Implementation of Moringa Leaf Brownies Innovation as an Effort to Support Breast Milk Production and Prevent Stunting in Toddlers

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Moringa leaves (Moringa oleifera) are a local food source rich in nutrients such as protein, iron, calcium, and vitamins that are beneficial for breastfeeding mothers and toddlers. Moringa leaves are known to help support breast milk production and fulfill nutritional needs in efforts to prevent stunting. However, their utilization in the community is still limited to vegetable preparations, making it necessary to develop more attractive and easily consumable food innovations. This activity was carried out through several stages, including socialization, preparation of ingredients, production of moringa leaf brownies, packaging, and distribution to the community. In addition to product distribution, educational sessions were also conducted regarding the benefits of moringa leaves for breast milk production and stunting prevention in toddlers. Moringa leaf brownies were developed as a functional food with high nutritional value and greater community acceptance compared to conventional moringa leaf preparations. The results of the activity showed that moringa leaf brownies were well accepted by the community and have the potential to become an alternative local food product to help increase breast milk production in breastfeeding mothers and support the nutritional needs of toddlers in efforts to prevent stunting.

Keywords: Breast milk innovation, toddlers, moringa leaf brownies, functional food, stunting.

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1. Introduction

Stunting remains one of the major nutritional problems in Indonesia because it can affect physical growth, cognitive development, and the quality of human resources in the future. Stunting occurs as a result of chronic malnutrition over a long period, particularly during the first 1,000 days of life. The causes of stunting are not only related to inadequate nutritional intake in toddlers but are also influenced by the mother's health condition, especially during pregnancy and breastfeeding. Suboptimal breast milk production may result in the infant's nutritional needs not being adequately fulfilled, thereby increasing the risk of growth disorders in toddlers (Ministry of Health of the Republic of Indonesia, 2023).

Efforts to prevent stunting can be carried out through the fulfillment of balanced nutrition for breastfeeding mothers and toddlers by utilizing local foods with high nutritional value. One local food source with strong development potential is Moringa leaves (Moringa oleifera). Moringa leaves contain protein, iron, calcium, vitamin A, vitamin C, and antioxidants that are beneficial in helping increase breast milk production and supporting toddler growth. Recent studies have shown that the consumption of moringa leaves can help improve both the quality and quantity of breast milk in breastfeeding mothers due to their high phytochemical and nutritional content (Rahmawati et al., 2024).

Despite their excellent nutritional content, the utilization of moringa leaves within the community remains limited and is generally restricted to vegetable preparations. This condition causes some community members, particularly mothers and toddlers, to be less interested in consuming them because of the

distinctive aroma and taste of moringa leaves. Therefore, more attractive, practical, and socially acceptable food innovations are needed. One possible innovation is the processing of moringa leaves into brownies. Brownies were chosen because they are widely favored by various groups, including breastfeeding mothers and children, and are therefore expected to increase interest in consuming moringa leaves (Handayani et al., 2023).

The innovation of moringa leaf brownies not only provides a variation of food products but can also serve as an alternative functional food in supporting breast milk production and preventing stunting in toddlers. The nutritional content of moringa leaf brownies is expected to help fulfill the nutritional needs of breastfeeding mothers while also supporting the optimal growth and development of toddlers. In addition, the development of local food products based on moringa leaves may increase the utilization of highly nutritious and easily accessible local food resources within the community. Based on the explanation above, the implementation of moringa leaf brownie innovation is needed as one of the efforts to support breast milk production and prevent stunting in toddlers through the utilization of local foods with high nutritional value and strong community acceptance.

2. Literature Review and Problem Statement

Stunting is one of the chronic nutritional problems that continues to receive attention in the field of public health, particularly in Indonesia. Stunting occurs as a result of long-term nutritional deficiencies that disrupt a child's growth and development. Children experiencing stunting not only have a height below the standard for their age but are also at risk of cognitive development disorders, decreased immune function, and lower productivity in adulthood. This condition makes stunting a problem that must be addressed continuously through the fulfillment of optimal nutrition from the early stages of a child's life (Ministry of Health of the Republic of Indonesia, 2023).

Moringa leaves (Moringa oleifera) are one of the local plants with high nutritional content and strong potential to be utilized as functional food. Moringa leaves contain protein, iron, calcium, vitamin A, vitamin C, and antioxidants that are beneficial for the health of both mothers and children. The iron and protein content in moringa leaves are known to help improve the nutritional quality of breastfeeding mothers, while their vitamins and minerals play a role in supporting toddler growth. In addition, several studies have reported that moringa leaves have potential as a natural ingredient to support breast milk production due to their phytochemical compounds that may assist the lactation process in breastfeeding mothers (Putri et al., 2024).

Despite their high nutritional value, the utilization of moringa leaves in the community is still not optimal. Generally, moringa leaves are only processed as vegetables, making them less appealing to some community members, especially children and young mothers. The distinctive aroma and taste of moringa leaves are among the factors contributing to the low level of consumption. This condition indicates the need for more attractive food processing innovations so that moringa leaves can be consumed more easily and accepted by the community (Sari & Handayani, 2023).

The implementation of moringa leaf brownie innovation as a food product supporting breast milk production and stunting prevention is still not widely practiced in the community. The limited utilization of highly nutritious local foods and the lack of variety in processed moringa products are among the issues that need attention. Therefore, the implementation of moringa leaf brownie innovation is needed as an alternative local food product that is more attractive, nutritious, and easily accepted by the community. This innovation is expected to help increase breast milk production in breastfeeding mothers while also supporting the nutritional needs of toddlers in efforts to prevent stunting.

3. Method

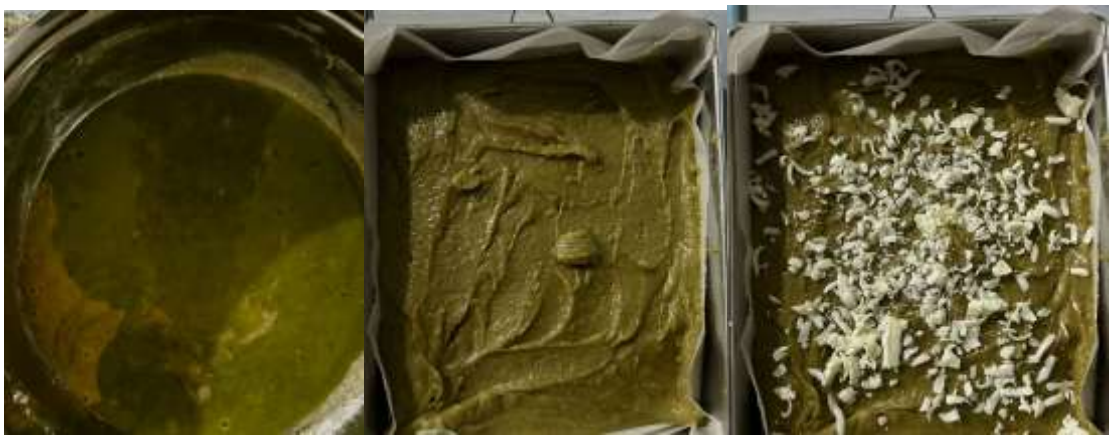
The ingredients used in the preparation of moringa leaf brownies include moringa leaves, wheat flour, granulated sugar, cocoa powder, eggs, margarine or butter, milk, baking powder, vanilla, and salt. The moringa leaves are first thoroughly washed and then blended to facilitate mixing into the brownie batter. The addition of moringa leaves aims to enhance the nutritional content of the brownies so that they can be utilized as functional food to support breast milk production and prevent stunting in toddlers.

The equipment used in the preparation of moringa leaf brownies includes a mixer, mixing bowls or batter containers, a whisk or stirrer, a spatula, baking trays, an oven, knives, ingredient scales, a stove, and packaging containers. All equipment is cleaned before use to ensure that the brownie production process remains hygienic and safe for consumption. The implementation stages of the moringa leaf brownie innovation program were carried out through the following steps:

1) Activity Socialization
   The activity socialization was conducted for the community, posyandu cadres, breastfeeding mothers, and mothers with toddlers. At this stage, information was provided regarding the benefits of moringa leaves, the importance of fulfilling the nutritional needs of breastfeeding mothers and toddlers, and the role of nutritious foods in supporting breast milk production and preventing stunting.
2) Activity Preparation
   The preparation stage involved preparing all ingredients and equipment used in the moringa leaf brownie production process. In addition, tasks were assigned to the implementation team to ensure that the activities could run effectively and in an organized manner.
3) Preparation of Moringa Leaf Brownies
   The brownie-making process was carried out together with the implementation team and involved community members or posyandu cadres. The process began with mixing the ingredients, blending the moringa leaves, preparing the batter, and baking the brownies using an oven. At this stage, education was also provided regarding the nutritional content of moringa leaves and the benefits of moringa leaf brownies for breastfeeding mothers and toddlers.
4) Packaging of Moringa Leaf Brownies
   The baked brownies were then cut into consumption-sized portions and packaged using plastic or mica containers to make them more hygienic and attractive. Packaging was carried out while maintaining product cleanliness to ensure the brownies were safe for distribution to the community.
5) Distribution of Moringa Leaf Brownies
   The final stage of the activity was the distribution of moringa leaf brownies to breastfeeding mothers and toddlers through posyandu activities or directly to the target community. In addition to product distribution, brief educational sessions were also conducted regarding the importance of consuming nutritious foods to support breast milk production and help prevent stunting in toddlers.

4. Results and Discussion

The implementation of the moringa leaf brownie innovation was carried out through the process of making brownies using moringa leaves as the main additional ingredient. The preparation process began with thoroughly washing the moringa leaves, after which the leaves were blended to facilitate mixing into the brownie batter. Other ingredients used included wheat flour, eggs, sugar, chocolate, margarine, milk, and other supporting ingredients. All ingredients were mixed evenly, and the batter was poured into a baking tray and baked in an oven until fully cooked.

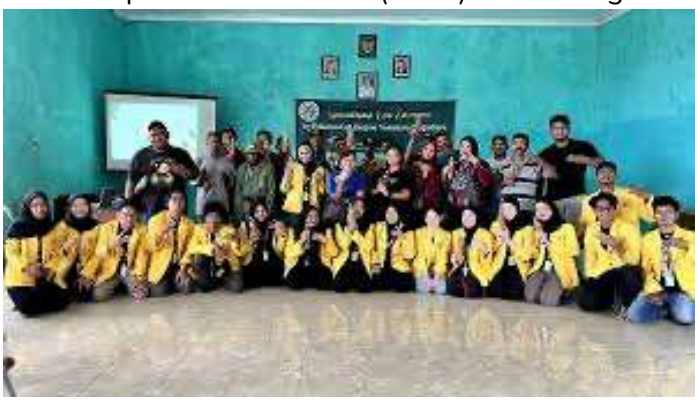


The resulting moringa leaf brownies had a soft texture, sweet taste, and an attractive brownish-green color. The addition of moringa leaves did not reduce the taste quality of the brownies, allowing the product to be well accepted by the community. Moringa leaves are known to contain high nutritional value and therefore have strong potential to be utilized as functional food for breastfeeding mothers and toddlers. The main nutritional components of moringa leaves are presented in the following table.

Table 1. Main Nutritional Components of Moringa Leaves

Nutritional Component	Content per 100 grams
Protein	9.4 grams
Vitamin A	378 mcg
Vitamin C	51.7 mg
Calcium	185 mg
Iron	4 mg
Potassium	337 mg
Fiber	2 grams
Carbohydrates	8.3 grams
Fat	1.4 grams

Source: Ministry of Health of the Republic of Indonesia (2023) and Moringa Leaf studies from 2023–2025.



5. Conclusion

The implementation of moringa leaf brownie innovation can serve as an alternative functional food based on local food resources that is beneficial for breastfeeding mothers and toddlers. Processing moringa leaves into brownies produces a product that is more appealing in terms of taste, texture, and appearance, making it more easily accepted by the community compared to consuming moringa leaves as vegetables.

Based on their nutritional content, moringa leaves contain protein, vitamins, and minerals that can help support the nutritional needs of breastfeeding mothers and potentially improve breast milk production. In addition, these nutritional components also play a role in supporting the growth and development of toddlers, thereby contributing to stunting prevention efforts. Moringa leaf brownies not only function as a supplementary food but also represent a practical, nutritious, and innovative local food product with the potential to improve the nutritional status of mothers and children in support of public health.

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