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Effectiveness of Parental Assistance in Providing Food on Nutritional Intake Among Children with Malnutrition

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ABSTRACT

Background: *Prevalence of stunting continues to affect 21.3% of children aged <5 years worldwide. The problem of malnutrition in children is caused by several factors, such as poor access to nutritious food, recurrent infections, and inadequate practice of offering food and care for mothers and children during the first 1,000 days.*

Objectives: *The purpose of the study was to know the effectiveness of feeding parenting style assistance to mothers of toddlers in increasing the nutritional intake of under-nutrition children*

Materials and Methods: *This study used a quasi-experimental design with a pre-test and post-test control group design approach. The population in this study was toddlers with malnutrition (according to weight/height). The sample size for each group was 35 mothers. The sample was divided into two groups. The first group was given parental assistance consisting of nutrition education and food processing guidance for the toddler for 3 months (the intervention group) and the second group was given health education about balanced nutrition for children under five (the control group). Collecting data had used a checklist of identity, nutritional status, and semi-quantitative food frequency questionnaire. Data were analyzed using paired t-test, p-value <0.05 for the 95% confidence interval.*

Results: *The nutritional intakes of children under five showed a significant difference between the group of mothers under five who were given intensive assistance (the intervention group) and the group that was only given nutrition education for children under five (the control group). The differences in nutritional intakes seen in macronutrients were the difference in calorie intake (p-value: 0.042; CI: 4.005-213.543) and protein intake (p-value: 0.040; CI: 0.197-8.065). The differences in micronutrient intakes were seen in the increase in consumption of vitamin E (p-value: 0.000; CI: 0.446-4.416), sodium (p-value: 0.000; CI: 61.859-193.741), potassium (p-value: 0.005; CI: 70.743-373.102), calcium (p-value: 0.000; CI: 51.851-137.863), and phosphor (p-value: 0.041; CI: 2.133-99.604).*

Conclusion*: Food parenting assistance for mothers of toddlers was effective in increasing toddler nutrition*

Keywords: *Food parenting assistance; Toddler; Nutrition; Malnutrition*

BACKGROUND

Stunting is a physical manifestation of chronic malnutrition and has shown higher rates of suboptimal development, morbidity, and mortality in young children, with frequent occurrences later in life [1]. The prevalence of stunting worldwide had decreased from 1990 to 2018. However, it was predicted that it would be increased to 21.3% in children aged <5 years worldwide. The burden of stunting is almost entirely in low-income countries where there is an increase, an excess of childhood infections, and an inadequate diet [2]. The problem of malnutrition in children is caused by several factors, such as poor access to nutritious food, recurrent infections, and inadequate practice of offering food and care for mothers and children during the first 1,000 days, from conception to the age of two[3]. The results of Rodiger's assessment (2020) in his research state the determinants of stunting which consist of basic determinants and direct determinants. The basic determinants are 1) household income asset index and 2) parental education, particularly maternal education. The underlying determinants are: 1) sanitary sewage, 2) clean water, 3) bed nets, 4) vaccination coverage, 5) attendance at antenatal polyclinic visits, 6) optimal breastfeeding practices, and 7) household food security. The direct determinants of stunting are: 1) decreased fertility, 2) birth spacing, 3) maternal height, 4) birth weight babies, 5) dietary diversity, and 6) incidence of diarrhea[2].

Controlling the practice of offering children's meals (guarding and pressure to eat) has been theorized to predict an increase in the child's weight status[4]. Infant and young child feeding (IYCF) has major implications for a child's survival, health,

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growth, and development. Cook, et. al (2020) also reported that age-appropriate IYCF practice especially complementary foods - was significantly associated with increased height-for-age z-score (HAZ) and decreased likelihood of stunting ($p < .05$). Also, age-appropriate IYCF practice - in isolation - made a modest statistical contribution to the rapid and sustained decline in age-specific linear growth of children from 1996-2016. A complemented multisectoral nutrition strategy - integrating and optimizing IYCF practice- is essential to further accelerate progress in dealing with childhood linear growth disorders. In addition, a special focus is needed on improving IYCF practices that have not shown significant progress over the past two decades: exclusive breastfeeding (EBF), a minimum acceptable diet, and providing minimal bottle feeding[5]. Therefore, researchers modified mentoring for mothers of children under five in training mothers to prepare and provide food for under-nutrition children. The aim of the assistance given to mothers of toddlers is to make efforts to prevent wasting and stunting in malnourished toddlers by preparing mothers of toddlers in terms of knowledge and skills in preparing economical and nutritious food for their toddlers.

MATERIALS AND METHODS

This study used a quasi-experimental design with a pre-test and post-test control group design approach. This research had passed the ethical test with the number :155/KEPK-FKM/UNIMUS/2019. This study used a simple random technique with an estimation approach where the population size was 90 mothers who had toddlers with malnutrition at Kedungwuni II Health Center. The malnutrition based on height/age indicators The calculation of the sample size is calculated using an alpha value approach of 0.05, 80% power based on Ayu SD's research (2008) previously obtained the mean (SD) of each item. The sample size was determined by simple random sampling. The sample size for each group was 35 mothers with under-five children. The sample was divided into two groups, namely the group that was given parental assistance consisting of nutrition education and food processing guidance for the toddler for 3 months (the intervention group) and the group that was given health education about balanced nutrition for children under five (the control group). In this study, inclusion and exclusion criteria were determined in determining the sampling. Inclusion criteria are mothers who have toddlers aged 1-3 years whose parents are permanent residents in Kedungwuni II Public Health Center, Pekalongan Regency. Meanwhile, the exclusion criteria were mothers whose children under five are malnourished and have congenital disabilities and chronic illness; mothers who are not willing to be respondents; mothers whose children under five are stunted and certain food allergies (including dropouts), mothers who do not comply with the intervention rules (not followed-up). The sampling technique was taken by making a serial number of respondents according to the list provided by Kedungwuni II Public Health Center. Researchers make numbers and draw random numbers that come out of their names and make them as respondents in the study. The enumerator collected data according to the name given by the researcher in the toddler class and continued with assistance to mothers who were willing to become research respondents in the toddler class organized by the researcher. Assistance is carried out in three face-to-face sessions, namely by providing education and training to prepare food according to the child's age followed by home visits. Home visits are carried out to monitor activities of supplementary feeding and to evaluate the achievements of Mothers with under-five children. Evaluation of the effect of the intervention was carried out after (follow-up) three months, by looking at differences in nutritional intake of children before mentoring and after mentoring.

Collecting data were using a checklist of identity, nutritional status checklist, and semi-quantitative food frequency instruments. While the tools used in the weight assessment were baby scales and microtoise to measured height. Data were analyzed using an independent t-test on the mean difference of infant nutritional intake between the control and intervention groups. The level of significance used in this test was p-value <0.05 for the 95% confidence interval.

RESULTS

The results of the research on 70 respondents who have participated in the toddler class for 3 consecutive months in two different groups are as follows:

Tables 1 and 2 show that most mothers of toddlers are housewives, who have a lot of time with their children and have a great opportunity to prepare food for their children. With the provision of higher education, education will be easier to do. The level of understanding is directly proportional to the level of education.

Table 3 shows the nutritional intake of children under five before and after Parental Assistance was carried out. This table shows a change in nutritional

intake for children under five, especially in the intake of macronutrients in energy, protein, and fats.

Table 4 shows that some of the nutritional intakes of children under five showed a significant difference between the group of mothers under five who were given intensive assistance (the intervention group) and the group that was only given nutrition education for children under five (the control group).

Table 1 Characteristic of Toddlers and Mother Toddlers

Variable	Intervention		Control		p-value
	n	%	n	%	
Gender					
Male	12	34	20	57	0.055
Female	23	66	15	43	
Breastfeeding History					
Exclusive	25	71	19	54	0.138
Not Exclusive	10	29	16	46	

Table 2 Characteristic of Mother Toddlers

Variable	Intervention		Control		p-value
	n	%	n	%	
Mother's educational level					
Lower secondary education	4	12	8	23	0.205
Upper secondary education	31	88	27	77	
Mother's working status					
Workers	6	17	10	29	0.255
Housewife	29	83	25	71	

Table 3 Comparison of Differences in Nutritional Intake of Children Under Five Before And After Intervention In The Intervention Group

Variable	Before	After	p-value	CI 95%
	Mean ± SD	Mean ± SD		
Energy	697±242.768	906.983±263.576	0.005	-350.898 – (-69.067)
Protein	20.04±9.69	27.663±9.806	0.005	-12.779 – (-2.466)
Fat	25.217±11.537	32.663±12.245	0.018	-13.549 – (-1.341)
Vitamin A	387±234.605	406.703±193.103	0.699	-119.086-80.756
Vitamin E	0.994±1.163	2.223±1.572	0.001	-1.949- (-0.508)
Vitamin B1	17.08±100.386	0.16±0.082	0.326	-17.573 – 51.413
Vitamin B2	0.217±0.207	0.188±0.211	0.586	-0.077-0.134
Vitamin B6	17.2±100.538	0.246±0.030	0.325	-17.596 – 51.505
Vitamin C	29.691±99.725	10.017±16.170	0.261	-7.616-7.428

Table 4 Comparison of the difference in nutritional intake of children under five in the intervention group with the control group

Variable	Intervention	Control	p-value	CI 95%
	ΔMean ± SD	ΔMean ± SD		
Energy	106.883±178.905	1.891±188.517	0.042	4.005-213.543
Protein	3.971±6.280	0.160±7.368	0.040	0.197-8.065
Fat	3.903±1.369	0.18±1.605	0.123	-1.156-9.321
Carbohydrate	14.645±25.811	0.400±26.574	0.057	0.480- 29.692
Vitamin A	1.349±155.576	8.257±187.648	0.896	-114.086-100.269
Vitamin E	0.720±0.828	0.106±0.691	0.000	0.446-4.416
Vitamin B1	0.014±0.091	0.009±0.082	0.824	-0.046-0.058
Vitamin B2	0.014±0.142	7.930±0.153	0.739	-0.101-0.072
Vitamin B6	0.008±0.008	0.029±0.125	0.359	-0.118-0.044
Vitamin C	-1.091±11.669	0.997±12.651	0.979	-7.616-7.428
Sodium	116.76±141.68	-11.04±19.387	0.000	61.859-193.741

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Potassium	209.46±251.27	-12.462±272.485	0.005	70.743-373.102
Calcium	81.914±87.044	-12.948±79.826	0.000	51.851-137.863
Magnesium	0.108±20.965	7.328±22.397	0.280	-21.227-6.352
Phosphorus	60.394±81.572	9.526±87.223	0.041	2.133-99.604
Iron	0.454±0.935	0.071±1.046	0.190	-0.199-0.964
Zinc	0.014±0.862	-0.011±0.910	0.922	-0.503-0.555

The differences in nutritional intakes seen in macronutrients were the difference in calorie intake (p-value: 0.042; CI: 4.005-213.543) and protein intake (p-value: 0.040; CI: 0.197-8.065). The differences in micronutrient intakes were seen in the increase in consumption of vitamin E (p-value: 0.000; CI: 0.446-4.416), sodium (p-value: 0.000; CI: 61.859-193.741), potassium (p-value: 0.005; CI: 70.743-373.102), calcium (p-value: 0.000; CI: 51.851-137.863), and phosphor (p-value: 0.041; CI: 2.133-99.604).

DISCUSSION

This study shows the differences in nutritional intake of children under five whose mothers receive nutrition training for toddlers with groups that are given nutrition education for toddlers only. This can be seen in the difference between nutrients consumed by toddlers before and after the intervention. The difference can be seen in the calorie intake of toddlers whose mothers are given assistance in parenting for toddlers with toddlers whose mothers are given nutrition education for toddlers only (p-value: 0.005; -350.898 – (-69.067)).

Improvement of childcare practices, especially at the end of mentoring nutrition is closely related to increasing the knowledge that mothers hold a dominant role in childcare. That is, nutritional messages and health-related childcare can be implemented by mothers as babysitters[6]. The toddler family assistance program conducted by Purwanti, Rachma, et al. (2020) shows an increase in the knowledge of mothers under five about exclusive breastfeeding and complementary breastfeeding that is following toddler nutrition, increased awareness of mothers to monitor the growth and development of toddlers through posyandu, increased maternal skills in making the F-100 increase the nutritional intake of children under five (seen from simulation activities and home visits), and the consumption of a more diverse diet for toddlers and an increase in energy, carbohydrate, protein, and fat intake [7]. Other research shows that there was a significant difference in knowledge before and after the Mother Smart Grounding (MSG) program (p = 0.000), there was a significant difference in attitude (p = 0.000), and there was a significant difference in motivation (p = 0.000). The MSG program is an educational package in the form of counseling conventional, booklet distribution, and demonstration of healthy snacks made from local moringa (Moringa oleifera)[8].

Inadequate nutritional intake is a direct cause of malnutrition in toddlers. Arifin (2012) said that toddlers with toddler nutrition less risk 2.6 times more stunted than toddlers with good toddler nutrition. This research has shown that there was a different protein intake of toddlers whose mothers are given assistance in parenting for toddlers with toddlers whose mothers are given nutrition education for toddlers only (p-value: 0.040; CI: 0.197-8.065)[9.] This is in line with the research results of Cahya and Sulistyaningsih which suggest that protein is associated with incidence stunting (p-value 0.002). Protein works in carrying out body regulations and new DNA forms for the body. Long-term protein deficiency will disrupt regulations body and growth hormone can distraction that it can cause nutritional disorders such as stunting[10, 11].

Several micronutrients showed a significant influence between vitamin and mineral intake between groups of toddlers whose mothers were provided with nutritional parenting and those whose mothers were only given nutrition education for toddlers. The study showed an increase in the amount of vitamin E intake in children under the intervention group amounting to 0.720 (p-value: 0.000; CI: 0.446-4.416). Vitamin E functions as an antioxidant which functions to increases body immunity. Lack of vitamin E will cause red blood cells to be easily damaged, damage to muscles and nerves to impaired intestinal absorption. In infants and toddlers who are deficient in vitamin E, it can inhibit growth and development so that the developmental stage cannot match the age it should be [12.] The results showed no significant difference in the consumption of vitamins A, B1, B2, B6, and C. This study is not in line with that research done by doing fortification micronutrients, including vitamins B1, B6, and B12 in toddlers who have an infection. Research result states that there is a decrease in disease infections in toddlers who get extra micronutrients[13.] While the taken amount of vitamin C insufficient amount can prevent the occurrence of infection. Low intake of vitamin C

represents risk factors for infection, especially in the area which are endemic to parasitic infections [14].

Several minerals important in the growth and development of children are the target of increasing intake in this study. This proved to be a significant difference in the intake of minerals such as sodium, potassium, and calcium which are important for skeletal growth. Sodium functions in the balance of body fluids maintain acid-base balance, regulates muscle and nerve sensitivity, plays a role in glucose absorption, and is a means of transporting nutrients through the membrane, especially the intestinal wall [12]. Sodium is a mineral that is needed in large quantities in the body, including during growth. While potassium is a macromineral that plays a key role in fluid balance, muscle contraction, and nerve function [15]. Potassium deficiency results in sluggishness and no appetite so that the role of potassium in increasing children's daily consumption is very important.

Apart from these two macro minerals, the most popular macro-mineral in preventing stunting is calcium. Calcium plays a role in the formation of bones, teeth, regulates blood clotting, catalyzes biological reactions, coordinates muscle contraction, increasing cell membrane transport, accelerates the transmission of stimuli, and activates certain enzymes[12]. Studies in China on boys' ages under 6 years proved that there is a link between stunted intake and intake of low fat and protein. The study also reported being stunted in men ages 2–5 years associated with other macronutrients such as protein as well as micronutrients such as calcium and riboflavin[16]. Increased phosphorus intake also serves to increase growth, especially in preventing stunting. Phosphorus functions in forming the main structure of bones together with calcium. Phosphorus is found in milk like calcium. But it is also abundant in other foods such as meat, fish, eggs, poultry, nuts, and seeds so children usually get a lot of phosphorus in their diet[15].

CONCLUSIONS

There were a significant difference in the nutritional intake of children under five whose mothers were provided nutritional parenting style assistance with groups of toddlers whose mothers were only given health education about toddler nutrition both in calorie intake, macronutrients, and micronutrients.

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