicals. Stunting can be prevented from the womb until the age of 2 years (Hanifah et al., 2019). The impact of stunting on children if not treated immediately can interfere with the child's growth and development later in life. Some studies have shown that Centella may increase zebrafish larvae by expressing BDNF growth factors (Ridlayanti et al., 2021). Administration of Centella before and after hatching can improve the development of brain neurons, and improve the hardening of the bones, thereby preventing stunting (Calapai, 2010). Previous research has shown that the empowerment of parents in processing the daily diet affects the increase in the height of children with stunting. Researchers added to another study that toddlers favor modifications of Centella in their daily snacks (Fatmawati, 2021).

In Indonesia, Centella is easy to get because this plant grows in the tropics. People in West Java usually consume it as a lalapan (Saputri & Evy Damayanthi, 2015). Benefits of Centella in addition to being a source of vegetable protein as well as antioxidants, anti-inflammatory, nerve protectors, strengthening the brain nerves, making concentration and memory higher, and can prevent stunting (Pittella et al., 2009). In addition, Centella also contains calcium, magnesium, phosphorus, zinc, copper, and beta-carotene. Centella is especially appropriate if children under five during the golden age are given the intake of Centella as one of their daily food ingredients (James & Dubery, 2009).

Preliminary studies that the authors have done show that 8 out of 10 children like processed healthy foods in the form of brownies, nuggets, crackers, and seaweed candies that Centella has added. Therefore, researchers are trying to explore more deeply the potential of processed healthy foods Centella healthy foods as an innovation in preventing stunting growth in children under five. This study aims to



find out the nutritional fact content contained in 1 pcs processed healthy Centella as an innovation in preventing the stunting growth of children under five.

METHOD

This research is an advanced study of exploratory study with a pre-experimental approach model one shoot case study. At this stage, this research design used a laboratory test in the form of nutritional facts tests. Some of these tests will be conducted at the food engineering laboratory of Pasundan University Bandung.

The sample in this study is a healthy food processed product made from Gotu kola (Centella) in the form of cupcake-shaped brownies consisting of 5 variants. This study was conducted within 6 months (May-October 2021). The nature of the problem that arises in this study is how the results of nutritional facts test analysis of the potential of processed Centella to prevent stunting growth in children.

The scope of testing of this study is the creative results of processed healthy foods based on Centella given in the study sample. There are 5 variants of processed centella food made by researchers consisting of brownies topping almond slices, brownies topping nuts, brownies topping white choco, brownies topping choco chips, and brownies topping cheese. These five food variants will be given to the laboratory for analysis of nutritional facts tests. The data obtained are the results of laboratory tests in the form of nutritional facts test results. This Research have etical approval from Health Polytechnique Ministry Of Health with No.04/KEPK/EC/X/2023.

RESULT AND DISCUSSION

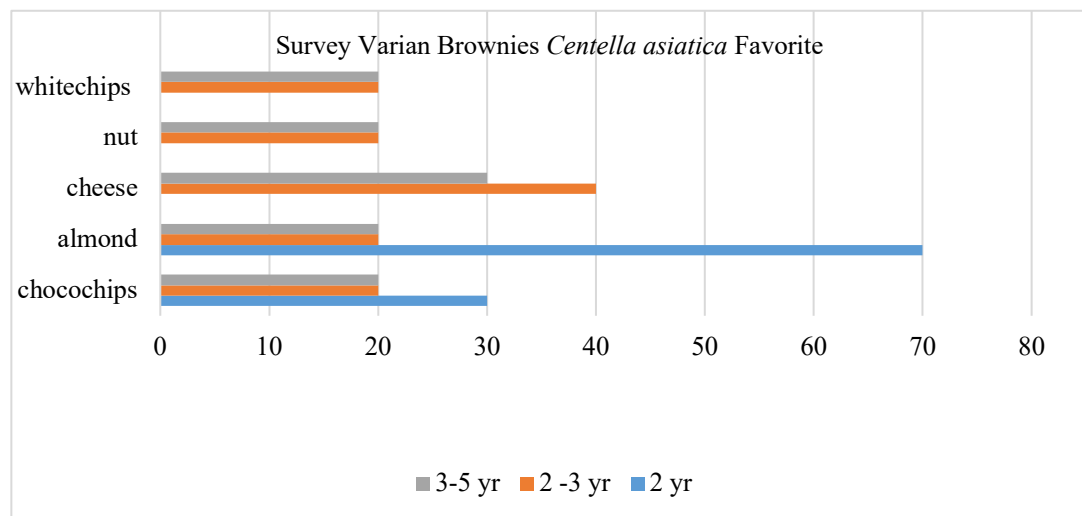
The manufacture of samples of healthy brownies processed Centella was done in the nutrition laboratory of the University of 'Aisyiyah Bandung. Once all the materials are prepared, the equipment is prepared in a clean state.

The results of the nutritional facts analysis test come out on August 27, 2023. With the following results:

No	Topping	Test Parameters	Unit	Test results	% NRA/100g
1	Choco chips	Fat	%	13,54	15,22
		Protein	%	5,35	8,10
		Carbohydrate	%	44,79	12,17
		Calorie	Kkal/100g	322,44	16,12

2	Almond	Fat	%	13,14	14,77
		Protein	%	5,60	8,49
		Carbohydrate	%	45,76	12,43
		Calorie	Kkal/100g	323,75	16,19
3	Cheese	Fat	%	13,03	14,64
		Protein	%	5,59	8,47
		Carbohydrate	%	45,59	12,39
		Calorie	Kkal/100g	322,01	16,10
4	Nut	Fat	%	13,09	14,70
		Protein	%	5,26	7,97
		Carbohydrate	%	45,29	12,31
		Calorie	Kkal/100g	319,97	16,00
5	White chips	Fat	%	15,83	14,42
		Protein	%	5,39	8,17
		Carbohydrate	%	46,40	12,61
		Calorie	Kkal/100g	322,40	16,13

In each age group, there were 10 children surveyed to taste this healthy food resulting in 70% liking this food and saying it was good to top almonds. Here's the survey results chart.





On the table is seen the calorie content in every 100 grams of Centella brownies. Brownies with almond topping have the highest calories compared to other variants where 100 grams of brownies reach 323.75 kcal. The average caloric value for healthy brownies Centella reaches 320 kcal/100 grams. The highest fat content is found in nut topping as much as 14.70%, the highest carb dioxide content is found in the white chips variant as much as 12.61% while the highest protein is owned by the almond variant at 8.49%. From the table came the conclusion that the almond variant has the highest calorie and protein content compared to other variants.

Healthy foods are foods that contain a variety of nutrients needed by the body. Healthy food balance is foods that contain carbohydrates, proteins, fats, minerals, and vitamins (G.S. et al., 2014). Processed healthy foods Centella has nutrients that are needed by the body, namely carbohydrates, proteins, and fats (Orhan, 2012). These nutrients are indispensable for children under five for their growth and development (Jamil et al., 2007). Stunting is a condition of height growth disorder where height according to age is below the value of -2SD according to table z-score. Stunting can be caused by long-term malnutrition. Children under five who are malnourished have the potential to develop diseases and growth disorders (Primaditya et al., 2020). Therefore, parents and people around them pay attention to the intake of nutrients consumed by children every day.

Kolstren (1996) analyzed that there is a link between intrauterine fetal growth (fetal life) and linear growth at the time of early postnatal. Nutrient incorporation greatly affects stunting growth in the postnatal period. This condition consists of the quality of digested nutrients and the interaction of nutrients with biochemistry. The quality of digested nutrients consists of the quality of food, the interaction of body nutrients at the time of absorption, the amount of food served to children, and the appetite of the child. Overall, this greatly affects the growth of the child's height (Kolsteren, 1996)

In Centella, there is a nutritional content that is terpenoids. This substance contains asiaticoside, centelloside, medecassoside, brahmoside, brahminoside, thankuniside, sceffoleoside, centellose, asiatic-, brahmic-, centellic-, and medecassic acids (Joshi, Kanchan and Preeti Chatudevi, 2013). Centella asiatica extract produces triterpenes including asiaticoside, asiatic acid, madecassoside, and madecassic acid

(Zahara et al., 2018). In addition, the active antioxidant ingredients of gotu kola include polyphenols, flavonoids, β -carotene, tannins, and vitamin C (Kumar et al., 2011). Gotu kola also has a nutritional content consisting of protein, fiber, various minerals, and vitamins. Gotu kola has estrogenic effects that can increase the proliferation and synthesis of collagen in the vaginal walls in mice due to the phytoestrogen content in it (Sherley, 2010). Centella (Gotu kola) has benefits as an antioxidant, anti-inflammatory, antiseptic, treating peptic ulcers, cardioprotective effects, immunomodulators, neuroprotective, cytotoxic, anabolic effects, memory enhancement, antifertility, radioprotective effects, effects on vascular or venous beats, hypertension, antidepressants, antipsoriatic, antitubercular, antileprotic, antiviral, antiprotozoal, antispasmodic, striae gravidarum, impaired liver function, vascular disease and decreased mental retardation in children (Hashim et al., 2011)

Therefore, researchers can conclude that processed healthy foods Centella can be an alternative intake of healthy foods for children under five as a solution to prevent stunting growth in children.

CONCLUSION AND SUGGESTION

This study concludes that evaluation of the potential of Centella asiatica brownies show a lot of good nutritional content for stunting prevention in children. The results show that the nutritional content in 1 cupcake brownie with 5 variants of toppings (choco chips, almonds, cheese, nuts, white chips) shows the content of Kkal/ 100 grams range from 319.97-322.44 Kcal, and the percentage of Calories Nutritional Rate Adequacy is 100 grams range from 16.00 - 16.19%.

This healthy food can be used as an alternative healthy snack for improving toddler nutrition. Among the five variants tested, the almond-topped brownie had the highest caloric and protein content, and was the most preferred by children. The nutrient profile of these products-including protein, fat, and carbohydrates-demonstrates their potential to support growth and development and contribute to stunting prevention. Therefore, the creative integration of centella into child-friendly processed foods may serve as a practical nutritional intervention to combat stunting in early childhood. This proceed healthy food always used ingredients based on local wisdom that are easy to find in everyday life. In the next research stage plan,



researchers will conduct sensory and expired tests and plan to apply for production permit registration at PIRT BPOM as part of a series of lecturer research roadmaps.

DECLARATION

Conflict of Interest

The authors declare that they have no competing interests in this article research.

Authors' Contribution

All the authors contribute to were involved in every stage of the research, from the initial concept to the drafting of the article. This sub-section highlights the collaborative nature of the research effort.

Ethical Approval

This Research have etical approval from Health Polytechnique Ministry Of Health with No.04/KEPK/EC/X/2023. The research has been reviewed and approved by an ethics committee.

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Data Availability

In this part, the authors state that the data supporting the research findings are available upon reasonable request. This promotes transparency and allows other researchers to verify and build upon the work.

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