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Research Article

Effects of Diet and Breastfeeding Duration on the Stunting Status of Children under 5 Years of Age at Maternal and Child Health Centers of the Palembang Regional Office of Health

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Abstract

Objectives: The objective of this study was to identify the effects of diet and breastfeeding duration on the stunting status of children under 5 years of age at maternal and child health centers of the Palembang Regional Office of Health. **Materials and Methods:** This non-experimental analytical study used a retrospective cohort (non-concurrent cohort) design. Both dependent and independent t-tests were used in the statistical analysis. **Results:** This study showed that 86% (n = 43) of children aged 48 and 60 months were stunted, 54% (n = 27) of whom were males. An adequate diet was noted among the age groups of 0-6, 6-7, 8-12, 12-24 and >24 months, with a prevalence of stunting 58% (n = 29), 60% (n = 30), 66% (n = 33), 98% (n = 49) and 98% (n = 49), respectively. Adequate breastfeeding duration was noted among 68% of participants (n = 34). A follow-up in 2016 showed changes in nutritional status among children who were stunted in 2013. Some of these children were either still stunted, normal, or tall in stature in 2016 based on their height-for-age measurements. There was a correlation between diet, breastfeeding duration and change in children's stunting status. **Conclusion:** Stunting was common among male children aged 48-60 months. Diet and breast feeding duration was associated with stunting status.

Key words: Effects of diet, effects of breastfeeding duration, change in stunting status, children under five years of age, visitor of maternal and child health center, Palembang, Indonesia

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Data Availability: All relevant data are within the paper and its supporting information files.

INTRODUCTION

Childhood is a period in which major growth spurt happens, which require macronutrients and micronutrients in adequate quantity and quality. The age of 1-3 years is a "golden" period characterized by rapid growth and development of the brain. Numerous children are stunted due to low nutritional intake and frequent sicknesses because of unhealthy environments¹.

According to the Indonesian health profile in 2012, three countries with the highest prevalence of stunting stature in ASEAN were Laos (48%), Cambodia (40%) and Indonesia (36%)². The results of Basic Health Research (Riset Kesehatan Dasar, Riskesdas) in 2010 stated that there were still many children with nutritional problems and this problem was still considered a community nutritional issue³. Stunting stature may be acquired in utero. The nutritional status of pregnant women, even before they are pregnant, will affect the growth of the fetus. Undernourished pregnant women are at risk of giving birth to babies with low birth weight, which is the main cause of stunting. After birth, babies who are inadequately breastfed are at risk of contracting various infectious diseases due to poor nutrition and unhygienic diets. Babies' diets determine their growth. After the age of 6 months, children will need adequate and safe sources of micronutrients and macronutrients. Socio-economic status, supply of food, clean water and access to primary health care facilities will have an impact on the prevalence of stunting stature⁴.

Stunting stature during childhood is a risk factor for increased mortality, diminished cognitive skills and motor development and impaired bodily functions⁵.

Terati *et al.*⁶ conducted a study in 2013 at 14 public health centers (Puskesmas) in the region of the Palembang Regional Office of Health and noted a stunting prevalence of 8.58%. In continuation of their previous study, Terati *et al.*⁶ were interested in assessing the stunting status of children at 36-60 months of age compared to their stunting status at 0-24 months of age.

This study aimed to assess the change in stunting status from 0-24 months to 36-60 months of age, while also identifying the effects of diet and breastfeeding duration on the stunting status of children under five years of age.

MATERIALS AND METHODS

This study was a non-experimental analysis with a retrospective cohort (non-concurrent cohort) design. This study was a follow-up of a previous study. It was carried out at

maternal and child health centers (Posyandu) in the region of the Palembang Regional Office of Health. The duration of the study was from October-November, 2016. Permission was granted by the ethical code of Makassar Health Polytechnic No. 291/KEPK-PTKMKS/X/2016.

The study population was children under five years of age whose body length was recorded during infancy. The sample consisted of children under 5 years of age who fulfilled the inclusion criteria and were brought to maternal and child health centers in the region of the Palembang Regional Office of Health. Samples were excluded if they lived outside the place of study and were diagnosed with chronic illnesses (e.g., heart disease, thalassemia) or severe congenital/chromosomal disorders such as Down or Turner Syndrome. The sample size was 50 responders.

Socio-economic characteristics: Information on socio-economic characteristics (age and sex) was obtained through direct interviews and questionnaires.

Diet: Information on diet was obtained through direct interviews and questionnaires.

Two-year breastfeeding: Information on breastfeeding duration was obtained through direct interviews and questionnaires.

Z-score: Information on z-scores was obtained through direct measurements using a Camry digital body weight scale, which was made in China, with a capacity of 150 kg and an accuracy of 0.1 kg. Direct measurements of body length were made using a microtoise with a capacity of 200 cm and an accuracy of 0.1 cm. The z-scores were acquired by comparing subjects' body weight and length with the standard deviation reference, which was taken from WHO. and NCHS⁷.

Statistical analysis: Obtained data were processed and analyzed using SPSS software v21. Univariate analysis was used to describe the following variables: Age, sex, diet, 2 years breastfeeding and z-score. Dependent t-tests were used to analyze the effects of diet and two-year breastfeeding on the mean z-score.

RESULTS

This study was a follow-up of a previous study. The previous study was conducted in 2013 and found that 96% (n = 48) of stunted children had z-scores between -3 and -2 SDs (Table 1). The present study showed that 62% (n = 31) of

Table 1: Frequency distribution of stunting of children under five based on z-score 2013

Categories	Total	
	n	%
Stunted	48	96.0
Severely Stunted	2	4.0
Total	50	100.0

Table 2: Frequency distribution of stunting of children under five based on z-score 2016

Categories	Total	
	n	%
Stunted	16	32.0
Normal	31	62.0
Severely stunted	2	4.0
High	1	2.0
Total	50	100.0

the subjects were of normal stature, while 32% (n = 16) were short-statured according to the z-scores (Table 2). Marked differences were noted between z-score measurements in 2016 and in 2013 (Fig. 1). Table 7 shows significant differences in mean z-scores between adequate and inadequate diet groups. Similar results were observed between adequate and inadequate breastfeeding duration groups (Table 8).

DISCUSSION

The sample size in this study was 50 subjects, 86% (n = 43) of whom were stunted and were 48-60 months old. This result was concordant with that of Saudah *et al.*⁸, who noted that stunting was highest among children (54.44%, n = 49) aged 48-60 months (Table 3). Zottarelli *et al.*⁹ stated that stunting was most prevalent above 12 months of age¹⁰. This finding may be due to the notion that the more children age, the more they stray from normal linear growth. This condition may also be attributed to increasing nutritional requirements as children age. Growth of children will continue to deviate from the normal course with inadequate dietary supply (quantity and quality)¹¹.

Of the 50 subjects, 54% (n = 27) were males and 46% (n = 23) were females (Table 4). This result was consistent with that of Wahdah *et al.*¹², who showed more stunted male (51.7%, n = 62) than female children. Similar results were reported by El Taguri *et al.*¹³, who noted that 53.3% (n = 495) of the stunted children were males. In addition, Riskesdas stated in 2013 that the stunting prevalence among male children was slightly higher (19.3%) than among female children (19.1%)¹⁴. Mothers' feelings of anxiety and closeness towards female children may play a role in this phenomenon. Female children tend to be considered frail compared to

Table 3: Frequency distribution of stunting of children under five based on age

Category of age (months)	Total	
	n	%
12-47	7	14.0
48-60	43	86.0
Total	50	100.0
Total	50	100.0

Table 4: Frequency distribution of stunting of children under five based on gender

Categories	Total	
	n	%
Male	27	54.0
Female	23	46.0
Total	50	100.0

Table 5: Frequency distribution of stunting of children under five based on dietary habit

Parameters	n	%
0-6 months		
Not correspond	21	42.0
Correspond	29	58.0
Total	50	100.0
6-7 months		
Not correspond	20	40.0
Correspond	30	60.0
Total	50	100.0
8-12 months		
Not correspond	17	34.0
Correspond	33	66.0
Total	50	100.0
12-24 months		
Not correspond	1	2.0
Correspond	49	98.0
Total	50	100.0
>24 months		
Not correspond	1	2.0
Correspond	49	98.0
Total	50	100.0

Corresponding: The 0-6 months exclusive breastfeeding (on demand). The 6-7 months breastfeeding (on demand) and complementary foods of breastfeeding (milk porridge 1x, filter of fruit 1x, filter of team 1x). The 8-12 months breastfeeding (on demand) and complementary foods of breastfeeding. Milk porridge 1x, filter of fruit 1x, filter of team 2x (more duration and more dense). The 12-24 months breastfeeding (on demand) and regular food. The >24 months regular food. Not correspond if the dietary habit is not same with the standard¹⁶

males, which explains the extra affection and attention. Moreover, male children are more physically active, which means that they burn more calories¹⁵.

The diets of children aged 0-6, 6-7, 8-12, 12-24 and >24 months were considered adequate (Table 5). Confirmation for these findings was obtained through direct interviews, in which most parents were aware of the appropriate form of food for the appropriate age. The appropriate food form for 0-6 months old children is exclusively breastmilk, which means no additional liquids

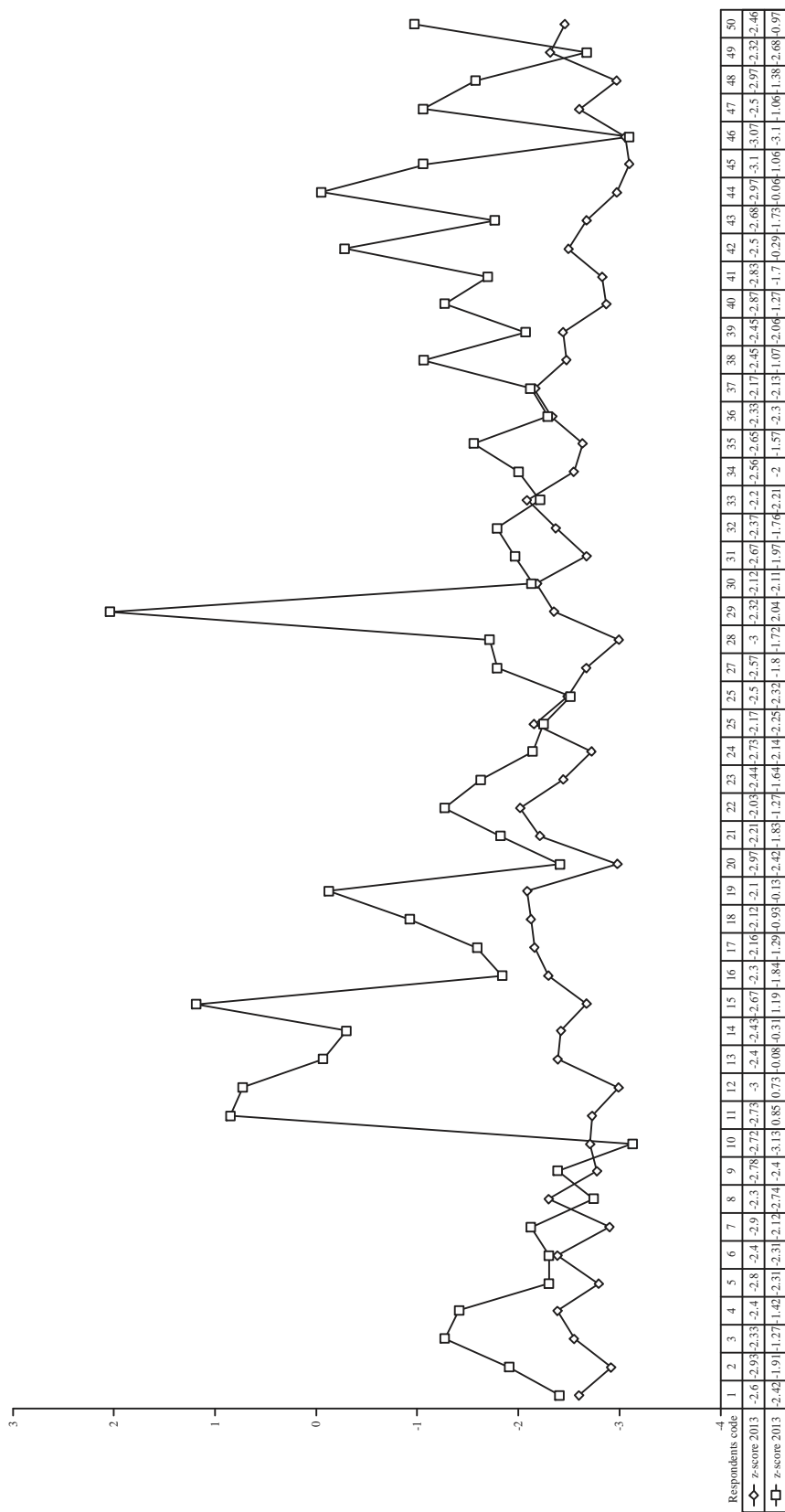


Fig. 1: Changes of status based on z-score 2013 and z-score 2016

Table 6: Frequency distribution of stunting of children under five based on breastfeeding for 2 years

Categories	Total	
	n	%
Not correspond	16	32.0
Correspond	34	68.0
Total	50	100.0

Table 7: Frequency distribution effect of dietary habit with stunting of children under five

Variable	Mean	SD	SE	p-value	N
Dietary habit					
Not correspond	-2.463	0.336	0.089	0.000	14
Correspond	-1.111	1.048	0.174		36

SD: Standard deviation, SE: Error standard mean, N: Total

Table 8: Frequency distribution effect of breastfeeding with stunting of children under five

Variable	Mean	SD	SE	p-value	N
Breastfeeding					
Not correspond	-2.421	0.333	0.083	0.002	16
Correspond	-1.052	1.048	0.179		34

Correspond if breastfeeding from 0-24 months. Not correspond if breastfeeding for less than 24 months⁷

(formula milk, orange water, honey, tea, plain water) and no additional solid food (banana, papaya, milk porridge, biscuit, rice porridge, steamed porridge). Exclusive breastfeeding is encouraged until children reach 6 months of age, after which solid foods are introduced while children still retain breastmilk in their diet until 2 years of age¹⁰.

Children above 6 months of age require complementary food in addition to breastmilk, as breastmilk alone no longer fulfills their energy, protein and other micronutrient requirements. The prerequisites for complementary food are correct time, correct amount, safety and correct methods of intake. Children must also be ready physically and psychologically to accept complementary foods. The type and ingredients of complementary foods should also be taken into consideration, children should be introduced to particular complementary foods one at a time, with the food repeated for 2 days so that they grow accustomed to its taste, aroma and type. Introducing new food once or twice will not be enough, at least 10-15 times are needed before children are considered tolerant of that particular food¹⁶. This particular age is also a good time to start introducing vegetables and fruits into children's diets.

Two-year breastfeeding was achieved by most of the subjects (Table 6). Direct interviews indicated that most parents continued giving breastmilk until their children reached 2 years of age because they thought that breastmilk had many advantages. This finding was also

confirmed by local health practitioners. This finding was supported by Wahdah *et al.*¹², who stated that unexclusively breastfed children would have clinically affected stunting.

This study showed a difference in the z-scores in 2013 and 2016. In 2016, 62% (n = 31) of subjects were normal-statured and 32% (n = 16) were short-statured. This finding was concordant with that of Saudah *et al.*⁸, who showed that 81.11% (n = 73) subjects were normal-statured and 17.78% (n = 16) were short-statured.

This study also noted a difference in mean z-scores between adequate and inadequate diet groups, as well as between adequate and inadequate breastfeeding duration groups.

This study was affected by several limitations. Relocating previous subjects was much difficult, as this was a follow-up of a study conducted 3 years prior. A handful of subjects had moved to new addresses or had stopped visiting maternal and child health centers, prompting us to allocate additional time and resources.

CONCLUSION AND FUTURE RECOMMENDATION

Stunting was prevalent among children aged 48-60 months (86%, n = 43). Stunting was more prevalent among male children (54%, n = 26). An adequate diet of children aged 0-6, 6-7, 8-12, 12-24 and >24 months was achieved by 58% (n = 29), 60% (n = 30), 33% (n = 66), 98% (n = 49) and 98% (n = 49) of the sample, respectively. Adequate breastfeeding was achieved by 68% of the subjects (n = 34). There was a difference in stunting status between the study in 2013 and the current study. Children under 5 years of age who were stunted in 2013 had either improved to normal or tall stature or remained stunted based on their height-for-age measurements. There was an association between breastfeeding duration and stunting status. There was an association between diet and stunting status.

Mothers should bring their children regularly to maternal and child health centers for an early screening of nutritional status until they are 5 years old.

Nutritionists and other health practitioners should carry out more promotional and socialization efforts concerning continuous feeding for children under 5 years of age.

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