The Three Months Balanced Diet Recommendation Education Could Improve Mother's Knowledge and Compliance in Better Diet and Nutrient Intake for Stunted Children in Surabaya, Indonesia

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Abstract

Intruduction: Stunting is a condition of low height for age in children that indicates a linear growth failure influenced to cognitive development for under two children. Balanced Diet Recommendation (BDR) specific for stunted children had not explore to get better outcome in nutrition. The purpose of this study was to analyze mother's knowledge and compliance in giving better diet as well as energy, protein, Fe, zinc intake for stunted children after getting 3 months education on BDR. ***Methods:*** The study was pre-post-test one group quasy experimental study. A total of 150 stunted children were involved, selected from 36 primary health centers in Surabaya.The BDR was derived from Optifood Linear Programming and prepared it for stunted children in Surabaya. Education on BDR was provided 3 times within 3 months by trained supervised nutritionists. Mother's compliance was assessed using the last 6 months Semi Quantitative Food Frequency and 2x24 hours food recall were used to measure nutrient intake. Height was measured with microtoise. The data were analyzed using paired t-test. ***Results:*** There was an improvement in mother's knowledge and mothers' compliance in giving better diet and nutrition intake to their stunted children. The mean of mother's compliance increased from 8.3 to 10.4 (p=0.00) and nutrients intake of all respondents increased significantly (p=0.000). Prolonged education may have impact to height for age z- score.***Conclusions:*** Education on locally specific BDR for stunting is an important approach to improve the dietary intake and nutrition status of stunted children.

Keywords: *knowledge, compliance, diet, nutritional intake, stunting*

Introduction

The first 1,000 days of life – between a child's conception and their second birthday – has been proven to be the key opportunity to prevent child stunting promote child nutrition, growth and development, which will have a lasting effect over the child's whole life[1]. The fulfillment of nutrition intake during the child's first 1000 days is very important. If a child gets optimal nutrition intake during this time, nutrition decline can be avoided. The fulfilment of optimal nutrition intake gives a child not only a longer, healthy and productive life, but also less possibility of degenerative diseases. Nutrition deficiency or malnutrition during early life will give impact on the quality of human resource. Malnutrition child will grow short (low birth weight) and will influence his cognitive development (the development of child intelligent is in line with his age) and education and productivity in his adulthood. In addition, malnutrition is the primary cause of baby and child death. Therefore, we must be fully aware that growth faltering during golden age not only influences physical growth, but also cognitive and

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intelligent development. While physical growth can be improved by giving better nutrition intake, intelligent development cannot[2].

Stuntingis the impaired growth and development that infants and childrens experience from poor nutrition, repeated infection, and inadequate psychosocial stimulation. Children are defined as stunted if their height-for-age is more than two standard deviations below the WHO Child Growth Standards median. The prevalence of child stunting in Indonesia has remained high over the past decade, and at the national level is approximately 37%. Data on the result of nutrition status monitoring of height-for-age indicator in East Java province shows that in 2010 there was 14,2% severe stunting and 18,0% stunting. In Surabaya, the data shows there was 7,5% severe stunting and 15,6% stunting. Data on Infant and Young Child Partnership Program in Surabaya from 2010 to late 2015 showed that almost 75% of the children was categorized stunting and this number cannot be reduced significantly, even its height for age Z-score decreased until -3.2 (very low)[3].

Half of the number (50%) of the children in the partnership program was stunting, and month by month the height of the children tended to become lower than WHO standard. There were some factors which contribute to this decline, one of which was the mother didn't have knowledge about and didn't have perseverance about giving nutrient balance food in line with age problem faced by the children[4]. Intervention efforts have been conducted, both sensitive and specific one; however, the results have not been so satisfying.

Linear Programming is a software that is created in order to produce a specific food recommendation or guideline according to the existing nutrition problem and that can be accepted locally in terms of power and price by the target society. Efforts to overcome stunting in 2017 was done by creating 'specific' balanced diet recommendation which was aimed to prevent stunting or to reduce severe stunting children in Surabaya. Therefore, there is a need to implement or promote the results of linear programming on Balanced Diet Recommendation (BDR) for stunting children in Surabaya in order to measure its effectiveness towards knowledge, obedience, eating habit, and consumption level of the children that can determine their growth and nutrition status.

Materials and Methods

This research is longitudinal that is *Pre dan Post Intervention Study* where the intervention in the forms of educative promotion or implementation balance dietary recommendation for stunting children at 3 months period. Baseline and endline are carried out before and after the intervention. Data analysis was done by using Paired t test to measure the variable difference on knowledge, obedience, eating habit, and consumption level of the children before and after the intervention. Intervention of balance nutrition promotion was carried out by trained nutritionists and supervised by senior nutritionists. Population was 250 stunting children under supervision in Surabaya. Samples of the research were 150 stunting children (6-59 months old) indicated by Z-Score of height for age is < -2.00 SD and were undergoing supervision in 2018 in Surabaya. The BDR was prepared specific for stunting children, which was derived from Optifood Linear Programming. The BDR are:1. Give 3 times a day meals plus 2 times a day healthy snacks, 2.Give animal protein source every day with priority from fish (catfish, milkfish, tongkolfish) egg, and or chicken 3 times everyday or at least 4 times a week, 3.Give plant protein source from tofu and or tempe everyday or at least 4 times a day, 4.Give nut-based food (soybean extract as supplement), 5.Give fruits and vegetables everyday or at least 4 times a week, 6.Give fortified biscuits 2 time a day or at least 4 times a week

Education on BDR was provided 3 times within 3 months by trained supervised nutritionists. Poster and leaflets were used to educate mothers. Mother's compliance in better diet was assessed using Semi Quantitative Food Frequency for the last 3 months and 2x24 h food recall were used to measure nutrient intake[5]. Height was measured with microtoise. The data were analyzed using Paired t-test.

Results

Baseline data done to know the characteristics of respondents before interventon. Table 1 showed that there was no significant differences between stunted and

severe stunted children in age, sex, history of breastfed, firstly introduce to complementary food and parent's income except for birthweight. The proportion of severe stunted children were higher came from Low birthweight history. In this study we found that no differences of respondents characteristics at baseline, nd the hypotysize of the study was to know the differences of mother's compliance on better diet according to recommendation and children dietary intake after 3 months of education on balanced diet recommendation specific for stunting

Table 1. Characteristics of Respondents

Variables	Catagory	Stunted (n=64)	Severe stunted (n=86)	P value*
Age	6-12 months >12-24 months >24-59 months	1 (1.5) 2 (3.1) 61(95.3)	1 (1.1) 2 (2.3) 83 (96.5)	0.427
Sex	Boys	30 (46.8)	40 (46.5)	0.126
Birthweight	Low birtweight	12 (19.4)	34 (40.5)	0,007*
History of Breastfed	Not breastfed < 6 months 6-12 months >12 months	5 (7.8) 14 (21.7) 7 (10.9) 38 (59.4)	9 (10.5) 21 (24.4) 18 (20.9) 38 (44.2)	0.227

Table 2 showed almost all respondent had breakfast habit, with more than 50% had 2 – 3 times a day of food frequency. No significant different in breakfast habit, food frequency, food portion, mean dietary intake, mother's knowledge score at baseline. Almost all nutrient intake of the children were below the recommendation according to age.

Table 2. Respondent's Food Habit and Mother's Knowledge at baseline

Variables	Catagory	Stunted (n=63)	Severe stunted (n=86)	P value*
Breakfast habit	Yes	60.0	40.0	0.227
Food frequency	2-3 times a day ≥3 times aday	55.3 45.7	57.2 43,8	0.332
Food portion	Not appropriate according to age	32.5	35.6	0,53
Mean dietary intake	Energy (Kcal) Protein (gram) Vitamin A Fe (mg) Zinc (mg)	937.3 30.9 932.6 7.05 4.66	908.9 32.7 848.1 7.4 4.77	
Mother's knowlwdge score	Mean ±SD	7.92±1.35	7.45±1.65	0.08

Table 3 showed mothers knowledge, mother's compliance in the diet, and children's mean dietary intake were significantly different between pre and post intervention. Mean score of Mother's knowledge was 7.65 before intervention and it increased after 3 months got nutrition education. It increased to 8.62 point. When mothers were educate by nutritionist in balanced diet for stunted children, they got new information regarding with their children's diet. They knew the specific balanced diet for stunted children in their own area. They were been refreshed by nutritionits that egg, fish and plants protein such as tofu and fermented soybean are the source of zinc and iron needed by children's growth. Individual nutrition education to mother at home could improve the knowledge as well as mother's compliance in better diet.

Table 3. Mother's Knowledge, Mother's Compliance, Mean Dietary Intake and HAZ of Respondents before and after intervention (Education about BDR)

Variables	Catagory	Pre (n=150)	Post N=150	P value*
Mother's knowledge score	Mean ±SD	7.65±1.38	8.62±1.32	0.000
Mother's compliance	Mean ±SD	8.34±2.61	10.45±2.89	0.000
Mean dietary intake	Energy (Kcal) Protein (gram) Fe (mg) Zinc (mg)	921.5±250.7 31.9±10.8 7.23±4.15 4.73±3.55	979.3±265.0 45.2±36.8 17.9±40.7 18.8±50.5	0.002 0.000 0.001 0.001
Height for age Z-Score	Mean ±SD	-3.33±0.81	-3.36±0.93	0.454

At the beginning mean of mother's compliance in better balanced diet for stunted children was 8.34. It increased significantly to 10.45 at the end of study. Mothers already known about the ideal of meal frequency, healthy snacks frequently and the advantages of zinc food source and zinc as well as fortified biscuits. The specific balanced diet recommendation for stunting was derived from Optimal Linnear Programming. Several guideline were gived to mothers are appropriate meal frequency, appropriate healthy snacks frequency, improvement in locally food-animal protein source, plant protein source as well as fortified biscuits. Three months intervention by nutritionist by persuading mothers in practicing the guideline in better diet with addition enforcing the food suplementation from public health office could increased mean dietary intake of stunted chidren. Recommendation on consuming protein source every day with priority from locally fish (lele, bandeng, mujair or tongkol) and or chicken as well as plant protein source such as tofu and tempe 3 times everyday or at least 4 times a week were the most easy practiced by mothers. Nutritionist gived advocay, motivation as well as food recipe to mothers in how to increase consuming protein-source food to their children. Sometime, nutritionist and mothers also cooked together if the mothers allow to do it. To make mothers memorize whatever they had to do, we put the recommendation in 2 pieces of posters and we put it the wall of mother's house. However, the significant enhancement of mean dietary intake had not been able to change the height for age Z-Score of the

children.

Discussion

Stunting and severe stunting were defined as the proportion of children whose weight-for-height z-score was below -2 standard deviations and -3 standard deviations, respectively, of the median height-for-age of the World Health Organization (WHO) Child Growth Standards.WHO definitions for indicators of Infant and Young Child practices in children aged less than two years were applied[6]. The recommendation that combined exclusive breastfeeding for children aged 0-6 months with minimum acceptable diet for children aged 6-23 month. However, in the practice of appropriate feeding still remind low especially for those were stunted. Stunted Children had less meal frequency and food-protein source consumption because of several reason[7]. Specifically, to tackle the direct causes of stunting, food recommended interventions should focus on appropriate complementary feeding focus on improving protein and zinc source food consumption and prevent related diseases. Improvement of complementary feeding through strategies in food-secure populations such as nutrition counselling and in food-insecure populations nutrition counselling, food supplements, conditional cash transfers, or a combination of these, could substantially reduce stunting and the related burden of disease.

Our study area is a city with several social problems, including slum urban area. More than 60% respondents lived in middle low economic condition. We did nutrition partnership programme which focus on educate mothers how to obey the balanced diet recommendation specific for their child conditiaon which were stunted. The recommendation already closely mathced with their usual food habit and socio economic condition. Beside that, the other approach were educate mothers in practicing handwashing properly, motivated mothers to come to reguler growth monitoring post, motivated to complete the immunization as well as motivated to obey in consuming children's supplementation from public health office. In the context of urban slums, the scoping review found that the interventions tackling children's stunting status were: 1) nutritional interventions (supplementation, micronutrient fortified food or complementary food, promotion of nutrition), 2) health interventions (Reproductive and Child Health (RCH) immunisation, and increased access to health services with performance pay), 3) WASH interventions (sanitation programmes and community□ based handwashing programmes), and 4) safety net programmes (conditional cash transfer)[8]. This programmes should implemented together from health programme side (speific intervention) and environment social programme side (sensitive intervention)[2].

At baseline, our findings showed that stunted children had history of low birtweigh and boys were slightly had higher risk of stunting. Most of the respondents' age were more 24 months and came from poor family condition. These findings were similar to those reported by Cochrane Systematic Review stated that poor access to food and particularly healthy food contributes to undernutrition and increases the risk of low birthweight and childhood stunting. This scoping review found that the mother's education was the most reported factor associated with the child's stunting, followed by the child's age, the child's gender, household income, family size and the child's morbidity status.In urban settings, the mother's education may be even more important for nutritional status than in other contexts as educational attainment can be linked to the ability of mothers to make choices in caring practices. In terms of age, the reported age groups with the highest prevalence of stunting were: 36 to 47 months and 48 to 60 months.. Analysis by gender showed that boys were more at risk than girls. Low household income was identified as a risk factor and is also well known to be an underlying cause of stunting[8]. The same with Erna Kusumawati, et.al findings showed that low birtweght, infection diseases and mother's knowledege were some risk factors of stunting for under 3 years children[1].

Mother's knowledge score were low and not different between respondents at baseline and it could significantly increased after 3 months of intervention about spesific balanced diet recommendation for stunting . This result was similar with Adelwais and Tiurma Sinaga study about education on Balanced Diet Recommendation for students . The study was done in Bogor, West Java in 2016. It showed the significant improvement in knowledge and practice of students

in balanced diet after 2 weeks of intervention[9]. It is also in line with Nurmasyita, et al findings with quasi-experimental study among overweight adolescents. It showed that nutrition education could improve nutrition knowledge score and fiber intake in treated group[10]. Knowledge about appropriate complementary food shoud be given to mothers to prevent children from unadequate intake in several nutrient, especially in the first one thousand life of children. In addition, proper complementary feeding should be well understood by mothers and healthworker[11].

Mean dieary intake (energy, protein, zinc and Fe) of respondents increased significantly at the end of intervention. During three months of intervention, nutritionist came to mothers hourse and giving motivation individually 3 times a months in how to increased the nutrients intake of their children. Poster and leaflet were used to make easier mothers in understanding the massages of BDR. Nutrition education with proper media such as individual poster and leaflets could improve knowledge and nutrients intake of students at 3 months[12]. Macro-nutrient usually be the main causes of growth disorder or stunting is protein. Protein has function as metabolisme factor which have the important role to micronutrients absorption. Protein is an essential nutreint to get optimal child's growth and development. Zinc, Fe and folic acid are the micronutrients have closely related with stunted, it consequences in cognitive development[13]. Lele, mujair and bandeng fish are several fish have high protein and zinc as well as Fe content inside. And all of this fish are available around the mothers and the price also cheap. We promoted to mothers to give to their children more often fish than usual intake. We put the fishe's picture and other animal and plants protein source such as egg and tofu and tempe in the Poster regarding with this advice. Mothers could remembering the advice and it could increased the children consumption, and in turn it could the nutrients intake. The findings from Boris martinez, at al and Md. Belal Hosain, et.al.showed the education could improved dietary diversity most significantly in younger age group which broadly supports The First Thousand Days. They said that individual education improved consumption and supplements foods (legumes and eggs). The trend toward improving fish and egg consumption is especially interesting showing their importance for complementary feeding intervention. Finally, the intervention also improved vitamin A-rich food and Zinc-source food, suggesting that the enhanced education could improve utilisation of local food resources by caregivers[7,14]. This 3 months intervention study could not enhance the height for age Z-Score of respondents because of the short time of intervention, but also because of the absence of intervention in preventing infection diseases among respondents. Our research priorities want to examine the impact of longer duration intervention as stunting prevention programme both sensitive and specific integrated programme[7].

Conclusion

This 3 months intervention education on spesific Balanced Dietary Guideline for stunting children could increase mother's compliance in better diet and diatery intake of the children, but it could not yet improve the height for age Z-Score of children. The future research suggestion is implement the longer duration of intervention integrated with sensitive and spesific intervention to reduce the stunting prevalence.

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Ethical Clearance: Ethical permission is approval from the Health Polytechnic Research Ethics Commission of the Ministry of Health of Surabaya, this research does not use human and animal experiment objects..

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