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The Effect of Providing Koya Nate on the Appetite of Stunting Toddlers

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DA Conceptualization, Investigation, Methodology, Validation, and Writing – Original Draft, Review & Editing; MZAR Conceptualization, Methodology, Formal Analysis, Validation, and Writing – Original Draft, Formal Analysis, Validation, Review & Editing; LW Conceptualization, Data Curation, Formal Analysis, Methodology, Validation, Visualization, Writing – Original Draft, Review & Editing;

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The authors declare no conflict of interest.

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The research has received ethical approval from the Health Research Ethics Committee of the Sekolah Tinggi Ilmu Kesehatan Hang Tuah Surabaya, Indonesia based on the ethical certificate number PE/78/VII/2023/KEP/SHT. During the research, the researcher gave on attention to the ethical principles of information to consent and respect for human rights.

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ABSTRACT

The appetite experienced by toddlers is at risk of causing nutritional disorders, which can have a negative impact on health, such as stunting. Efforts are being made to overcome toddler appetite issues through innovation in the form of Koya Nate. This research examined the impact of Koya Nate, an innovative intervention, on the appetite of stunted toddlers in Surabaya. Using a quasi-experimental approach with a pre-post design, 16 toddlers aged 1-5 years participated, with 8 in the intervention group and 8 in the control group. The study found a significant influence on the appetite of toddlers in the intervention group after the intervention (Sig. 0.000), while there was no significant change in the control group without intervention (Sig. 0.157). A comparison between the two groups revealed a significant influence on appetite in the intervention group compared to the control group (Sig. 0.000). This suggests that Koya Nate has a positive impact on the appetite of stunted toddlers, addressing issues of picky eating. The study emphasizes the importance of innovative approaches in presenting food menus to toddlers facing appetite-related nutritional challenges. The findings highlight the potential of Koya Nate as an effective intervention for improving the appetite of stunted children, contributing to efforts to combat nutritional disorders and prevent negative health impacts such as stunting.

Keyword: appetite; child health; koya nate; malnutrition; stunting

INTRODUCTION

The problem of malnutrition remains one of the primary public health concerns worldwide, especially given the relatively high prevalence of malnutrition in Indonesia[1,2]. One of the nutritional challenges frequently encountered by children is a decline in appetite or difficulty in eating, as, at this age, children start to be selective about the foods they prefer[3,4]. Prolonged periods of reduced appetite in children can lead to stunted growth in height[5,6].

The United Nations International Children's Emergency Fund (UNICEF) reports that the global prevalence of stunting is 28%, with rates of 40% in Eastern and Southern Africa and 38% in South Asia[7]. The results of the Indonesian Nutrition Survey Study in 2022 indicate a 3% decrease in the prevalence of stunting in Indonesia since 2021[8]. In East Java Province, there has been a significant reduction in the prevalence of stunting, particularly in children aged < 30 days, which decreased by approximately 30% from the previous year. Additionally, in children aged 12-23 months, there was a notable decrease of 7% from the previous year[9]. Various cities and districts in Indonesia have also witnessed a substantial reduction in stunting rates, with Surabaya recording a stunting prevalence rate of 4.8% in 2022, making it the second city with the lowest stunting prevalence rate[10].

Incidents of child stunting are influenced by several important factors, one of which is nutritional factors, namely animal and vegetable protein[11,12]. The high nutritional value of animal and vegetable protein contained in each food ingredient is available and in sufficient quantities; however, if the child does not want to eat or follows the wrong feeding pattern, it can result in a lack of nutritional intake for the toddler[13–15]. Appetite problems experienced by children are at risk of causing nutritional disorders and will have a negative impact on the health, growth, and development of toddlers[16–18]

One of the factors contributing to delayed growth and development in toddlers is a diminished appetite. Interviews conducted by researchers and village health workers with

parents of toddlers participating in Integrated Services Post (called *Posyandu* in Indonesia) activities revealed that parents reported their toddlers faced challenges in consuming provided food due to specific food dislikes. Consequently, toddlers frequently left their meals unfinished. Addressing toddlers with a lack of appetite becomes crucial for achieving optimal growth. Recommending food therapy, which includes options rich in protein and with a smooth texture, can facilitate better consumption by toddlers[19–21].

One of the efforts to address toddlers' diminished appetite involves the innovation of snacks, such as Koya Nate, which boasts high nutritional value capable of enhancing toddlers' appetite. Previous research indicates that Koya Nate's snack innovation, featuring an 80% tuna and 20% tempeh formula validated through organoleptic tests, effectively increases appetite. The composition of this formula eliminates the typical fishy smell associated with fish, allowing toddlers to consume Koya Nate without encountering unpleasant odors[22]. Based on this, this study aimed to analyze the effect of giving koya nate on the appetite of stunted toddlers.

METHODS

Research design

The research design employed in this study utilized a quasi-experimental method with a two-group pre-post design approach to ascertain the impact on toddlers' appetite. The intervention group was provided with Koya Nate snacks, while the control group did not receive Koya Nate snacks.

Study Participants

The sample used in this research was determined through sample size calculations using the Federer formula. The calculated sample size resulted in 8 samples for the group that received Koya Nate and 8 samples for the group that did not receive Koya Nate. The sample selection was based on the calculation results and was also adjusted to the population's

condition in this study, specifically toddlers experiencing stunting in one of Village in Surabaya City, Indonesia. Therefore, the selection of samples for both the intervention and non-intervention groups was limited. The samples were selected from the intervention and non-intervention (control) groups using the Simple Random Sampling technique, considering the inclusion and exclusion criteria: children aged 1-5 years, meeting the stunting criteria (if their height-for-age is more than two standard deviations below the WHO Child Growth Standards median)[23], not currently suffering from an illness, and willing to participate as study samples.

Variable, Instrument and Data Collection

The independent variables in this study consisted of demographic factors, specifically the toddler's characteristics (age, gender, height, weight, stunting category), and the mother's characteristics (age, education level, mother's occupation, and family income). Additionally, the variable related to the toddler's comfort eating was considered. The dependent variable in this research was the provision of Koya Nate snacks, sourced from 80% tuna and 20% tempeh. Koya Nate was administered to the intervention group for one week. Each day, they were given Koya Nate once during the day, with the composition of one portion of food and the addition of one small 40g package.

The instrument used to assess toddlers' appetite was a questionnaire developed by the researchers, measured by evaluating the results of food waste from the child's initial portion of the meal using the Comstock Method[24]. This method utilized a scale where 0 represented the percentage of toddlers consuming the entire portion of food from the start of the meal. Scale 1 represented the percentage of toddlers consuming ¾ of the initial amount of food, scale 2 represented the percentage of toddlers who consumed ½ the initial portion of food, scale 3 represented the percentage of toddlers who consumed ¼ of the initial part of food, scale 4 represented the percentage of toddlers consuming 1/9 (only a tiny portion) of the initial part of food, and scale 5 represented the percentage of toddlers who did not eat at all from the initial

part of the meal. Appetite data collection was conducted using the Comstock method, administered by village health workers who had obtained competency at the Primary Health Center in Surabaya City.

Data Analysis

The data analysis employed statistical tests, specifically paired t-tests and independent t-tests, assuming the data were normally distributed. This statistical analysis aimed to examine the impact on appetite both before and after the Koya Nate intervention and the comparison of appetite between those who received the Koya Nate intervention and those who did not. The indicator used to measure appetite involved assessing the leftover food provided by the toddler's parents.

Ethical Clearance

The research received ethical approval from the Health Research Ethics Committee of Sekolah Tinggi Ilmu Kesehatan Hang Tuah Surabaya, Indonesia, based on the ethical certificate number PE/78/VII/2023/KEP/SHT. Throughout the research, the researcher paid attention to the ethical principles of informed consent and respect for human rights.

RESULTS

Table 1 shows that demographic factors, specifically the age of toddlers (< 41 months and ≥ 41 months), constituted 50% in the intervention group. For toddlers aged ≥ 41 months, the majority was 62.5% in the control group. Boys dominated both the intervention and control groups, constituting 62.5% in each. In terms of height, 50% of toddlers in the intervention group were < 80 cm, while 75% of toddlers in the control group fell into this height category. Regarding weight, 62.5% of toddlers in the intervention group weighed < 10 kg, while 62.5% of toddlers in the control group weighed ≥ 10 kg. Maternal age ≥ 25 years old was predominant at 75% in the intervention group, whereas maternal age < 25 years old was predominant at 62.5% in the control group. The majority of mothers in both groups had a senior high school

education level (87.5% in the intervention group and 100% in the control group). In terms of employment status, 87.5% of mothers in the intervention group were unemployed, compared to 62.5% in the control group. Regarding income, 75% of mothers in the intervention group had incomes below the Minimum Wages (MW), while in the control group, 50% had incomes both above and below the MW.

Table 1. Characteristics of demographic factors (N=8)

Demographic Factors	Intervention group		Control group	
	f	%	f	%
Toddler Age				
< 41 Months	4	50	3	37.5
≥ 41 Months	4	50	5	62.5
Total	8	100	8	100
Toddler Gender				
Boy	5	62.5	5	62.5
Girl	3	37.5	3	37.5
Total	8	100	8	100
Toddler Height				
< 80 cm	4	50	6	75
≥ 80 cm	4	50	2	25
Total	8	100	8	100
Toddler Weight				
< 10 Kg	5	62.5	3	37.5
≥ 10 Kg	3	37.5	5	62.5
Total	8	100	8	100
Mother's Age				
< 25 Years old	2	25	5	62.5
≥ 25 Years old	6	75	3	37.5
Total	8	100	8	100
Mothers' Education Levels				
Primary School	0	0	0	0
Junior High School	1	12.5	0	0
Senior High School	7	87.5	8	100
College	0	0	0	0
Total	8	100	8	100
Mother's Employment Status				
Unemployed	7	87.5	5	62.5
Employed	1	12.5	3	37.5
Total	8	100	8	100
Mothers Income				
Below MW	6	75	4	50
Above MW	2	25	4	50
Total	8	100	8	100

Table 2 shows that in the pre-intervention group, toddlers' appetite was primarily consuming 1/9 of the initial portion, accounting for 37.5%. In the post-intervention group, toddlers' appetite increased, with 50% consuming ¾ of the initial portion. Meanwhile, in the pre-control group, the majority of toddlers' appetite consumed ¼ of the initial portion, constituting 62.5%. In the post-control group, most toddlers' appetite consumed 1/9 of the initial portion, making up 37.5%.

Table 2. Distribution of food portions for toddlers in the intervention and control group

Portion spent	Pre-Test				Post-Test			
	Intervention		Control		Intervention		Control	
	f	%	f	%	f	%	f	%
Not Eaten	2	25	2	25	0	0	2	25
1/9 Portion	3	37.5	5	62.5	0	0	3	37.5
¼ Portion	1	12.5	0	0	0	0	2	25
½ Portion	1	12.5	1	12.5	3	37.5	1	12.5
¾ Portion	1	12.5	0	0	4	50	0	0
Full Portion	0	0	0	0	1	12.5	0	0
Total	8	100	8	100	8	100	8	100

Table 3 shows that the pre and post-intervention group data are normally distributed, with a significant value of 0.109. In contrast, the data for the pre-control group indicates non-normal distribution, with a significant value of 0.001, while the post-control group data demonstrates normal distribution, with a significant value of 0.200.

Table 3. Normality test for toddlers' appetite in the intervention and control groups

Group	**p-value***	**Values**
Intervention Group (Pre-Test)	0.109	Normally
Intervention Group (Post-Test)	0.109	Normally
Control Group (Pre-Test)	0.001	Not Normally
Control Group (Post-Test)	0.200	Normally

Note (*): Uji Kolmogrov - Smirnov

Table 4 shows the influence of toddlers' appetite before and after the intervention group, as evidenced by the significant value (0.005) with a mean difference of -2.250. Meanwhile, there was no influence of toddlers' appetite before and after the control group, as evidenced by the significant value (0.157) with a mean difference of -0.250.

Table 4. Analysis of the influence of appetite in the pre and post- intervention and control groups

Indicatior	Group	Mean	Std. Deviation	t	p-value
Appetite	Pre - intervention Post – intervention	-2.250	1.581	-4.025	0.005(*)
	Pre - Control Post - Control	-0.250	0.463	-1.414	0.157(**)

Note (*) Paired t-test
(**) Wilcoxon Sign Rank Test

Table 5 shows that there is an influence on appetite in both the intervention group and control group, as evidenced by the significant value (0.000) with a mean difference of 4.75.

Table 5. Analysis of the influence of toddlers' appetite in the intervention and control groups

Indicator	Group	n	Mean	Std. Deviation	t	p-value*
Appetite	Post – intervention	8	4.75	0.707	5.641	0.000
	Post - control	8	2.25	1.035	5.641	

Note (*) Independent t-test

DISCUSSION

The results of the study showed that there was an influence on toddlers' appetite before and after researchers provided Koya Nate in the intervention group. Meanwhile, there was no influence on toddlers' appetite before and after Koya Nate was not given. Koya Nate, a snack composed of 80% tuna fish and 20% tempeh (fermented soybean), has been given so far. The management of Koya Nate does not contain the fishy smell typically found in processed fish food, making it effective in increasing toddlers' appetite and meeting their daily protein needs[22].

Koya Nate is provided to fulfill the daily protein needs of toddlers. If not accompanied by innovations made by parents in serving food, toddlers' protein needs cannot be met due to their picky eating habits[25]. Providing Koya Nate, a protein-rich snack, consistently over an extended period can contribute to the local government's efforts in Scaling Up Nutrition (SUN)[26].

The role of parents, especially mothers, is crucial in the context of Scaling Up Nutrition. Mothers spend more time with toddlers compared to fathers, and they must pay more attention to children's eating patterns to ensure increased appetite and fulfilled nutrition[27,28]. The family serves as a reinforcing factor in meeting nutrition requirements for toddlers. It plays a pivotal role in promoting the introduction and provision of nutritious food, implementing health practices, and serving as a role model for all family members[29].

The results of this study, in testing the hypothesis, showed that there was an influence on the appetite of toddlers in the group given Koya Nate compared to the group not given Koya Nate. The influence on toddlers' appetite is attributed to several factors, including menu preparation, food management, food presentation, and the method of food delivery. When parents correctly address these factors, they can indirectly enhance the toddler's appetite[30]. Koya Nate stands out as a practical snack that addresses food management and presentation. With a substantial macronutrient content, a smooth taste, and texture that is easy for toddlers to consume, Koya Nate emerges as a preferred choice[22,31].

Furthermore, the appetite of toddlers who received intervention in the form of Koya Nate is high in the required protein. However, in addition to protein, toddlers also need adequate absorption of iron and folic acid, especially those aged under 24 months[32]. It's important to note that the impact of giving Koya Nate is not immediate; it takes a considerable amount of time[32]. Another effort to reduce the incidence of stunting extends beyond the Koya Nate intervention, reaching back to the prenatal period and continuing through the formation

of a fetus up to the age of two[33]. Since the impact of Koya Nate is not immediate but requires an extended period, it is essential to propagate and sustain the influence of providing Koya Nate to toddlers over an extended duration[34].

There are several limitations in the data collection method for the intervention group providing Koya Nate. First, researchers encountered difficulty in directly monitoring the provision of Koya Nate during toddlers' dinner time. Second, the eating schedules varied among toddlers' families, leading to a situation where one respondent was not available at the time of Koya Nate provision and it had to be done the following day. Additionally, data collection was conducted directly by researchers and assisted by village health workers to ensure accurate data. Lastly, the study's sample size is relatively small due to the limited population of stunting toddlers in Kenjeran Village, preventing the generalization of the study results to the broader population.

CONCLUSION

The provision of Koya Nate snacks has a significant impact on toddlers' appetite both before and after consumption. Furthermore, there is a notable influence on the evening appetite of toddlers who have been given Koya Nate snacks compared to those who have not received them. The nutritional value of Koya Nate, particularly its high animal protein content, contributes to meeting toddlers' nutritional needs. Additionally, the smooth texture of Koya Nate makes it easy for toddlers to consume. The implications of providing Koya Nate extend over a substantial period, positively impacting toddlers' abilities and development as anticipated.

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