

The Effect of *Tinutuan Tinu* Key Complementary Feeding on the Nutritional Status of Infants (PB/U) Aged 6-12 Months

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ABSTRACT

Introduction: One of the problems often experienced by children related to the fulfillment of nutrition that has a negative impact on child growth and development is stunting. This study aims to analyze the effect of *Tinutuan Tinu* Key complementary feeding on the nutritional status of infants aged 6-12 months.

Methods: This experimental study without a control group was conducted in Wori Village, North Minahasa Regency. The study population was all babies born to pregnant women who were respondents in the first year of the study, namely mothers who were pregnant throughout 2023, and continued in the second year, namely babies born at the end of 2023-2024, totaling 52 babies. The intervention was carried out for 14 days to the babies. Complementary foods were prepared by health cadres. Babies and mothers received assistance from health workers 14 times. The main variable in this study was the nutritional status of the baby

Results: The results of the study showed that the average nutritional status of toddlers based on body length according to age before the intervention of providing complementary foods was 2.67%, and after intervention by 3.13% with a significance value (2-tailed) of 0.004. Statistical analysis using paired sample t-test to see the difference in the average between the two samples and the results obtained p value <0.005 which means that the provision of MP-ASI there is a difference in the average body length before and after the intervention.

Conclusion: The Tinutuan tinu key complementary feeding potentially affects the nutritional status of children during their growth period, if children's food intake is met properly, then the child's growth and development will be good and they will be free from nutritional problems.



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INTRODUCTION

Stunting is a state of malnutrition related to inadequate nutrients in the past so that it is classified as a chronic nutritional problem (Asmawanti-S, D., Sari, N., Fitranita, V., & Hidayat, WS., 2022). *Stunting* is one of the focuses of improving nutrition in the world until 2025 (Priyono, P., 2020). *Stunting* can occur due to the habit of people not measuring the height or length of toddlers in health services (Agustina, N., 2022). This results in the indicators of *stunting* in toddlers not being realized. The knowledge of mothers and parents of toddlers is very important in preventing *stunting*. The multidimensional factors of *stunting* result in the importance of intervention in the first 1000 days of a toddler's life to prevent an increase in the prevalence of *stunting* (Ministry of Health of the Republic of Indonesia., 2018)

The vulnerable groups at risk of nutritional issues include those in society who are most susceptible to malnutrition, such as infants and children, due to their high nutritional requirements that support physical growth and development (Bloosner, M & De Onis., 2005). Nutritional status is one of the indicators of a country's development success. One health indicator for monitoring nutritional status within a population is children's growth (Atsu BK, Guure C, Laar AK., 2017). The issue of stunted growth in children reflects the socioeconomic conditions of society. This condition can lead to delays in motor and mental development, decreased productivity, increased morbidity, and a higher risk of infectious diseases (H. S. Anugraheni, and M. I. Kartasurya, 2012).

According to data from the World Health Organization (WHO) in 2020, globally, 22% or 149.2 million children under the age of five experienced stunting. In Asia, 53% of children under five were reported to be stunted in 2020. WHO data reveals that Asia ranks first in the incidence of stunting worldwide, with Southeast Asia holding the second position, accounting for 83.6 million stunted children and 25.7 million experiencing stunting after South Asia. WHO standards indicate that the prevalence of stunting should be below 20% (WHO., 2021). Based on the results from the Indonesian Nutritional Status Survey (SSGI) conducted by the Ministry of Health in 2021, the prevalence of stunting in Indonesia was recorded at 24.4%, which decreased to 21.6% in 2022. This indicates that stunting cases in Indonesia remain above 20%. Indonesia aims to reduce the stunting rate to 14% by 2024 (Ministry of Health of the Republic of Indonesia., 2022).

Nutritional issues are problems experienced throughout the life cycle, from pregnancy to infancy, toddlerhood, adolescence, and into old age. This means that nutritional problems can occur at all age categories, and that the nutritional status at a certain age group can influence the nutritional status in subsequent life cycle periods (Republic of Indonesia, 2012). Maternal nutrition and health status are crucial determinants of stunting (Unicef, 2013). Not only during childbirth, but the first two years (the critical 1000 Days of Life) are critical for supporting children's growth and development. Factors contributing to malnutrition include food availability, infectious diseases, food security, child-rearing practices, healthcare services, environmental health, education levels, knowledge and skills of parents, as well as the maternal nutritional status during pregnancy. Nutritional issues must be addressed starting from when the child is still in utero. If there is a deficiency in nutritional status early in life, it can lead to consequences such as fetal growth restriction (FGR), low birth weight (LBW), weakened immunity, and increased risk of mortality. The nutritional status of mothers before and during pregnancy can affect the growth of the fetus they are carrying. If a mother's nutritional status is normal before and during pregnancy, there is a high likelihood of delivering a healthy term baby with normal birth weight (Yuningsih., 2022).

One of the efforts made by the Indonesian government to tackle nutritional issues, particularly among children, is to be part of the 1000 Days of Life movement (Diah Krisnatuti., 2008). This research involves monitoring child growth and development starting from gestation through the monitoring of maternal nutritional status during pregnancy until the child is born and begins consuming complementary feeding (known as MP-ASI in Indonesia) (Chomaria, N., 2013). Complementary feeding refers to additional food provided to infants after they reach six months up to 24 months of age. Therefore, in addition to complementary feeding, breastfeeding should continue for infants for at least 24 months; the role of complementary feeding is not to replace breast milk but to complement it. In this context, complementary feeding differs from food given when an infant no longer consumes breast milk. The introduction of complementary feeding should be gradual and varied, starting with fruit purees, fresh fruits, thick porridge, mashed foods, soft foods, and finally solid foods (Langi, G., Kereh, PS., 2015). *Tinutuan* is a local dish that is well-known among culinary enthusiasts in Indonesia and worldwide. Research by Langi G et al. (2016) shows that *tinutuan*, popularly known as "*bubur manado*," is not merely a dish consisting of porridge and various vegetables for human sustenance but is also a nutritious food source.

With vegetables as the main ingredient, *tinutuan* can be a healthy food choice that provides health benefits. In addition, the processing method is boiled and does not use oil. The results of *tinutuan* modifications using local ingredients generally do not change the nutritional value of the food. Therefore, it is important to utilize local food in supporting the fulfillment of children's

nutritional intake, besides being easy to obtain, local food also has many benefits, one of which is that it can be processed as a varied food ingredient for children in an effort to prevent stunting. This study aims to analyze the effect of providing *Tinutuan Tinu Key* complementary food on the nutritional status of infants aged 6-12 months to prevent stunting in Wori Village, North Minahasa Regency (Hadjrato., Kadir, S., & Bait, Y., 2020)

METHOD

In this study, a one-group pre-test/post-test design was employed, which involved conducting research on a single group to determine whether there were differences before and after the intervention, using a quasi-experimental method without a control or comparison group. The study population consisted of all infants born to mothers who participated in the study. totaling 52 babies . The sampling technique used was total sampling using all members of the population as samples. With the inclusion criteria, namely babies aged 6-12 months who were born to mothers who were respondents in the previous study in 2023. Then for the exclusion criteria, namely babies who are not yet 6-12 months old and have not consumed MPASI.

The research was conducted from March to October 2024 in Wori Village, North Minahasa Regency. The primary variable was the nutritional status of the infants. The preparatory stage carried out was to prepare nutritional education materials for health cadres to be used in providing health support, then the second preparatory stage was the preparation of making *tinutuan tinu key*.

The ingredients that must be prepared are: Rice 20 gr, Pumpkin 30 g , Spinach leaves 20 gr, Water Spinach leaves 10 gr, Young Corn 2 gr, 1 Pandan leaf, Lemongrass, Basil leaves, Potatoes 30 gr, Tude fish 100 gr. Then for how to make it is: 1). Wash the rice until clean, boil water, add rice, cook over medium heat until the rice breaks, 2). Add pandan, lemongrass, cook over low heat until boiling, 3). Add pumpkin, sweet corn and potatoes, a little salt, cook until it becomes a soft porridge, pumpkin and potatoes are soft, 4). Then add vegetables, cook until wilted and soft and the porridge thickens, 5). Add basil leaves, stir until wilted, remove and serve.

The next step involved administering *Tinutuan Tinu Key* complementary food made from local ingredients. In this study, infants received an intervention consisting of *Tinutuan Tinu Key* prepared by health cadres for 14 days, given once a day with a food texture adjusted to the baby's age, Mashed for ages (6-7 months) and Soft for children (8-12 months). During the intervention, the baby and the baby's mother monitoring support from health cadres during the intervention. Due to time constraints, it was only carried out for 14 days, ensuring that the respondents received the intervention properly.

Table 1 shows that one serving of *Tinutuan Tinu Key* contained approximately 3.25% calories, 1.5% protein, 17.5% fat, 1.92% carbohydrates, 1.34% fiber, 1.57% calcium, 1.9% phosphorus, 2.61% iron, 1.59% sodium, 1.91% potassium, 1.59% zinc, 0.42% Vitamin B1, 1% Vitamin B2, and 1.02% Vitamin B3 based on the nutritional needs of infants aged 0-12 months. Before starting the intervention, health cadres and researchers conducted initial measurements on the infants, namely anthropometric measurements including weighing using a baby scale, namely the Baby Scale, after which the infant's body length was measured using an Infantometer measuring tool. The same measurements were also carried out after the intervention was completed for 14 days to see if there was an increase in body weight and body length.

The data were processed and analyzed using a Paired Sample T-Test to assess the effect of complementary feeding on the nutritional status of infants before and after the intervention. This study received ethical clearance from the Ethics Committee of Poltekkes Kemenkes Manado with No. KEPK.01/08/306/2024.

Table 1. Nutritional composition and percentage contribution to nutritional intake of 1 serving of tinutuan tinu key food

Ingredients	Energy	Protein	Fat	Carbs	Fiber	Ca	P	Fe	Na	K	Zinc	Vitamin		
												B1	B2	B3
Gedi Leaves (30 g)	18.0	0.96	0.21	3.12	1.02	126	21	0.51	6	15	0.42	0.12	0.09	0.87
Yellow Pumpkin (200 g)	102	3.4	1	20	5.4	80	360	1.4	560	440	3	0.4	0	0.2
Potatoes (200 g)	124	4.2	0.4	27	1	126	116	1.4	14	792	0.6	0.18	0.2	2
Cassava Leaves (30 g)	9.3	1.11	0.18	1.44	0.48	48	15	0.78	3.9	4.2	0.6	0.06	0.03	0.01
Spinach (30 g)	6.9	0.39	0.18	1.11	0.33	45	10.5	0.15	4.8	92.5	0.09	0.06	0.03	0.27
Total	260.0	10	2	52.7	8.2	425	522.5	4.2	588.7	1347	4.7	0.7	0.4	4
Nutritional needs of babies aged 6-12 months	800	15	35	105	11	270	275	11	370	700	3	0.3	0.4	3.9
Percentage Contribution to Nutritional Intake of 1 Serving	3.25	1.5	17.5	1.92	1.34	1.57	1.9	2.61	1.59	1.91	1.59	0.42	1	1.02

RESULTS

Table 2. Characteristics of Infants

Characteristics	Frequency (n)	Percentage (%)
Baby Age		
6 month	12	23.1
7 month	12	23.1
8 month	12	23.1
9 month	11	21.1
10 month	4	7.6
12 month	1	2
Gender		
Male	27	51.9
Female	25	48.1
Type of Delivery		
Normal	43	82.7
Cesarean	9	17.3
Birth Weight		
>2500	2	3.8
2500-4000	50	96.2
Birth Length		
<45.6	1	1.9
>45.6	51	98.1

Table 2 shows the characteristics of the infants. Based the largest age was 6-8 months, with 12 babies each (23.1%). on gender, the majority of the sample consisted of males, with 27 infants (51.9%). Regarding the mode of delivery, the most common type was normal delivery, with 43 infants (82.7%). The majority of infants had a birth weight between 2500-4000 grams, totaling 50 infants (96.2%), and the most common birth length was greater than 45.6 cm, with 51 infants (98.1%).

Table 3. Frequency Distribution of Nutritional Status Before and After Providing Complementary Feeding

Nutritional Status (length-for-age)	Before Complementary Feeding		After Complementary Feeding	
	n	%	n	%
Very short (< -3 SD)	5	9.6	0	
Short (-3 SD - <-2 SD)	10	19.2	3	5.8
Normal (-2 SD - +3 SD)	34	65.4	39	7.0
High (> +3 SD)	3	5.8	10	19.2

According to Table 3, the frequency distribution of nutritional status based on Length-for-Age (PB/U) before receiving complementary feeding showed that there were 5 infants (9.5%) classified as very short (< -3 SD), 10 infants (19.2%) as short (-3 SD - <-2 SD), and 34 infants (65.4%) as normal (-2 SD - +3 SD). After intervention of *Tinutuan Tinu Key*, there was a change in the nutritional status of the infants: the number classified as short (-3 SD - <-2 SD) decreased to 3 infants (5.8%), while those classified as normal (-2 SD - +3 SD) increased to 39 infants (75.0%), and those classified as high (> +3 SD) increased to 10 infants (29.2%).

Table 4. Description of Body Weight and Height Before and After Intervention

Variables	n	Median	Standard Deviation
Weight Before	52	6.61	.617
Weight After	52	7.87	.591
Body length Before	52	66.18	6.033
Body Length After	52	70.32	4.190

Table 5. Differences in average body weight and height before and after assistance and provision of complementary feeding

Measurement Indicator	Average measurement		p-value
	Before	After	
Body weight (kg)	6.61	7.87	.000
Body length (cm)	66.18	70.33	.000

Table 5 indicates a significant difference in weight and height before and after nutritional support, with a p-value of 0.000 (<0.05). The average increase in weight among toddlers was 1.26 kg, and the average increase in length was 4.15 cm. These increases in weight and length exceeded the standard growth expectations ([Ministry of Health of the Republic of Indonesia., 2020](#)).

Table 6. Average value of the influence of assistance and provision of complementary feeding on the nutritional status of infants based on length-for-age before and after intervention

Variable		Mean	t	p-value
Nutritional status (length-for-age)	Before	2.67	-3.045	.004
	Afer	3.13		

Table 6 presents results showing that the average nutritional status of infants based on length-for-age (L/A) before intervention was 2.67, while after, it increased to an average of 3.13, with a p-value of 0.004 (<0.05). This indicates a significant difference in nutritional status before and after the provision of nutritional support and *Tinutuan Tinu Key* complementary food for infants aged 6-12 months.

DISCUSSION

Providing additional food is one of the important efforts to overcome nutritional problems by utilizing local food ingredients that are easily available in the surrounding area and have a very crucial role in supporting children's growth and development. Based on the results of the study, a paired sample t-test produced a p value of 0.04 (<0.05), which shows a significant effect of providing complementary foods on the nutritional status of infants aged 6-12 months. By providing complementary foods that are rich in nutrition, children's nutritional needs can be met. The nutrition provided to infants at birth consists of exclusive breastfeeding, which is given for the first six months, after which infants are introduced to complementary feeding. The provision of supplementary food is crucial for meeting the nutritional needs of infants during their growth and development. By paying attention to how to feed children properly, providing a varied MP-ASI menu will increase children's appetite. When children are given nutritious and varied food every day, the food given will be liked by children.

Complementary foods are given every day, with the form of food adjusted to the baby's age. A person's nutritional status is said to be good when their nutritional intake and needs are balanced. A person's nutritional status is determined since in the womb and during breastfeeding. Good intake greatly supports nutritional status during toddler age. Food intake and infectious diseases are direct factors that affect nutritional status. Factors that affect malnutrition are food availability, infectious diseases, food security, childcare patterns, health services, environmental health, education level, knowledge, and skills of parents, and history of maternal nutritional status during pregnancy.

According to research by Zogara et al., the most fundamental issue affecting the nutritional status of toddlers is the timing of complementary feeding introduction ([AU Zogara., MS, Loaloka & MG Panaleon., 2021](#)). Therefore, an individual's nutritional status depends on what they consume. During the intervention, health cadres consistently prepared supplementary foods using local ingredients, including a porridge menu made from Tinutuan. All toddlers received supplementary feeding 14 times over two weeks. Complementary feeding was provided daily, with food forms adjusted according to the infant's age. Several factors must be considered in providing supplementary food, including the type of feeding given, frequency, portion size, and method of administration, all of which significantly influence outcomes.

In the provision of supplementary food, several factors must be considered, including the type of feeding given, frequency, portion size, and method of administration, all of which significantly influence outcomes. The supplementary feeding must be varied according to the child's age, progressing from thin porridge to thick porridge, fruit purees, fresh fruits, mashed foods, soft foods, and finally solid foods ([Fikawati, S., Syafiq., & Veratamala, A., 2017](#)).

Research conducted by Hestuningtyas and Noer in 2014 demonstrated a positive effect of supplementary feeding on increases in both height and weight ([AU Zogara., MS, Loaloka & MG Panaleon., 2021](#)). Similar results can be observed in the data presented in Table 3, which shows the average differences in weight and height before and after the administration of complementary feeding. The p-value for weight was 0.00 (<0.05) and for height was also 0.00 (<0.05), indicating a significant effect of Tinutuan Tinu Key complementary feeding on the increase in weight and height, thereby influencing the nutritional status of infants. This suggests that supplementary foods containing balanced nutrients can adequately meet infants' nutritional needs and improve their nutritional status, thus reducing nutritional problems among children.

Stunting is a condition where a child experiences growth disorders, so that their growth and development are not in accordance with their peers as a result of chronic nutritional problems, namely lack of nutritional intake for a long time. Stunting cases in Indonesia are still a major problem that requires serious handling by all parties.

The prevalence of stunting begins to increase at around three months of age, with the stunting process slowing down when children reach approximately three years old. There are differences in the interpretation of stunting occurrences between the two age groups. In children under 2-3 years old, a low length-for-age (PB/U) curve may indicate an ongoing process of growth failure or stunting. In contrast, in older children (those over three years old), this reflects a state

where the child has already experienced growth failure or has become stunted (T. R. Hestuningtyas, and E. R. Noer., 2014).

To prevent the occurrence of child growth failure, preventive efforts are needed, one of which is by providing complementary foods containing nutrients. One of them is Tinutuan Tinu Key complementary foods made from local food ingredients containing nutrients that are beneficial for the growth and development of children.

CONCLUSION

Providing sufficient, varied, and balanced food, especially Tinutuan Tinu Key, can contribute to fulfilling infant nutrition. Interventions in providing complementary feeding have shown a significant effect on weight gain and changes in nutritional status in infants before and after intervention. Providing complementary feeding to infants aged 6-12 months by paying attention to the form of food given to suit the infant's condition so that nutrient intake can be well received and can suppress the increase in stunting. Providing nutritious and creative complementary feeding by utilizing local ingredients is very good for research that will be carried out in an effort to prevent nutritional problems.

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