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Influence of Intervention Model of Local Fish Utilization to Adequacy of Energy and Protein in Children in the Coastal City of Bengkulu, Indonesia

Meriwati Mahyuddin

Ph.D. Candidate, Faculty of Public Health, University of Indonesia, Indonesia

Diah Mulyawati Utari

Lecturer, Department of Nutrition of Public Health, Indonesia University, Indonesia

Abstract:

The nutritional Status of toddlers is determined by food intake and infectious diseases, both factors are very much determined by the role of mother. Smart and skilled mothers are expected to meet the needs of family nutrition, especially toddlers. The optimal growth period of adaisat an early age, especially the first 2 years of life. This research aims to analyse the influence of nutrition intervention model in the form of local fish utilization education in groups of approximately 10-15 participants per group in the coastal area of Bengkulu. Location of Bengkulu City as the provincial capital is a coastal city that has not optimal the local fish utilization, one of the type of fish thyrissa sp that all year is always there and the price is relatively cheap and easy to obtain. This research is the quasi experiment with random allocation of the study area, which is the working area of the puskesmas located on the beach. The large formula of the minimal sample used is the average mean difference, so that in large need a minimum sample in each group is 28 participants with the criteria of having toddlers aged 12-18 months before the intervention, evaluation of a minimum attendance of 75% meeting. Based on exclusion or exclusion criteria, the baseline sample of the 45 participants intervention group and the 35 participants control. After 2 months of intervention, a large sample intervention group amounted to 35 and controls 32 participants. The statistical analysis used is the paired T-Test and the multivariate OF Anova analysis (MANOVA) with the help of Nutrsurvey application to process recall and Stata 16 results for data analysis. The results showed the energy adequacy rate of the baseline intervention group of 53.95% and endline 70.40%, while the baseline control group was 47.29% and endline 67.22%. The nutritional intervention model affects the change in the energy adequacy rate (sign 0.007) and the protein adequacy rate (sign 0.011), as well as simultaneously affecting the average change in the energy adequacy rate and the protein adequacy rate (sign < 0.05).

Keywords: %AKE, %AKP, intervention, nutrition education, theory, local fish, thyrissa sp

1. Introduction

The direct cause of lack of nutrition is nutrient intake and infection of the disease. The main causes that produce the results are household food insecurity, inadequate health care and unhealthy environment and weak treatment for children. These three main causes are based on economic factors, political, legal, and cultural affairs, with poverty as a central role (UNICEF 2015; UNICEF, WHO, and Group 2017).

The pattern of parenting or childcare as a manifestation of the role of mother in the family in the provision of food to family members especially The toddler has a big impact on food adequacy and growth (Campbell et al. 2016; Grantham-Mcgregor et al. 2014; Hou 2014; Øverby, Hernes, and Haugen 2017). Unicef Indonesia study stated that the obstacles that caused the high nutritional problem of toddlers aged 6-23 months in Indonesia are inadequate knowledge and nutrition practices are not appropriate. It is specifically explained that such inappropriate knowledge and practices include the lack of exclusive and improper delivery of the accompanying meal (UNICEF 2016; UNICEF South Asia 2017).

Practice the fulfillment of toddler food is not loose from the form and source of food ingredients, one of the essential nutrients for growth is protein. The globally recognized protein source is positively influential (Kawarazuka 2017). Fish utilization in the practice of fulfillment of toddler food is very potential to be applied, given the fishery potential of the Indonesian region as a country of contentment with 17,502 fruits, coastlines of 81,000 km and the area of fisheries in the sea about 5.8 million km². Mlauzi M and Mzengereza research suggests that the proportion of children's nutritional problems in fishery areas is smaller than those of non-fisheries (Mlauzi 2017).

Based on the nutritional adequacy rate (AKG) in 2013, the protein requirement per day for the age of 1-3 years is 26 grams (Kemenkes RI 2013a). Fish proteins are particularly meaningful to growth and development, in addition to the essential amino acids, the properties of which are easily digestible, compared to other animal protein sources (Kaushik

and Seiliez 2010; Kawarazuka 2017; Mlauzi 2017). Although fish is a potential source of protein potential in Indonesia, the fact that fish consumption of Indonesian society is relatively low, year 2016 only 37.29 kg/capita/year where the national target of 43.88 kg/capita/year. Bengkulu provincial Target of 36.09 kg/capita/year, and Bengkulu City only 29.178 kg/capita/year (DKP Bengkulu province 2017; Erwina and Kurnia 2015).

2. Methods

2.1. Location and Study Population

This research is done in the work area of Puskesmas located in the coastal areas of the city of Bengkulu which most of its working area near the beach lips. Respondents to this study were mothers with toddlers aged > 12-24 months. At the start of intervention children aged 12-18 months.

Inclusion criteria:

- Recorded in Posyandu in selected puskesmas work area
- Settled according to local government registration
- Has write-reading ability (literacy)
- Attendance during intervention > 75% of meetings

Exclusion criteria:

- Toddlers suffer from congenital abnormalities
- Do not sign *informed consent* Research

2.2. Design Study

This study was conducted through quasi-experimental research through random allocation as shown below

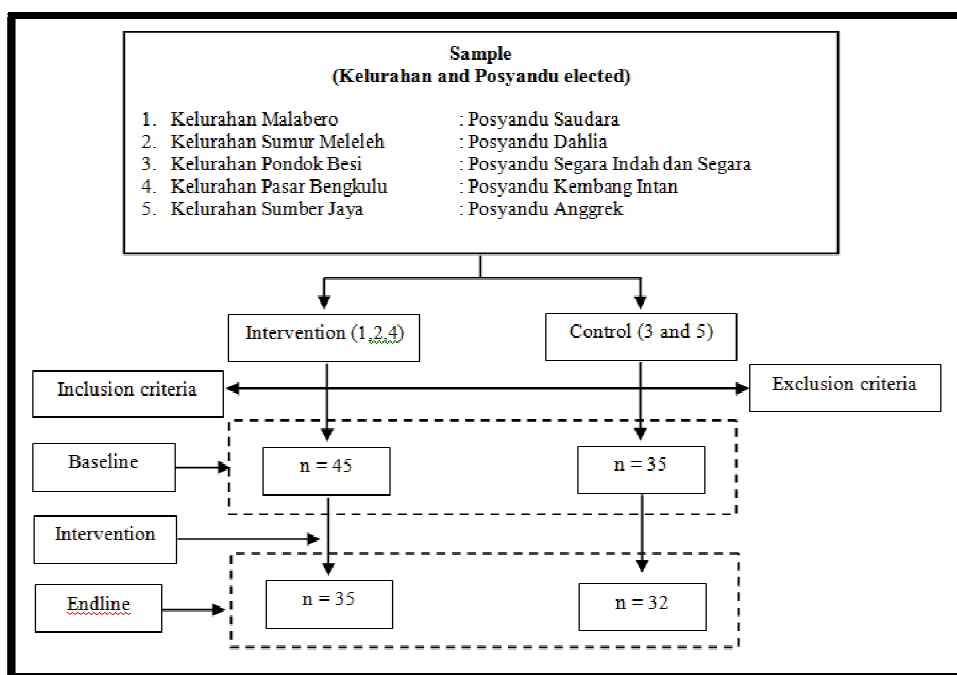


Figure 1: Flow Chart for Sample Determination and Intervention Design

At the end of the study was acquired respondents of each group as many as 35 groups of respondents in the intervention group and the 32 respondents control group. The form of intervention given in the form of nutritional education consisting of 8 meetings with material growth concept, child nutrition status, basic concept of nutrition and utilization of local fish. Interventions use simulated methods and demonstrations with media leaflets, flipcharts, stationery, materials and practice equipment tailored sub-materials.

2.3. Data Collection

Measurement of protein adequacy using the 24-hour recall method is compared to the standard adequacy of nutritional substances recommended by the Ministry of Health RI (Kemenkes RI 2013b).

2.4. Data Analysis

The data is processed with the help of *Nutri Survey* and Stata 16 which are analyzed according to the data properties and the appropriate statistical test techniques, namely Paired t-test, and MANOVA.

2.5. Ethical Clearance

This research has got the ethical approval of the Commission ethics Faculty of Public Health University of Indonesia number: 697/UN2.F10/PPM.00.02/2018.

3. Results and Discussion

Based on the results of interviews to the subject of research, obtained the following characteristics:

Child characteristics	Intervention (n =35)		Control (n =32)	
	Amount	%	Amount	%
Gender				
Male	19	54.29	17	53.12
Women	16	45.71	15	46.88
Age Group of Children				
12-14 months	20	57.14	14	43.75
15-16 months	6	17.14	10	31.25
17-18 months	9	25.71	8	25

Table 1: Child characteristics
Source: Research Data, 2019

Table 1 shows that the child's gender in the control group and the practice of male proportions is much more than females. Age group proportions show that ages 12-14 months in both groups (control, education practices) are more than other age groups.

Characteristics of Mother	Intervention (n =35)		Control (n =32)	
	Amount	%	Amount	%
Mother age group				
20-35 years	28	84.38	27	80
> 35 years	7	15.62	5	20
Mother's Education				
Low	11	40.62	13	31.43
Intermediate	22	50	16	62.86
High	2	9.38	3	5.71
Mother's work				
Work	5	9.38	3	14.29
Not working	30	90.62	29	85.71

Table 2: Characteristics of Mothers
Source: Research Data, 2019

Table 2 shows that the mother age group is 20-35 years old in both groups (controls and interventions) more than any other age group. The proportion of maternal education is largely intermediate category as well as in the intervention group, as well as most mothers do not work formally.

Dependent	Intervention			Control		
	Baseline	Endline	P _{Value}	Baseline	Endline	P _{Value}
AKE (%)	53.95±22.01	70.40±24.38	0.001	47.29±17.81	67.22±27.47	0.000*
AKP (%)	91.02±38.45	122.54±43.65	0	84.83±37.56	120.63±53.72	0.000*

Table 3: Number of Energy Adequacy and Protein
Source: Research Data, 2019
*The Level of Significance 0.05

Table 3 shows that the average percentage of energy and protein adequacy numbers in both groups (intervention and control) *endline* is greater than the *baseline*. The average percentage of energy and protein adequacy rates at the *baseline* and *endline* levels were found in the intervention group, meaning the average difference in the adequacy of energy and protein figures between the *baseline* and the *endline*.

Variable		Intervention	Control	P _{Value}	R ² Squared	P _{Value}
Independent	Dependent	(N = 35)	(N = 33)			
Model intervention	AKE changes	16.66±27.29	9.94±25.35	0.007	78	< 0.050
	AKP changes	31.52±43.42	25.80±43.02	0.011	69	

Table 4: Effects of Intervention Model on Changes in Energy Adequacy and Protein
Source: Research Data, 2019
*The Level Of Significance 0.05

Table 4 shows that there is an influence of the model of nutritional intervention on the change in energy adequacy rate and protein, the influence of the intervention model of the AKE change is greater than the AKP. This nutritional

intervention Model also simultaneously affects the average change in energy adequacy figures and proteins according to all the criteria (*Pillai's Trace, Wilks'lambda, Hotelling's Trace, Roy's Largest Root* (sign < 0.05)

A balanced pattern of feeding at an early age will affect the appetite of the next child, so that the introduction of food in this period has become very important. As known that nutritional problems are determined by the intake and factors of disease (Unicef South Asia 2017; Unicef, WHO, and Group 2017). A good intake can cause a child to easily get infected with an infectious disease, while a child who has suffered an infection clasp affects his or her fifth ability to food. If this intake disorder runs for a long time, then the child will be slow to grow. Some studies have shown a meaningful link between the intake of food in a group, such as ingestion of consumption with the status of Anthropometry in children (Kam et al. 2016; Ramakrishnan, Nguyen, and Martorell 2018)

Nutrition Education is one of the health efforts, individually as well as a group can help individuals in regulating dietary patterns through increased awareness, motivation, facilitating the ability to take action, and improve environmental support (Contento 2007). Nutrition Education is one of the health efforts, individually as well as a group can help individuals in regulating dietary patterns through increased awareness, motivation, facilitating the ability to take action, and improve environmental support (Bullerwell et al. 2016).

Nutritional education content includes food and nutrition with personal health, such as the relationship between diet and health, healthy and balanced food recommendations, How to get the best nutrition, food safety, breastfeeding, how to get children to eat healthier, breakfast, eating balance and physical activity, addressing chronic disease-related diets (Contento, 2007). Content of fish utilization on this model of intervention is very well done, besides as food for intelligence, the dish will make a high donation on body tissues especially in children. Fish protein absorption is higher than beef, chicken, etc. This is due to the fish's meat properties that have protein fibers shorter than those of beef or chicken protein fibers. So that fish and product results are very beneficial for individuals who have digestive difficulties. The vitamins that exist in the fish are also various, namely Vitamin A, D, Thiamin, Riboflavin, and Niacin. Fish also contain minerals that are more or less the same as the minerals that exist in milk such as calcium (Kawarazuka 2017; Kristinsson and Rasco 2000; Lovell 1998).

The average *baseline* energy adequacy rate of research subjects is still low (< 60%. 00). Although the *endline* stage increases, but the increase has not reached 80% as the limitation is quite good or quite fulfilled. Energy function is as a power substance, a child who is experiencing energy deficiency can cause weight loss, even in a long time the impact on the body length or height with the term stunting (Htet et al. 2019; WHO 2014) and the low weight (*underweight*). The fulfillment of the *baseline* and *endline* protein adequacy figures has > 80% with the largest average in the intervention group. Proteins according to its function are forming and building body tissues (Gibson 1990; Ministry of Health RI et al. 2019). Sehgga the fulfillment of protein adequacy figures must be fulfilled in order to optimal body growth, especially fish proteins that are undoubtedly the benefits and effects on children's Health (Widodo et al. 2015; Widodo DKK 2015). The Energy and nutrients required by each age are strictly determined gender and age. Based on the average nutritional adequacy rate recommended for children, especially macro nutrients for children aged 1-3 years with a height of 91 cm, weight loss 13 kg, then adequacy of energy 1125 kcal and 26gram protein. The adequacy of energy and protein is said to be good if > 80% (Kemenkes RI 2013b; Ministry of Health RI 2014).

4. Conclusions and Recommended

There are influences of the model of nutritional intervention on the change in energy adequacy rate and protein, where the influence of model intervention on changes in %AKE is greater than %AKP. This nutritional intervention Model also simultaneously affects the Second amendment of the average adequacy of energy and protein figures. So, it is necessary to develop a nutritional education program aimed to improve the skills of mothers in meeting the needs of toddlers, to improve the nutritional status of children. Good energy and Protein efficiency in children can impact normal growth and health. Children who grow normal and healthy certainly have high productivity for the time of the nations.

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