

feeding_practise

by Haripin Sinaga

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Using scores in interpreting growth status effectively improved infant feeding practices and calorie intake of child aged 0–12 months

Haripin Togap Sinaga, Bernike Doloksaribu, Hertha Masthalina Tobing, Ida Nurhayati

Jurusan Gizi, Polytechnic of Health Medan, North Sumatera, Indonesia.
Correspondence to: Haripin Togap Sinaga, E-mail: haripinsinaga@yahoo.com

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Abstract

Background: Inappropriate feeding practices including breast-feeding practice during the first year of life identified to be associated with 60% of child malnutrition and mortality. Lack of feeding skills is the major cause. World Health Organization (WHO) mentions that growth chart is a good educational tool for parents. It needs an innovation to introduce growth chart.

Objective: The objective of this study is to assess the effect of scores in measuring child growth status on feeding practices and calorie intake. The hypothesis of this study is that after intervention there would be a significant improvement of feeding practices which in turn will affect the calorie intake of children in the intervention group.

Materials and Methods: This study is to measure the impact of using score bubble growth chart on infant feeding practices and calorie intake. A total of 107 caregivers selected purposively from two different locations. Mothers in intervention group were trained to use score bubble growth chart while mothers in control group used the normal growth chart. Sixteen written questions were designed and tested to measure mothers' behavior in feeding their babies. Data were analyzed using independent t-test and chi-square test.

Result: Before intervention, there was no significant difference of infant feeding practices and types of food given ($p > 0.05$) and child calorie intake ($p > 0.05$) between intervention and control groups. However, after intervention, there was significant difference in exclusive breast-feeding proportion (58% vs 36%; $p < 0.01$), breastfed more than eight times/day (58% vs 32%; $p < 0.01$), breastfed more than 15 min/session (45% vs 29%; $p < 0.01$) and calorie intake (91.6% recommended dietary allowance [RDA] vs 76.5% RDA; $p < 0.00$) in intervention and control groups, respectively.

Conclusion: Using scores in growth monitoring program improved infant feeding practices and calorie intake.

KEY WORDS: Scores, growth status, infant feeding practices, calorie intake

Introduction

Inappropriate feeding practices including breast-feeding practice during the first year of life identified associated with

60% of child malnutrition and mortality.^[1] About 1.3 million lives of children under five per year can be saved by exclusively breast-feeding.^[2] Even though breast-feeding is the oldest practices by all regions and universally adopted as a solution in preventing early malnutrition, the proportion of exclusive breast-feeding practices is still low in almost all countries.^[3]

Data from different countries revealed that breast-feeding practices between countries are largely different. The breast-feeding patterns across regions are still far from the recommendation. Data from 37 developing countries between 1990 and 2004 show that the rate of exclusive breast-feeding for the first 6 months ranged from 34% to 41%.^[4] While in Indonesia, the prevalence of exclusive breast-feeding in 2013

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was 26.6 % and in Deli Serdang District, 45%. This might lead to the high prevalence of stunting in Indonesia, 37.2%.^[5]

In preventing malnutrition, Indonesian Government has launched a program known as Scaling Up Nutrition (SUN) movement program. SUN is a principle movement that all people especially babies of age 0–24 months have a right to food and good nutrition.^[6] In Indonesia, one of the SUN program is called “1000 hari pertama kehidupan,” means the first thousand days of life, started with the infant in the womb for 270 days until the baby aged 2 years for 730 days. This period is the golden period in which a child should have the right to appropriate food.^[7]

Mothers' milk is not only appropriate but the best food for babies. No other food can replace the function of mothers' milk. The current evidence proves that exclusive breast-feeding is not only improves growth and body immune but also protects against obesity and breast cancer. After 6 months of life baby needs complementary foods.^[8]

A baby aged 0–6 months should be breast-fed exclusively at least eight times a day, for at least 15 min per session or until the two breasts are emptied.^[9,10] In every 2 hours, a baby should be breast-fed. Then on entering age of 7 months, baby should be given complementary foods. In weaning the baby, the consistency and source of foods also should be considered. At the age of 6–7 months, baby should be fed with semisolid foods, food from animal sources should not be introduced in this age. Then, at the age of 8–10 months and 11–12 months, food consistency should be gradually improved to be more solid. However, these feeding steps and skills are not well informed and advised to mothers and caregivers.^[11]

Several researchers who found low proportion of breast-feeding practices suggested that the educational efforts and cultural approaches need to be performed to really change mothers' attitudes in feeding babies.^[12–14] Improper knowledge has been known as a major cause of malnutrition in young children; therefore, nutritional knowledge, especially the relation between infant feeding practices and child growth, need to be taught properly and intensively to mothers with a simpler method.^[15]

World Health Organization (WHO) states that growth chart is an appropriate nutritional education tool for mothers. The graph of child growth is shown every month and the trend of growth can be used to encourage mothers to do innovative health behavior and to motivate their changes in feeding babies.^[16]

The real situation is different since Roberfroid^[17] found that around 30%–75% mothers in Asia, Africa, and Latin America had poor understanding in interpreting the growth chart. While in Indonesia, only around 35% mothers understand how to use their child growth chart.^[5] Thus, it can be assumed that the performance of current growth chart is complicated and not informative. WHO suggested that a simpler, understandable, and informative growth chart need to be created in order for more mothers and family member to easily understand the function of growth chart.^[18] Around 200–300 kinds of modified

growth charts are currently used in more than 80 countries in the world. Mexico, India, and Leshoto had positive experiences in using growth chart in enhancing mothers' knowledge, understanding, interpretation and comprehension on growth chart.^[19]

In this study, the authors introduced an innovation to use scores in interpreting growth status in a nutrition education program. The growth chart is a modification of the new WHO-2005 growth chart, which is in certain parts modified. At the lines along vertical axis replaced by bubbles, at the right side of color tape is presented score/number 5, 6, 7, 8, and 10. The explanation on how to interpret the weight status and its relation to feeding practices are presented in score growth chart. See Appendix 1. The scores are intended to assist mothers to interpret the child weight status. Child weight position on score 5 and 6 means the weight status is abnormal. Score 8 and 10 means the baby gets normal and excellent weight. Use of numbers, scores, and ratios is frequent in health and medical promotion program.^[20,21]

The objective of this study is to assess the effect of scores in measuring child growth status on feeding practices and calorie intake. The hypothesis of this study is that after intervention there will be a significant improvement of feeding practices which in turn will affect the calorie intake of children in intervention group.

Materials and Methods

The present study was a quasi experimental study with *pre and post nonequivalent group design*. This study was conducted from June 2014 until October 2014. The study design is shown in Figure 1.

The sample size was calculated by the formula; $n = \frac{Z_{1-\alpha} \cdot 2\sqrt{2PQ} + Z_{1-\beta} \sqrt{[P_1(1-P_1) + P_2(1-P_2)]^2 / (P_1 - P_2)^2}}{d}$, where n is the required sample size.^[2] It was assumed that after receiving nutrition education, there would be a 30% improvement of exclusive breast-feeding practices of mothers in intervention group. Based on the calculation, the total sample was 50. Then 10% was added for drop-out possibility in each group; therefore, 55 mothers were recruited from 4 posyandus.

The selection of respondents was purposeful. The inclusion criteria required mothers had child aged 0–12 months, mothers' age between 20–27 years, following at least 9 years formal education, baby birth weight 2,600–4,000 g and breast-fed and never hospitalized in the last 1 month.

Total sample was 107 mothers/caregivers (54 mothers in intervention group and 53 mothers in control group) who had children aged 0–12 months.

Study Location

The study was conducted in two subdistricts; Lubuk Pakam subdistrict as intervention area and Tanjung Morawa subdistrict as control study area. In each study area, four posyandus were selected based on site representation; one posyandu from around of city, one posyandu was located in between the city and rural area, and two posyandus from rural areas. The criteria of posyandu selection were the following: the average

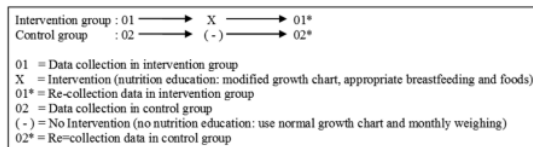


Figure 1: Process of study design.

level of community participation was at least 40%, number of cadres more than two persons, visited by community midwife every month, and easy to access.

Data Collection

There are two phases of data collection. First, collecting base data such as frequency of monthly weighing, breast-feeding practices, and types of food given. These were collected using written questionnaires. Sixteen written questionnaires were developed by researchers. The closed and open answer was provided; for example, *Do you weigh your child to Posyandu every month? Yes/No. How many times do you breastfeed your baby in a day?.....times/day.* In average, what is the duration of breastfeeding in each session?.....minutes. Prior to use the questionnaires a reliability and validity test was conducted and revised two times.

Phase Two

Collection of similar questionnaires. This was done 1 month after nutrition education ended. A 24-hour recall method for two nonconsecutive days was used to get the information on the duration and frequency of breast-feedings and types of food.^[21]

Implementation of Intervention

The authors prepared a module and bubble size of bubble score growth chart. See Appendix 1. It was used as the main media in nutrition education intervention. The contents of module were taken from the score bubble growth chart. The nutritional lessons were emphasized how to interpret baby's weight status and its relation to daily feeding practices.

Intervention was an intensive nutrition education session conducted eight times during 4 months. Around 75% of the lessons was delivered in the class while another 25% was out of the class. In the class meeting, mixed method was used; lecture, group discussion, and practicing. During 4 months intervention there were five topics delivered. Each topic was repeated three times with the total time around 40 h.^[22] Out-class meeting was conducted in posyandu. Prior to giving the lessons, the researchers observed how mothers used the chart and fed their babies. After recording the observation followed nutritional counseling. A certified lactation consultant was recruited to be in charge as breast-feeding counselor. Mothers were advised to breast-feed at least eight times and at least 15 min per session.^[23,24]

While mothers in control group used normal growth charts (see Appendix 2). They received nutritional message especially on breast-feeding practices from a community midwife in posyandu. Mothers were encouraged to visit posyandu every month and to bring their child growth charts.

Research Implementation

Four researchers were assisted by six enumerators from Academy of Nutrition. Prior to collecting the data, enumerators were trained to have similar perception on the questionnaires. The team visited posyandu every month; if mothers did not attend posyandu, then the team visited mothers' house.

Data Analysis

To analyze the breast-feeding and food feeding practices, two optional answers and scores were provided, Yes = 1 and No = 2. Then the percentage of each answer was calculated. Calorie intake from mothers' milk and foods was calculated by a Food Processor program. To calculate the calorie content from mother's milk, a formula was used. In the first 6 months, a healthy lactating mother produces around 800–900 mL milk during 24 h. Each 100 mL of mother's milk contains 62 calories.^[25] If mother breastfeed her baby every 2 h with the two breasts simultaneously, the baby will get around 550 calories. The level of calorie intake was divided into two categories; high calorie intake and low calorie intake. If the calorie intake \geq mean = high calorie intake and calorie intake $<$ mean = low calorie intake. The values are compared to recommended dietary allowance (RDA); 0–6 months = 550 calories, 7–12 months = 650 calories, and 1–3 years = 1100 calories.^[25] Statistical analyses were conducted using the SPSS for Mc, version 17 used to test statistical significance of differences between two groups. T-independent test used to measure the comparison and Pearson's chi-square test for determining the significance.

Results

As seen from Table 1, among 10 characteristics of respondents, none of variables was significantly different ($p > 0.05$). It meant that the two groups of study were comparable. Birth weight was (3.3 ± 0.48 vs 3.3 ± 0.45 kg in intervention and control groups, respectively). The average time of initiation of breast-feeding was around 2 h (2.2 ± 0.52 vs 2.1 ± 0.67). Only few mothers had higher education (9.3% vs 1.9%, respectively, in intervention and control groups)

In terms of occupation, most mothers worked as household workers; 81.5% vs 88.6%. The average number of household members was four persons in each group of study. The score of monthly income of the two groups was 17, meaning that the family earned income between 1,5 and 2,0 million rupiahs per month (1USD = 11,600 IRD). This amount was almost similar to regional minimum salary rate determined by the local government.

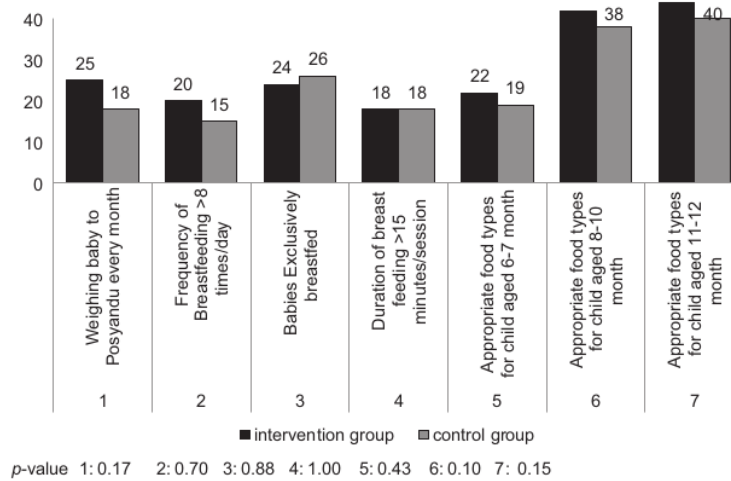


Figure 2: The proportion of monthly weighing, exclusive breastfeeding, frequency and duration of breastfeeding in a day, types of foods given at age 6–7 months, 8–10 months, and 11–12 months before intervention in the two study groups.

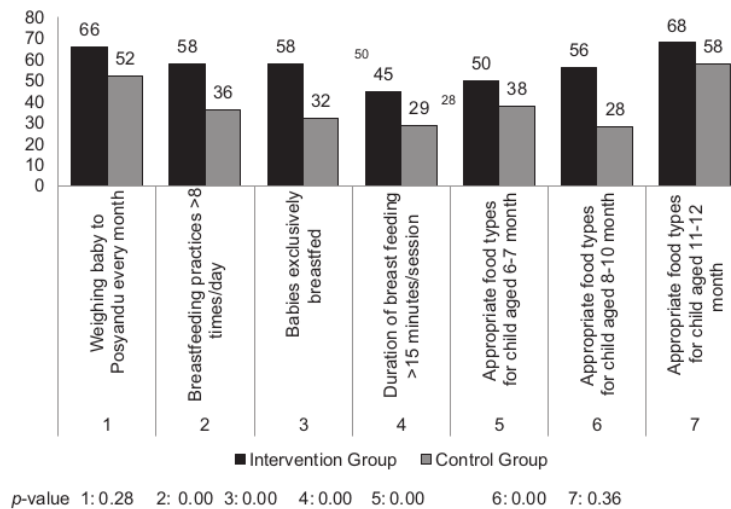


Figure 3: The proportion of monthly weighing, exclusive breastfeeding, frequency and duration of breastfeeding in a day, types of foods given at ages 6–7 months, 8–10 months, and 11–12 months after intervention in the two study groups.

Figure 2 shows that before intervention the proportion of breast-feeding and proper food feeding practices between the two groups of study are comparable. It can be seen from Figure 2 that most mothers breast-fed their babies less than eight times (80% vs 85%, $p > 0.05$) and did not exclusively breast-feed their babies (76% vs 74%, $p > 0.05$). In terms of giving appropriate foods, the proportion of mothers in

intervention group was higher than those in control group, but it was not significantly different (aged 6–7 months, 22% vs 19%; aged 8–10 months, 42% vs 38%, and aged 11–12 months, 44% vs 40%) but not significantly different. Then, after 4 months of intervention (see Figure 3), feeding practices changed. There was a 60% increase in the number of mothers who breast-fed more than 15 min in a session and 80% increase in exclusive

Table 1: Baseline characteristics of respondents in intervention and control group

Characteristics	Intervention group (N = 54)		Control Group (N = 53)	p Value ^a
	Mean ± SD	n (%)	Mean ± SD n (%)	
Birth weight (kg)	3.3 ± 0.48		3.3 ± 0.54	0.87
Initiation Breastfeed (hour)	2.2 ± 0.51		2.1 ± 0.67	0.81
Age (month)	5.19 ± 3.54		4.6 ± 3.83	
0–5 months	27 (50.0)		30 (56.6)	0.40
6–8 months	13 (24.1)		4 (22.6)	
9–12 months	14 (25.9)		11 (20.8)	
Mother's age (year)	28.7 ± 4.44		28.9 ± 4.59	0.93
Mother's education				0.69
Grade 7–9	17 (31.5)		15 (28.3)	
Grade 10–12	32 (59.2)		37 (69.8)	
Above grade 12	5 (9.3)		1 (1.9)	
Mothers occupation				0.37
Household workers	44 (81.5)		47 (88.6)	
Agricultural/skill labor	4 (7.4)		4 (7.6)	
Private sector	6 (11.1)		2 (3.8)	
Fathers education				0.48
Grade 1–6	5 (9.2)		5 (9.4)	
Grade 7–9	7 (12.9)		11 (20.8)	
Grade 10–12	35 (64.8)		35 (66.0)	
Above grade 12	6 (11.1)		2 (3.8)	
Fathers occupation				0.45
Government workers	3 (5.5)		3 (5.7)	
Agricultural/skill labor	7 (13.0)		5 (9.4)	
Private sector	42 (77.8)		43 (81.1)	
Others	2 (3.7)		2 (3.8)	
Household member (person)	4.02 ± 0.94		4.04 ± 0.99	0.91
Family income (rupiah)	2.76 (±0.75)		2.75 (±0.61)	0.97

^aIndependent t-test, significant at $p < 0.05$

Table 2: Child calorie intake before and after intervention

Age group (month)	Before intervention			Age group (month)	After intervention		
	Intervention group	Control group	p-value		Intervention group	Control group	p Value
	Mean ± SD (Calorie)	Mean ± SD (Calorie)			Mean ± SD (Calorie)	Mean ± SD (Calorie)	
0–5	375.9 ± 64.8	352.8 ± 85.1	0.21	5–10	525.6 ± 48.2	491.8 ± 62.6	0.00
6–8	482.4 ± 39.3	510 ± 94.6	0.21	11–13	578.5 ± 48.5	485.8 ± 72.7	0.00
9–12	511.6 ± 44.7	537 ± 88.3	0.26	14–17	995.1 ± 99.1	723.8 ± 88.2	0.00

breast-feeding practices in the intervention group compared with the control group (58% vs 36%, $p = 0.00$ and 58% vs 32%, $p = 0.00$).

The proportion of feeding appropriate foods also improved significantly for babies aged 6–7 months (50% vs 38%; $p = 0.00$) and 8–10 months (58% vs 28%; $p = 0.00$), but not for babies aged 11–12 months (68% vs 58%; $p = 0.36$).

The authors also documented that mothers in control group had introduced food from animal source such as fish, egg, and meat as prelacteal foods. The percentage of mothers' attendance in posyandu was not significantly different before

and after intervention ($p > 0.05$), but there was a sharp improvement compared to before intervention; from 25% to 66% and 18% to 52% in intervention and control groups, respectively.

Table 1 illustrates the calorie intake before and after intervention between the two groups of study. After intervention the calorie intake of the test group in all categories improved significantly compared to control group ($p < 0.00$). It was identified that child aged 9–12 months is more vulnerable to malnutrition since there was a difference of 272 calorie intake between the child in test group and that in control group after intervention.

Table 2 shows that before the nutrition education the mean calorie intake in three aged groups between intervention and group is not significantly different ($p > 0.05$). The calorie intake in intervention and control groups, respectively, of age 0–5 months was 375.9 ± 64.8 vs 352.8 ± 85.1 , 6–8 months was 482.4 ± 39.3 vs 510 ± 94.6 , and 9–12 months was 511.6 ± 44.7 vs 537 ± 88.3 . None of the three groups reached RDA. After 5 months of intervention, the mean of energy intake was significantly different in the three groups of study ($p < 0.01$). But none among the three age groups reached the 100% RDA; group aged 5–10 months: 95.4% RDA, 11–13 months: 89.0% RDA, and 14–17 months: 90.4% RDA.

Discussion

This study demonstrated that the enhanced feeding practices and child calorie intake related to applying scores in measuring growth. Our study found that there was a significant enhancement of exclusive breast-feeding proportion, from 24% to 58%. This result was in line with the study conducted in Bangladesh, in which the proportion of exclusive breast-feeding was 59.8% after 2 months of nutrition education for mothers with low birth weight babies.^[27] But this achievement was still far from UNICEF/WHO recommendation of 90% exclusive breast-feeding.^[28]

The emphasizing of breast-feeding education messages of the recent study was similar to Thakur's study^[27]; babies' mouth attachment to breast, babies position on breast-feeding, and exclusively breast-feeding.

The most challenging one was to ask mother to breast-feed baby until the two breasts were emptied. Only 45% mothers followed the suggestion. We expected more mothers follow this suggestion because most of them were household workers. In fact, it was not easy to ask them to breast-feed longer than 15 min in each session. Aziezah also found that most mothers breast-fed their child only 10 min in each session.^[9]

Calorie intake of child in intervention group became more sufficient, aged 5–10 months: 95.4%, aged 11–13 months: 89.0%, and aged 14–17 months: 90.4%. The result of recent study was in line with a study in Lusaka, Zambia, and Bangladesh.^[2,28] The difference was in the efforts and creativities used. In this study using scores in interpreting weight status and connected to breastfeeding, hence using scores numbers and ratio were not new in health and medical promotion program.^[20,21]

Insufficient energy was found in control group children; the older the child, it consumed more bulky foods, which contained more water and carbohydrate. These foods did not contain essential nutrients such as fat and protein that can improve adipose tissue deposition.

Limitation

Our study did not cover mothers with low education and the number of respondents was small. Therefore, the next study needs to consider mothers with lower education since most of them have more risks to have children with malnutrition.

Conclusion

Using scores in interpreting child growth status positively improved infant feeding practices and calorie intake. SUN program should not only focus on infant but also focus on maternal eating attitude. Community health workers, especially community midwives, should have innovation and creativity in using the existing health promotion media in improving the quality program of maternal and antenatal care.

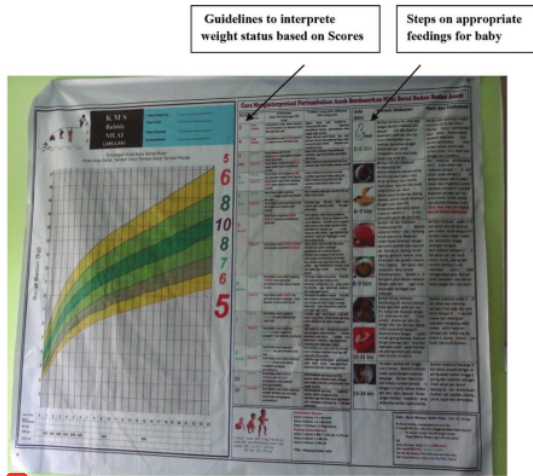
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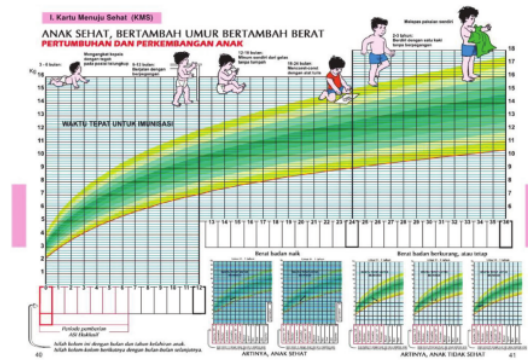
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Appendix 1: Bubble Score Growth Chart (Big Size).



Appendix 2: Normal Growth Chart.

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