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Original Research

Study of Complementary Feeding and Children's Nutritional Status in Jambi City

Studi Pemberian MP-ASI dan Status Gizi Anak di Kota Jambi

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Abstract: *Providing adequate complementary feeding, quantitatively and qualitatively, supports children's nutritional status. This study aims to analyze complementary feeding and children's nutritional status in Jambi City. This type of research is quantitative with a cross-sectional study design conducted in 2023. The population used in this research was children aged 6-24 months in Jambi City with 116 respondents as sample taken using accidental sampling technique. Primary data collection was carried out through validated questionnaires, 1x24 hour food recall forms, food frequency questionnaires and anthropometrics assessment to measure the variables (complementary feeding and nutritional status). Data processing was carried out univariately and bivariate to see the correlation between complementary feeding and nutritional status which was tested using spearman correlation test. Nutritional status data shows that 6.9% of children are underweight and 13.8% of children are at risk of being overweight; as many as 24.1% of children were severely stunted and 15.5% were stunted; and as many as 53.4% of children experience problems of under- and over-nutrition. As many as 62% of children at the age of 6 months have the first food/drinks given consisting of: formula milk, rice porridge/tim rice/rice/mashed side dishes, and mashed fruit with mashed texture/thick porridge fed by parent or caregiver. The average nutrition intake obtained by children from complementary feeding is 889 kcal energy (90.2 %) and 34.3 g protein (201.1 %). There is no significant correlation between complementary feeding and nutritional status of children because this study has not followed the continuous complementary feeding. Complementary feeding for children needs controlling of daily nutrition intake by parents.*

Key word: Children, Complementary feeding, Nutritional status

1. INTRODUCTION

Children's nutritional status is an important indicator that determines growth achievement at a certain age. Optimal growth will determine child's development as well as their health and productivity in adulthood. Measuring child's nutritional status can be done using the anthropometric method, which are the results will be recorded in the Health Card (Kartu Menuju Sehat/KMS). Monitoring of children's weight must be done every month using KMS at the integrated health post (Pos Pelayanan Terpadu/Posyandu). In addition to weight, another indicator that is also very important for child's growth is height. The height measurement adjusted to the child's age is an indicator in determining stunting. Nutritional intake obtained from food consumption received from parents or caregiver are direct determinant of child's nutritional status (1).

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The 2022 Global Nutrition Report showed that there is a current global nutrition crisis, which is even higher than before Covid-19. The number of people affected by hunger has soared by 150 million people since the Covid-19 outbreak, from 618 million people in 2019 to 768 million people in 2021. At the same time, the food consumed is below the minimum standard for healthy and sustainable diet. As a result, as many as 20% of all children are now overweight or obese (2). Meanwhile, the results of the 2022 Indonesian Nutritional Status Survey (Survei Status Gizi Indonesia/SSGI) showed the following data on nutrition problems in toddlers: stunted 21.6%; wasted 7.7%; and underweight 17.1%. Jambi Province has a prevalence of stunted toddlers of 18.0%, in addition, overweight toddlers were also found at 3.4% (3). In 2022, Jambi City had a percentage of toddlers with severely underweight and underweight of 0.72% and 5.07%, as well as toddlers with severely wasted of 1.02% and wasted of 3.57% (the second highest in Jambi Province) (4).

In children aged six months to two years, providing adequate complementary feeding both quantitatively and qualitatively is very important because it supports the nutritional status of children. WHO recommends that complementary feeding be carried out through responsive feeding. This study aims to analyze the provision of complementary feeding and nutritional status of children in Jambi City. This study is expected to support the increase in the provision of children's complementary feeding in Jambi City.

2. METHODS

This research is a quantitative study with a cross-sectional approach. The complementary feeding and nutritional status research has been conducted in Jambi City which covers 11 sub-districts. From 11 sub-districts, randomization (sampling) has been carried out so selected respondents can represent data collection. Data collection has been conducted at the integrated health post (posyandu) monthly. The research has been carried out for eight months, starting from May to December 2023.

The population used in this study is children aged 6-24 months. Based on data from the Jambi Province Health Profile in 2021, there were 10,021 newborns in Jambi City in 2021, so it is assumed that this number can be used as a population. Based on the calculation, a sample of 116 childrens was obtained (an addition of 10% of the minimum sample size). The sampling technique in this study was determined by simple random sampling with the following steps: (a.) Determining the sub-districts and villages studied by drawing or lottery technique; (b.) After the drawing, the number of samples was calculated from each village using a proportional formula.

Primary Data Collection was obtained directly from respondents using a questionnaire. Secondary data was obtained from related stakeholder documents (Jambi City Health Office and Public Health Service/Puskesmas). Data collection includes: socio-economic characteristics, provision of complementary feeding, and nutritional status. The questionnaire used was an interview method and was equipped with a questionnaire filling guide. Data collection was carried out by trained enumerators to explore socio-economic characteristics and the provision of complementary feeding using 1x24-hour food recall form and a food frequency questionnaire. Children's nutritional status was measured directly using indicators weight/age, height/age, and weight/height. Nutrient

adequacy was categorized in high, normal, and deficit base on Indonesia Nutrition Adequacy Rate (AKG).

Data processing and analysis has been conducted using univariate and bivariate data with WHO Antro and IBM SPSS Statistics applications 30.0.0.0. Univariate data processing describes descriptive data from the research variables. Meanwhile, bivariate data processing with spearman correlation test was used to examine the correlation between the nutrition intake from complementary feeding and children's nutritional status.

3. RESULTS

The research data collection was conducted in Jelutung, Palmerah, Alam Barajo, Danau Sipin, and Telanaipura Districts which representing Jambi City. Based on table 1, as many as 64% of respondents were male and 57% of respondents were aged 12-24 months. The average age of the respondents' fathers and mothers was 34 years and 32 years. Most of the respondents' mothers had a final education from university (66%). Almost all respondents had birth weight ≥ 2500 g (97%) and birth length ≥ 48 cm (79%).

Table 1. Children's characteristics

Variables	Frequency	
	N	%
1. Gender		
• Male	74	64
• Female	42	36
2. Age		
• 6-8 months	20	17
• 9-11 months	30	26
• 12-24 months	66	57
3. Mother's education		
• Elementary and middle schools	40	34
• University	76	66
4. Birth weight		
• < 2500 g	4	3
• ≥ 2500 g	112	97
5. Birth length		
• < 48 cm	24	21
• ≥ 48 cm	92	79
Total	116	100

Children's Anthropometry has been measured based on body weight and length/height parameters consisting of 3 (three) index, including: weight by age (W/A z-scores), length/height by age (L/A or H/A z-scores), and weight by length/height (W/L or W/H z-scores). Figure 2 showed that as many as 6.9% of children are underweight and 13.8% of children are at risk of being overweight; as many as 24.1% of children were severely stunted and 15.5% were stunted; and as many as 53.4% of children experience problems of under- and over-nutrition. This measurement data is higher than the 2022 monthly report of nutritional performance indicator achievement which published by Jambi City Health Office. The report showed that there is 0.4% of severely wasted, 2.1% of wasted, and 1.2% of overweight in toddlers.

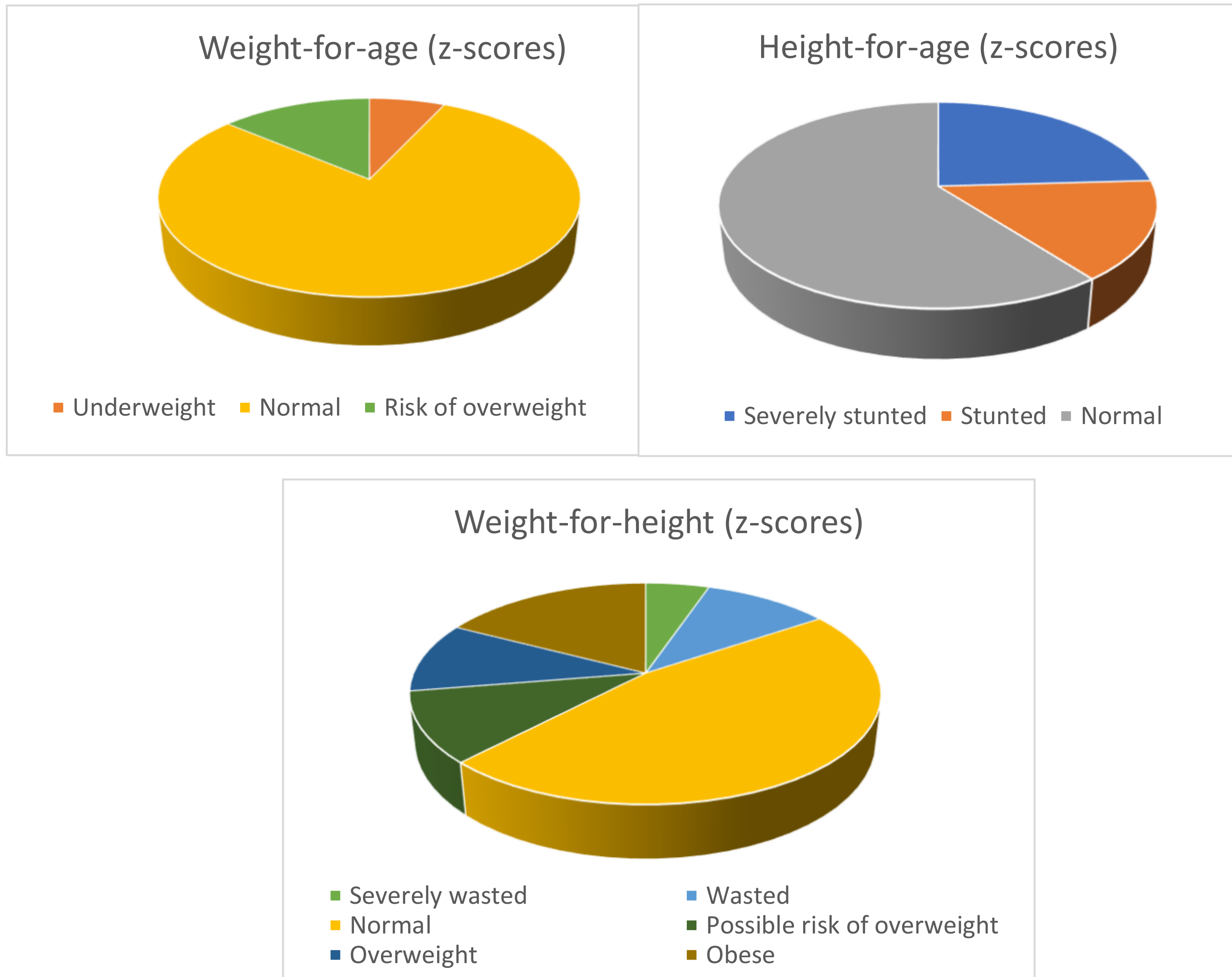

Figure 2. Children's nutritional status

World Health Organization (WHO) and Indonesia Ministry of Health recommend complementary feeding giving when children aged 6 months old. The research results shows that there are 38% of children who receive complementary feeding less than or more than the child's age of 6 months. The most common types of food/drinks consumed by children for the first time consist of formula milk (67%), rice porridge/tim rice/rice/mashed side dishes (55%), and mashed fruit (34%) with mashed texture/thick porridge (93%) fed by parent or caregiver. As many as 7% of parents or caregivers give complementary feeding to children in the food form of finger foods that are easy for children to hold for various purposes (Table 3).

Table 3. Children's early complementary feeding

Variables	Frequency	
	N	%
1. Providing complementary feeding at the age of 6 months		
• Yes	72	62
• No	44	38

Variables	Frequency	
	N	%
2. Food/drinks consumed by children for the first time (can choose more than 1)		
• Formula milk	78	67
• Non-formula milk	2	2
• Formula porridge	28	24
• Biscuit	32	28
• Flour porridge/strained porridge	34	29
• Rice water	2	2
• Mashed fruit	40	34
• Rice porridge/tim rice/rice/mashed side dishes	64	55
• Juice	22	19
• Others (mineral water)	6	5
3. Texture of first complementary feeding		
• Mashed texture/thick porridge	108	93
• Finger food	8	7
Total	116	100

Children aged 6-8 months are recommended to get complementary feeding with the texture of mashed food/thick porridge, for children aged 9-11 months is chopped food or finger food, meanwhile for children aged 12-24 months is family food. In reality, there are still children aged over 9 months who consume food with the texture of mashed/thick porridge and there are still children aged over 1 year who cannot consume family food with the texture normally consumed at home. Almost all respondents consumed complementary feeding as the main meal with complete food composition consisting of carbohydrate food, animal protein food, vegetable protein food and vegetables. As many as 43% of children receive complementary feeding by being fed by their parents or caregivers and taught to eat themselves (baby led weaning) (Table 4).

Table 4. Children's current complementary feeding

Variables	Frequency	
	N	%
1. Food textures		
• Mashed food/thick porridge	38	33
• Chopped food or finger food	24	21
• Family food	54	47
2. Composition of complementary feeding (can choose more than 1)		
• Carbohydrate food	108	93
• Animal protein food	106	91
• Vegetable protein food	94	81
• Vegetables	96	83
3. The process of giving complementary feeding		
• Fed by parents or caregivers	62	53
• Baby led weaning	4	3
• Combination	50	43
Total	116	100

Table 5 provides data that children's energy intake was deficit. In underweight and risk of overweight children, there are 75% of children have deficit energy adequacy level. However, it can be seen that normal and risk of overweight children have more energy intake than underweight children. In contrast to energy intake, protein intake data showed that almost three-quarters of children have high protein adequacy level (72.5%). Meanwhile, in underweight children (25.0%) the prevalence of deficit protein adequacy level is higher than other childrens.

Table 5.Correlation between nutrition intake from complementary feeding and children's nutritional status

Category	Nutritional status			Total	*P-value*
	Underweight	Normal	Risk of overweight		
	N (%)	N (%)	N (%)	N (%)	
1. Energy adequacy level					
• Deficit	6 (75.0 %)	50 (54.3%)	12 (75.0 %)	68 (58.6%)	0.089
• Normal	2 (25.0 %)	18 (19.6%)	0 (0%)	20 (17.2%)	
• High	0 (0%)	24 (26.1%)	4 (25.0%)	28 (24.2%)	
Total	8 (100.0%)	92 (100.0%)	16 (100.0%)	116 (100.0%)	
2. Protein adequacy level					
• Deficit	2 (25.0%)	14 (15.4%)	4 (23.5%)	20 (17.2%)	0.057
• Normal	0 (0%)	9 (9.9%)	3 (17.6%)	12 (10.3%)	
• High	6 (75.0%)	68 (74.7%)	10 (58.9%)	84 (72.5%)	
Total	8 (100.0%)	91 (100.0%)	17 (100.0%)	116 (100.0%)	

4. DISCUSSION

The nutritional status of children in this study was measured using weight by age (W/A z-scores), length/height by age (L/A or H/A z-scores), and weight by length/height (W/L or W/H z-scores). The weight by age index is used to assess children with underweight or very underweight, but cannot be used to classify children as obese or very obese. It is important to note that child with low W/A z-scores is likely to have growth problems. The length/height by age index describes the growth of child's length or height based on their age. This index can identify children who are severely stunted or stunted, which is caused by long-term malnutrition or frequent illness. The weight by length/height index describes whether the child's weight is appropriate for their growth in length/height. This index can be used to identify children who are wasted, severely wasted, and children who are at risk of overweight.

This study found several nutrition problems, namely: underweight and risk of being overweight (W/A index); severely stunted and stunted (L/A or H/A index); and severely wasted, wasted, possible risk of overweight, overweight, and obese. Measurement of nutritional status in toddlers's Jambi City in this study had slightly higher results compared to the 2022 Jambi Province Health Profile and the 2022 Indonesian Nutritional Status Survey. This is thought be caused by the sampling used in this study was not sufficiently representative of Jambi City's child population and the low accuracy

of nutritional status measurement tools at the integrated health service post (posyandu).

The 2022 Indonesian Nutritional Status Survey (SSGI) showed that nutritional problems in Indonesia have several determinants, one of which is the lack of diverse food for toddlers (3). The lack of diverse food for toddlers is closely related to low availability, distribution, and consumption of food, specifically local food. Local foods contribute for meeting nutrition intake for children. Data on infant and child feeding practices from the 2018 Jambi Province primary health research showed that the number of toddlers who consumed complementary feeding in diverse food group had not reached 50%. In the age groups of 6-11 months and 12-23 months, only 24.63% and 48.13% of toddlers consumed variety of complementary feeding. The recommendation of complementary feeding diversity consists of seven food groups, namely: cereals and root, nuts, milk and its products, meats, eggs, vegetables and fruits as sources of vitamins. The definition of diverse complementary feeding is if it consists of four or more food groups from the seven food groups (5).

Complementary feeding given too early at < 6 months of age will replace breast milk intake, food contains low nutrients if given in liquid form, increases the risk of illness, and increases the risk of maternal pregnancy due to insufficient breastfeeding. Meanwhile, Giving MP-ASI at age > 6 months will impact on unmet children's nutritional needs, slower growth and development, and the risk of nutrients deficiencies such as anemia due to iron deficiency (6). Study in 2023 found that there is a relationship between the age of complementary feeding and the incidence of stunting (7).

The results of this study found that as many as third of childrens were still given complementary foods unappropriately for their age. This is in line with research conducted in Bandar Lampung City. As many as 60.9% child have poor complementary feeding giving behavior. There is a significant positive relationship between maternal behavior regarding giving complementary feeding and child's nutritional status (8).

Other research conducted about the quality, quantitity, and age of giving complementary food for toddlers shows the quality, quantity and age at which children start MP-ASI have an effect on children's nutritional status. The quantity of complementary feeding is associated with child's nutritional status in Puskesmas Tirta Pekalongan (9). More than half of respondents in this research consumed formula milk when they received breast milk for the first time. This proves that exclusive breastfeeding coverage is still low. This is in accordance with Perdana and Ekasari's research who found that exclusive breastfeeding coverage had not reached the target, even though it was related to the incidence of stunting (10). Rice porridge/tim rice/rice/mashed side dishes and mashed fruit are also usually given to children when they first get complementary feeding because of the ease of processing and preparing the food. However, in this study, the type of food provided was not examined, whether it was homemade or packaged food.

Indonesia Ministry of Health recommended complementary feeding for children aged 6-8 months is mashed food/thick porridge, for children aged 9-11 months is chopped food or finger food, meanwhile for children aged 12-24 months is family food. Nowadays, parents or caregivers give finger foods as complementary feeding for children that are easy to hold for various purposes. Based on research of finger foods in toddlers, finger foods consumption was found to be mainly affected by texture, hand motor skills, age, and experience (11). Study about toddlers's food consumption in

Bungo, Jambi Province state as many as 63.5% of respondents have received complementary feeding ≥ three times a day (12).

This research found that in underweight and risk of overweight children, there are three-quarter of children have deficit energy adequacy level. In contrast to energy intake, protein intake data showed that almost three-quarters of children have high protein adequacy level. It can be understood that children's protein intake is obtained from breast milk and formula milk. Children under two years old have unstable food consumption due to various reasons. Low consumption of main foods in children causes low energy intake. The results of this study show that carbohydrate foods as the main contributor of energy are consumed by 93% of children, but in amounts that do not meet Indonesian balanced nutrition guidelines.

Data Normality test using Kolmogorov-Smirnov Test showed p-value data 0.011 (<0.05), therefore the correlation test in this study uses spearman correlation test. There is no significant correlation between complementary feeding and nutritional status of children (p-value>0.05). This research only correlates the correlation between complementary feeding (level of energy and protein adequacy) quantitatively with children's nutritional status. In future research, it could be considered to examine the variables of providing complementary feeding qualitatively, for example age, frequency, quantity and texture of MP-ASI. Research at the Juanda Community Health Center shows the same thing. There is no significant relationship between knowledge, attitudes, and family practices in early complementary feeding with the incidence of stunting (13). As well as there is no significant relationship between intake of animal and vegetable protein and the incidence of stunting because it's influenced by several factors, such as internal factors (age, physical condition and disease infection) and external factors (income, education, employment, culture, others food consumption) on Perdana's et al research (14).

The results of the correlation test show different things from those carried out by other studies. Others study found that there was significant association between frequency of complementary feeding and amount of complementary foods given with stunting incidence. Meanwhile, other parameters namely age of introduction of complementary food and texture of complementary foods given did not have a significant association with stunting incidence (15). Overall feeding practices are related to the incidence of stunting. Adequate feeding and responsive feeding are related to stunting (16).

5. CONCLUSION

In children aged six months to two years, providing adequate complementary foods both quantitatively and qualitatively is very important because it supports good nutritional status in children. The results of the study showed that the average nutrition intake obtained by children from complementary feeding is 889 kcal energy (90.2%) and 34.3 g protein (201.1%). There is no significant correlation between complementary feeding and nutritional status of children because this study has not followed the continuous complementary feeding. Complementary feeding for children needs controlling of daily nutrition intake by parents.

CONFLICT OF INTEREST

The authors declare that there were no conflicts of interest in this study.

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