Complementary feeding practices and nutritional status of children 6-23 months old: formative study in Aceh, Indonesia

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BACKGROUND/OBJECTIVES: The 6-23 months for infants is the longest period in the “first 1,000 days” of life. This period is very important for child development, so complementary feeding (CF) practices should be optimized to maximize children’s potential for growth and development. The aim of this study was to analyze the CF practices and nutritional status of children aged 6-23 months.

SUBJECTS/METHODS: For this cross-sectional study, 392 children aged 6-23 months were selected using stratified random sampling. Socio-demographic data were collected through interviews. CF practices, collected by interviews and repeated 24-hour food recall method, were the timely introduction of CF, minimum meal frequency, dietary diversity and minimum acceptable diet, consumption food rich in proteins and vitamin A. Nutritional status was assessed using the indicators of underweight, wasting and stunting. To analyze the association between socio-demographic indicators and CF with nutritional status, the chi-square test with a confidence interval of 95% was used.

RESULTS: Results showed that 39% were exclusively breastfed, only 61% received prolonged breastfeeding and 50% received timely introduction of CF. Minimum meal frequency was met by 74% of subjects, but dietary diversity and minimum acceptable diet were only realized in 50% and 40% of the children, respectively. Age of the child, birth order, birth weight, parents’ education level, family size and incidence of fever and diarrhea during the previous two weeks were associated with underweight, while child’s birth order, fathers’ education level, mother’s age, family size, completion of the age-appropriate vaccination and fish consumption frequency were associated with wasting. Age of the child, incidence of fever and acute respiratory infection, and fortified food consumption were associated with stunting.

CONCLUSIONS: Suboptimal CF practices and high prevalence of underweight, wasting and stunting were found among children aged 6-23 months old in Aceh. These results highlight the need to improve CF and nutritional status.

INTRODUCTION

The age of 6-23 months old is the longest period in the “first 1,000 days” of life. This period is called the window of opportunity and is the important stage to optimize child growth and development in order to prevent malnutrition, including wasting, underweight and stunting, as well as the negative consequences in adulthood [1].

The prevalence of stunting and underweight remain high in developing countries. In Indonesia, the prevalence of underweight increased from 17.9% (2010) to 19.65% (2013) and stunting from 35.6% to 37.2%, respectively. Aceh province has the 7th highest prevalence of underweight and stunting in Indonesia, with underweight increasing from 23.7% to 26.3% and stunting from 38.9% to 41.5% [2,3]. The high number of malnourished children aged 6-23 months is strongly related to improper feeding practice since from age 6 months breast milk is no longer able to completely meet energy and nutrient requirements so that the nutrition gap must be fulfilled by complementary feeding (CF) [4].

Improper feeding practices remain a common problem in developing countries. WHO found that only less than one-fourth of children aged 6-23 months met the minimum acceptable diet (MAD), dietary diversity and meal frequency standards in these countries [5]. Feeding practices might affect the nutritional status of the children; about 32% of children under five were stunted and 10% were wasted due to poor breastfeeding and CF [6].

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Inadequate feeding is caused primarily by poor macro- and micronutrient quality due to poor diversity, as well as energy and nutrient density; second by improper frequency, consistency, and quantity of food; and third by the poor safety of food and water, including contamination, poor hygiene practice, unsafe food storage and preparation [7]. These conditions cause inadequate energy and nutrient intake among children.

The poor quality of CF is also seen in its energy and nutrient content. The Total Diet Study Indonesia Year 2014 showed that the proportions of children under-five in Aceh with energy and protein intake lower than the recommended dietary allowance were still high, namely 60.4% and 24.7%, respectively [8].

Aceh was one of the provinces with the most severe health and nutrition problem in Indonesia, due to a severe conflict for 30 years. However, after the 2004 tsunami, many rehabilitation and reconstruction activities were conducted via health and nutrition aid from many countries and international NGOs. One of the NGO-conducted programs in nutritional improvement was building the capacity of the community, particularly the community health workers, in educating the importance of proper feeding practice for children. Breastfeeding and CF counseling training for the cadres and counseling for the mothers/caregivers of children aged 6-23 months were conducted. Nevertheless, no study has yet examined the impact of the program and intervention on improved feeding practices.

One of the NGO-conducted programs in nutritional improvement and nutrition aid from many countries and international NGOs. This cross-sectional study was conducted in May-June 2016 in 3 sub-districts in Aceh Besar District, and data were collected for 392 children aged 6-23 months. The sample was chosen using cluster random sampling technique with the following inclusion criteria: 1) child aged 6-23 months, 2) the mother agreed to be interviewed, and 3) the child was apparently healthy, not experiencing chronic/congenital diseases, such as heart abnormality, and not having experienced acute conditions such as fever, diarrhea and respiratory infections in the previous 2 weeks. The minimum sample size was calculated using the formula for the survey by Lwanga and Lemeshow [9,10].

The study was conducted according to the Helsinki declaration and all procedures involving human subjects were approved by the University of Indonesia (UI)’s Ethics Committee of the Faculty of Medicine: 452 / UN.2.F1 / ETIK / 2016. At least one of the parents of all the infants participating in this study provided written informed consent prior to enrolment in the study.

Measurement of variables

Data on child characteristics and family socio-demography included the age of the child, sex, birth weight, birth order, family size, education of the parents, occupation of the parents and family income. The data were collected through interview. Body weight and length measurement were conducted to determine the nutritional status of the child, body weight was measured using a portable Tanita digital scale (Tanita Corporation of America, Arlington Heights, Illinois, USA) with a precision of 0.1 kg, and the recumbent length was measured using an infant length board with a precision of 0.1 cm. In terms of nutritional status, underweight was defined as a weight for age z-score less than 2 standard deviation (SD) below the mean, wasting as weight for length z-score less than 2 SD below the mean and stunting as length for age less than -2. This analysis was conducted using WHO Anthro 2005 v.2.0.4 software (Nutrition department of WHO, Geneva, Switzerland) [11].

CF practices adopted the following recommendation of WHO and Pan American Health Organization/WHO/UNICEF for infant and young child feeding (IYCF) [4,12]. 1) Early breastfeeding initiation (EBI), the child was breastfed until 1 hour after birth. 2) Exclusive breastfeeding (EBF), the child was given only breastmilk until the age of 6 months. 3) Prolonged breastfeeding (PBF), the child was still breastfed. 4) A timely introduction to CF, the child was given solid, semi-solid and liquid food at the age of 6 months. 5) Minimum dietary diversity (MDD), the child aged 6-23 months received CF with ≥ 4 out of 7 food groups. 6) Minimum meal frequency (MMF), the child aged 6-23 months received a meal with standard frequency taking account the breastfeeding status. 7) MAD, the child aged 9-23 months received a meal meet standard for dietary diversity and frequency [4,13]. 8) Iron-rich or iron-fortified and vitamin A-rich green leafy and orange vegetables consumption. The data on EBI, EBF and PBF were collected through interview using structured questionnaire. MDD was calculated as the mean of 3 repeated 24-hour recall results. The dietary diversity was categorized as good when the child consumed 4 out of the following 7 food groups: cereals and tubers, legumes, dairy products (milk, yoghurt, cheese), flesh food (meat, fish, poultry, organ meat), eggs, vitamin A-rich fruits and vegetables, and other fruits and vegetables [4,13]. MMF was calculated through an interview on the frequency of meals and snacks. The recommended standard was only breastfeeding for infants, meal 2 times/day or more for children aged 6-8 months, meal 3 times/day or more for children aged 9-23 months, and meal 4 times/day or more for non-breastfed children [4,13]. To ensure the internal validity of the questionnaire, an expert nutritionist performed content and language checking of questionnaire and field trials were carried out.

Data management and analyzed

Data were processed through editing, coding, entry and analysis using SPSS version 21 (International business machines corporation, Armonk, New York, USA). Bivariate analysis was conducted to analyze the association of child characteristic and family socio-demography as well as CF practice with nutritional status. Chi-square test with a confidence level of 95% was conducted to analyze the association of socio-demography and CF practice with underweight, wasting and stunting.

RESULTS

Child characteristic and family socio-demography

The families’ socio-demography data and the health status
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Table 1. Socio-demographic characteristics and health outcomes of subjects

| Socio-demographic and characteristics | n   | %    |
|--------------------------------------|-----|------|
| Sex of the child                     |     |      |
| Female                               | 190 | 48.5 |
| Male                                 | 202 | 51.5 |
| Age of the child                     |     |      |
| 6-11 months                          | 149 | 38.0 |
| 12-23 months                         | 243 | 62.0 |
| Birth order of the child             |     |      |
| 1 to 2                               | 229 | 58.4 |
| 3 to 4                               | 135 | 34.4 |
| ≥ 5                                  | 28  | 7.1  |
| Birth weight status                  |     |      |
| Low birth weight                     | 53  | 13.5 |
| Normal                               | 339 | 86.5 |
| Age of the father (yr)               |     |      |
| < 25                                 | 11  | 2.8  |
| 25-35                                | 188 | 48.0 |
| ≥ 36                                 | 193 | 49.2 |
| Employment status of the father      |     |      |
| Government employee                 | 58  | 14.8 |
| Entrepreneur and seller              | 176 | 44.9 |
| Farmer/fisherman                     | 48  | 12.2 |
| Labor/driver/service                 | 110 | 28.1 |
| Education level of the father        |     |      |
| ≤ Elementary school                 | 44  | 11.2 |
| Junior high school                   | 80  | 20.4 |
| Senior high school                   | 218 | 55.6 |
| University                           | 50  | 12.8 |
| Age of the mother (yr)               |     |      |
| < 25                                 | 75  | 19.1 |
| 25-35                                | 234 | 59.7 |
| ≥ 36                                 | 83  | 21.2 |
| Employment status of the mother      |     |      |
| Housewife                            | 361 | 92.1 |
| Working                              | 31  | 7.9  |

Table 1. continued

| Socio-demographic and characteristics | n   | %    |
|--------------------------------------|-----|------|
| Education level of the mother        |     |      |
| ≤ Elementary school                 | 37  | 9.4  |
| Junior high school                   | 87  | 22.2 |
| Senior high school                   | 191 | 48.7 |
| University                           | 77  | 19.6 |
| Family size (person)                |     |      |
| 3-4                                  | 214 | 54.6 |
| 5-6                                  | 149 | 38.0 |
| 7 and above                          | 29  | 7.4  |
| Family income (IDR/month)            |     |      |
| < 1.9 million                        | 169 | 43.1 |
| 1.9-3.5 million                      | 187 | 47.7 |
| > 3.5 million                        | 36  | 9.2  |
| Fever in the last 2 weeks            |     |      |
| Yes                                  | 138 | 35.2 |
| No                                   | 254 | 64.8 |
| Acute respiratory infection in the last 2 weeks |     |      |
| Yes                                  | 88  | 22.4 |
| No                                   | 304 | 77.6 |
| Diarrhea in the last 2 weeks         |     |      |
| Yes                                  | 44  | 11.2 |
| No                                   | 384 | 88.8 |
| Completion of age appropriate vaccination |   |      |
| Complete                             | 200 | 51.0 |
| Incomplete                           | 123 | 31.4 |
| Not at all                           | 69  | 17.6 |

IDR: Indonesian Rupiah

1 Low birth weight = < 2,500 g and normal = ≥ 2,500 g

2 Classification by Aceh province minimum regional wage 2017

of the study subjects are listed in Table 1. It shows that about half (51.5%) of the children were boys and almost two thirds (62%) of them were aged 12-23 months and only 13.5% of them had low birth weight (LBW). More than half (51.0%) of the children completed the age-appropriate vaccination, and some

Fig. 1. Complementary feeding practice by indicators among children 6-23 months old
Table 3. Bivariate analysis of nutritional status by complementary feeding and socio-demographic indicators

| Complementary feeding and socio-demographic indicator | Wasting n (%) | P | Underweight n (%) | P | Stunting n (%) | P |
|-------------------------------------------------------|--------------|---|------------------|---|---------------|---|
| Sex of the child                                       |              |   |                  |   |               |   |
| Female                                                | 45 (22.3)    | 0.933 | 57 (28.2)       | 0.368 | 63 (31.2)     | 0.124 |
| Male                                                  | 43 (22.6)    |       | 46 (24.2)       |       | 46 (24.2)     |       |
| Age of the child                                       |              |   |                  |   |               |   |
| 6-11 months                                           | 35 (23.5)    | 0.699 | 28 (18.8)       | 0.009** | 19 (12.8)     | <0.001** |
| 12-23 months                                          | 53 (28.1)    |       | 75 (30.9)       |       | 90 (37.0)     |       |
| Birth order of the child                              |              |   |                  |   |               |   |
| 1 to 2                                                | 38 (16.6)    | 0.003** | 52 (22.7)       | 0.027* | 60 (26.2)     | 0.569 |
| 3 to 4                                                | 39 (28.9)    |       | 38 (28.1)       |       | 42 (31.1)     |       |
| ≥ 5                                                   | 11 (39.3)    |       | 13 (46.4)       |       | 7 (25.0)      |       |
| Birth weight status                                   |              |   |                  |   |               |   |
| Low birth weight                                      | 14 (26.4)    | 0.458 | 23 (43.4)       | 0.003** | 17 (32.1)     | 0.456 |
| Normal                                                | 74 (21.8)    |       | 80 (23.6)       |       | 92 (27.1)     |       |
| Age of the father (yr)                                |              |   |                  |   |               |   |
| < 25                                                  | 1 (9.1)      | 0.141 | 0 (0.0)         | 0.291 | 3 (27.3)      | 0.997 |
| 25-35                                                 | 36 (19.1)    |       | 44 (23.4)       |       | 52 (27.7)     |       |
| ≥ 36                                                  | 51 (26.4)    |       | 59 (30.6)       |       | 54 (28.0)     |       |
| Employment status of the father                       |              |   |                  |   |               |   |
| Government employee                                   | 8 (13.8)     | 0.184 | 12 (20.7)       | 0.572 | 16 (27.6)     | 0.842 |
| Entrepreneur and seller                               | 37 (21.0)    |       | 47 (26.7)       |       | 49 (27.8)     |       |
| Farmer/fisherman                                      | 12 (25.0)    |       | 11 (22.9)       |       | 11 (22.9)     |       |
| Labor/driver/service                                  | 31 (28.2)    |       | 33 (30.0)       |       | 33 (30.0)     |       |
| Education level of the father                         |              |   |                  |   |               |   |
| ≤ Elementary school                                   | 14 (31.8)    | 0.016* | 16 (36.4)       | 0.040* | 11 (25.0)     | 0.523 |
| Junior high school                                    | 26 (32.5)    |       | 28 (35.0)       |       | 20 (25.0)     |       |
| Senior high school                                    | 37 (17.0)    |       | 50 (22.9)       |       | 67 (30.7)     |       |
| University                                            | 11 (22.0)    |       | 9 (18.0)        |       | 11 (22.0)     |       |
| Age of the mother (yr)                                |              |   |                  |   |               |   |
| < 25                                                  | 10 (13.3)    | 0.002** | 60 (25.6)       | 0.142 | 22 (29.3)     | 0.776 |
| 25-35                                                 | 48 (20.5)    |       | 15 (20.0)       |       | 62 (26.5)     |       |
| ≥ 36                                                  | 30 (36.1)    |       | 28 (33.7)       |       | 25 (30.1)     |       |
| Employment status of the mother                       |              |   |                  |   |               |   |
| Housewife                                             | 80 (22.2)    | 0.641 | 98 (27.1)       | 0.188 | 105 (39.1)    | 0.063 |
| Working                                               | 8 (25.8)     |       | 5 (16.1)        |       | 4 (12.9)      |       |
| Education level of the mother                         |              |   |                  |   |               |   |
| ≤ Elementary school                                   | 13 (35.1)    | 0.094 | 13 (35.1)       | 0.047* | 11 (29.7)     | 0.447 |
| Junior high school                                    | 13 (27.6)    |       | 31 (35.6)       |       | 29 (33.3)     |       |
| Senior high school                                    | 36 (18.8)    |       | 42 (22.0)       |       | 52 (27.2)     |       |
| University                                            | 15 (19.5)    |       | 17 (22.1)       |       | 17 (22.1)     |       |

SD: standard deviation
### Table 3. Complementary feeding practices among children

| Family size (person) | Wasting n (%) | p   | Underweight n (%) | p   | Stunting n (%) | p   |
|----------------------|---------------|-----|--------------------|-----|----------------|-----|
| 3-4                  | 36 (16.8)     | 0.012* | 49 (22.9)          | 0.018* | 59 (27.6)      | 0.991 |
| 5-6                  | 42 (28.2)     |       | 40 (26.8)          |       | 42 (28.2)      |       |
| 7 and above          | 10 (34.5)     |       | 14 (48.3)          |       | 8 (27.6)       |       |

| Family income (IDR/month) | Wasting n (%) | p   | Underweight n (%) | p   | Stunting n (%) | p   |
|---------------------------|---------------|-----|--------------------|-----|----------------|-----|
| < 1.9 million             | 44 (26.0)     | 0.311 | 46 (27.2)          | 0.885 | 49 (29.0)      | 0.867 |
| 1.9-3.5 million           | 36 (19.3)     |       | 47 (25.1)          |       | 51 (27.3)      |       |
| > 3.5 million             | 8 (22.2)      |       | 10 (27.8)          |       | 9 (25.0)       |       |

| Fever in the last 2 weeks | Wasting n (%) | p   | Underweight n (%) | p   | Stunting n (%) | p   |
|----------------------------|---------------|-----|--------------------|-----|----------------|-----|
| Yes                        | 58 (22.8)     | 0.804 | 49 (35.5)          | 0.002** | 54 (39.1)      | < 0.001** |
| No                         | 30 (21.7)     |       | 54 (21.3)          |       | 55 (21.7)      |       |

| Acute respiratory infection in the last 2 weeks | Wasting n (%) | p   | Underweight n (%) | p   | Stunting n (%) | p   |
|------------------------------------------------|---------------|-----|--------------------|-----|----------------|-----|
| Yes                                            | 68 (22.4)     | 0.934 | 28 (31.8)          | 0.181 | 37 (42.0)      | 0.001** |
| No                                             | 20 (22.7)     |       | 75 (24.7)          |       | 72 (23.7)      |       |

| Diarrhea in the last 2 weeks                     | Wasting n (%) | p   | Underweight n (%) | p   | Stunting n (%) | p   |
|------------------------------------------------|---------------|-----|--------------------|-----|----------------|-----|
| Yes                                            | 74 (21.3)     | 0.579 | 19 (43.2)          | 0.008** | 16 (36.4)      | 0.181 |
| No                                             | 14 (31.8)     |       | 84 (24.1)          |       | 93 (26.7)      |       |

| Completion of age-appropriate vaccination        | Wasting n (%) | p   | Underweight n (%) | p   | Stunting n (%) | p   |
|------------------------------------------------|---------------|-----|--------------------|-----|----------------|-----|
| Complete                                      | 34 (17.0)     | 0.032* | 44 (22.0)          | 0.123 | 60 (30.0)      | 0.608 |
| Incomplete                                    | 35 (28.5)     |       | 36 (29.3)          |       | 31 (25.2)      |       |
| Not at all                                    | 19 (27.5)     |       | 23 (33.3)          |       | 18 (26.1)      |       |

| Early initiation breastfeeding                 | Wasting n (%) | p   | Underweight n (%) | p   | Stunting n (%) | p   |
|------------------------------------------------|---------------|-----|--------------------|-----|----------------|-----|
| Yes                                           | 44 (24.6)     | 0.354 | 47 (26.3)          | 0.994 | 47 (26.3)      | 0.530 |
| No                                            | 44 (20.7)     |       | 56 (26.3)          |       | 62 (29.1)      |       |

| Exclusive breastfeeding                        | Wasting n (%) | p   | Underweight n (%) | p   | Stunting n (%) | p   |
|------------------------------------------------|---------------|-----|--------------------|-----|----------------|-----|
| Yes                                           | 35 (22.9)     | 0.871 | 61 (25.5)          | 0.672 | 67 (28.0)      | 0.900 |
| No                                            | 53 (22.2)     |       | 42 (27.5)          |       | 42 (27.5)      |       |

| Prolonged breastfeeding                        | Wasting n (%) | p   | Underweight n (%) | p   | Stunting n (%) | p   |
|------------------------------------------------|---------------|-----|--------------------|-----|----------------|-----|
| Yes                                           | 66 (24.4)     | 0.160 | 73 (27.0)          | 0.610 | 75 (27.8)      | 0.985 |
| No                                            | 22 (18.0)     |       | 30 (24.6)          |       | 34 (27.9)      |       |

| Timely introduction to complementary feeding   | Wasting n (%) | p   | Underweight n (%) | p   | Stunting n (%) | p   |
|------------------------------------------------|---------------|-----|--------------------|-----|----------------|-----|
| < 6 months                                    | 42 (21.5)     | 0.667 | 50 (25.6)          | 0.776 | 55 (27.9)      | 0.960 |
| Start at 6 months                             | 46 (23.4)     |       | 53 (26.9)          |       | 54 (27.7)      |       |

| Minimum meal frequency                        | Wasting n (%) | p   | Underweight n (%) | p   | Stunting n (%) | p   |
|------------------------------------------------|---------------|-----|--------------------|-----|----------------|-----|
| Met                                           | 69 (23.6)     | 0.339 | 74 (25.3)          | 0.474 | 78 (26.7)      | 0.409 |
| Not met                                       | 19 (19.0)     |       | 29 (29.0)          |       | 31 (31.0)      |       |

| Minimum dietary diversity                     | Wasting n (%) | p   | Underweight n (%) | p   | Stunting n (%) | p   |
|------------------------------------------------|---------------|-----|--------------------|-----|----------------|-----|
| Met                                           | 46 (23.4)     | 0.667 | 53 (27.2)          | 0.686 | 55 (28.8)      | 0.816 |
| Not met                                       | 42 (21.5)     |       | 50 (25.4)          |       | 54 (27.4)      |       |

| Minimum acceptable diet                       | Wasting n (%) | p   | Underweight n (%) | p   | Stunting n (%) | p   |
|------------------------------------------------|---------------|-----|--------------------|-----|----------------|-----|
| Good                                          | 32 (20.5)     | 0.455 | 39 (25.0)          | 0.641 | 42 (26.9)      | 0.751 |
| Poor                                          | 56 (23.7)     |       | 64 (27.1)          |       | 67 (28.4)      |       |

| Iron or multivitamin supplement intake in the last 3 months | Wasting n (%) | p   | Underweight n (%) | p   | Stunting n (%) | p   |
|-----------------------------------------------------------|---------------|-----|--------------------|-----|----------------|-----|
| Yes                                                       | 21 (21.0)     | 0.687 | 24 (24.0)          | 0.549 | 35 (35.0)      | 0.063 |
| No                                                        | 67 (22.9)     |       | 79 (27.1)          |       | 74 (25.3)      |       |

| Fortified food consumption in the last 3 months           | Wasting n (%) | p   | Underweight n (%) | p   | Stunting n (%) | p   |
|-----------------------------------------------------------|---------------|-----|--------------------|-----|----------------|-----|
| Yes                                                       | 13 (17.6)     | 0.264 | 20 (27.0)          | 0.870 | 29 (39.2)      | 0.015* |
| No                                                        | 75 (23.6)     |       | 83 (26.1)          |       | 80 (25.2)      |       |

| Meat consumption (time/week)                             | Wasting n (%) | p   | Underweight n (%) | p   | Stunting n (%) | p   |
|-----------------------------------------------------------|---------------|-----|--------------------|-----|----------------|-----|
| ≥ 3                                                       | 9 (26.5)      | 0.772 | 14 (41.2)          | 0.128 | 11 (32.4)      | 0.720 |
| 1-2                                                       | 18 (20.5)     |       | 22 (25.0)          |       | 26 (29.5)      |       |
| Never                                                     | 61 (22.6)     |       | 67 (24.8)          |       | 72 (26.7)      |       |
of the children had been reported ill in the previous 2 weeks preceding the study (32.5% experienced fever, 22.4% ARI and 11.2% diarrhea). Based on family socio-demography, almost half (49.2%) of the fathers were aged ≥ 36 years and worked as entrepreneurs (44.9%), and more than half (55.6%) had graduated from senior high school. More than half (59.7%) of the mothers were aged 25-35 years, the majority were housewives and had graduated from senior high school (48.7%). The family size of the children was mostly 3-4 people with income between Indonesian Rupiah (IDR) 1.9 million and IDR 3.5 million per month.

**CF practices of children aged 6-23 months**

The CF practices of the children aged 6-23 months are shown in Fig. 1. It shows that the majority of the children was inappropriate CF, almost half of the children received a timely introduction to CF and met the MDD (49.7%), and more than one third (39.8%) fulfilled the MAD. Almost three out of four (74.4%) children met the recommended MMF. The result of the study also shows that less than 25% of the children received iron or multivitamin syrup supplementation and fortified food, consumed meat ≥ 3 times/week, nuts and dairy products ≥ 3 times/weeks. More than a quarter consumed eggs ≥ 4 times/week, vegetables ≥ 4 times/weeks and fruits ≥ 3 times/weeks. More than half of the children consuming fish ≥ 4 times/week.

**Nutritional status of 6-23 months old children**

The study shows that the average weight-for-age, weight-for-height and height-for-age z-scores were -1.22 ± 2.36, -1.12 ± 1.95 and -0.84 ± 3.19, respectively. While about one-fourth of the children were underweight (26.3%), wasting (22.5%) and stunting (27.8%). The prevalence of underweight and stunting were higher among boys at the age of 12-23 months while wasting was higher among girls at the age of 6-11 months, as listed in Table 2.

**Association of social-demography and CF practices with underweight, wasting and stunting.**

The analysis results (Table 3) showed that birth order (P = 0.003), father and mother’s education level (P = 0.016 and P = 0.002), family size (P = 0.012), completion of the age-appropriate vaccination (P = 0.032) and fish consumption frequency (P = 0.012) were associated with wasting. The age of the child (P = 0.009), birth order (P = 0.027), birth weight (P = 0.003), father and mother’s education level (P = 0.040 and P = 0.047), family size (P = 0.018) and incidence of fever and diarrhea during the previous two weeks (P = 0.002 and P = 0.008) were associated with underweight. The factors associated with stunting were the age of the child (P < 0.001), the incidence of fever and ARI during the previous two weeks (P < 0.001 and P = 0.001) and fortified food consumption during three months ago (P = 0.015).

**DISCUSSION**

Referring to the indicators of CF practices set by IYCF for children aged 6-23 months recommended by WHO [6], all the indicators of CF practices in this study were sub-optimal. The study results (Fig. 1) showed that among eight main indicators of CF practices, only food consumption was close to the

| Table 3. continued |
|-------------------|
| Complementary feeding and socio-demographic indicator | Wasting n (%) | p | Underweight n (%) | p | Stunting n (%) | p |
|-------------------|
| Eggs consumption (time/week) | | | | | | |
| ≥ 4 | 34 (23.9) | 0.805 | 44 (31.0) | 0.276 | 43 (30.3) | 0.711 |
| 1-3 | 33 (22.4) | | 34 (23.1) | | 39 (26.5) | |
| Never | 21 (20.4) | | 25 (24.3) | | 27 (26.2) | |
| Fish consumption (time/week) | | | | | | |
| ≥ 4 | 39 (18.6) | 0.012* | 54 (25.7) | 0.499 | 63 (30.0) | 0.575 |
| 1-3 | 26 (35.6) | | 23 (31.5) | | 18 (24.7) | |
| Never | 23 (21.1) | | 26 (23.9) | | 28 (25.7) | |
| Legumes consumption (time/week) | | | | | | |
| ≥ 3 | 15 (25.9) | 0.542 | 21 (36.2) | 0.174 | 19 (32.8) | 0.618 |
| 1-2 | 37 (24.0) | | 39 (25.3) | | 43 (27.9) | |
| Never | 36 (20.0) | | 43 (23.9) | | 47 (26.1) | |
| Green leafy and orange vegetables consumption (time/week) | | | | | | |
| ≥ 4 | 31 (20.5) | 0.542 | 39 (25.8) | 0.969 | 44 (29.1) | 0.491 |
| 1-2 | 31 (25.2) | | 32 (26.0) | | 37 (30.1) | |
| Never | 26 (22.0) | | 32 (27.1) | | 28 (23.7) | |
| Fruits consumption (time/week) | | | | | | |
| ≥ 3 | 28 (19.9) | 0.356 | 37 (26.2) | 0.995 | 43 (30.5) | 0.623 |
| 1-2 | 42 (26.1) | | 42 (26.1) | | 41 (25.5) | |
| Never | 18 (20.0) | | 24 (26.7) | | 25 (27.8) | |

IDR: Indonesian Rupiah
* P < 0.05, ** P < 0.01
1 Bivariate analysis with chi-square test

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standard. The other indicators, namely timely introduction to CF, EBF, MDD, MAD, and consumption of iron and vitamin A-rich food, were still low. This result was similar with a study conducted by Blaney et al. [14] in Indonesia finding that CF practices for children aged above 6 months were sub-optimal, particularly on the indicator of MDD, iron-rich food consumption and hygiene practice.

The proportions of children receiving EBI and EBF were still very low at 45.7% and 39.0%, respectively. This was in line with the data on EBF in Aceh in the last decade, which was lower than the national average. Sharp reductions were seen in 2007, 2009 and 2010 with proportions of 11.4%, 8.5% and 4.3%, respectively [15,16]. Moreover, the prevalence of EBI and EBF found by this study were higher than those of a study conducted by the UI and UNICEF in 3 districts in Aceh in 2012. The EBI proportion was 30.5% in Aceh Besar, 34.7% in Aceh Timur and 76.3% in Aceh Jaya, while the EBF proportion was 16.9% in Aceh Besar, 9% in Aceh Jaya and 8.2% in Aceh Timur [17]. When also compared to the analysis result found by the International Baby Food Action Network (IBFAN) in 2008-2012 in Indonesia, the EBI proportion was lower (29.3%), while the EBF proportion was higher (41.5%) [18].

In terms of the timeliness of introduction to CF, this study found less than half (49.7%) of the children received CF timely, while the rest was introduced earlier (4.5% after birth, 8.4% before 1 month old, 37.2% before 6 months old). The finding by UI and UNICEF in Aceh also presented a similar condition, starting from the age of 3 days, the children were given food, namely water, formula milk, fresh milk and other food (grains, pumpkins, sweet potatoes, food made of roots and tubers) [17]. When also compared to the result of IBFAN in Indonesia, the proportion was almost similar, with 43.9% children receiving CF too early [18]. A study in Pakistan mentioned that 67% of infants received solid, semi-solid and liquid food at the age of 6-8 months [19]. Some other studies also showed early solid food feeding. A study in Nigeria found that 73.5% of the mothers fed solid food before their children reached the age of 6 months, with 2.3% of them feeding solid food from after birth up to 1 month old and 12.9% at the age of 2 months [20]. Studies in India and Ethiopia found that 10.2% and 10.5% of children received CF before 6 months old, respectively [21,22]. Another study in Ethiopia obtained a very low proportion, which was 2.1%, while 79.7% of the children received timely CF (6 months old) [23]. A study by Aguayo found a very similar result with 57.4% of children aged 6-23 months in South Asia receiving timely CF [24]. Untimely introduction to CF was the global problem, particularly in Latin America, the Caribbean, and East Asia Pacific, where almost half of the children received CF at the age of 4-5 months [25].

Child feeding should fulfill the criteria of MMF and MAD [6,12,13]. The minimum standard of daily consumption for children was ≥ 2 times for children aged 6-8 months, ≥ 3 times for age of 9-23 months, and ≥ 4 times for those who were not breastfed with a minimal diversity of 4 of out 7 food groups [6,12,13]. Based on this indicator, this study showed that 7 out of 10 children (74.4%) met the MMF, but with poor dietary diversity (49.7%) (Fig. 1). When compared to the standard of MAD with the criteria of both the frequency and diversity, almost 4 out of 10 children (39.8%) met the criteria. Another study in Aceh showed that the proportion of children aged 6-23 months meeting MAD was 55.9%, while in Aceh Besar the proportion was 49.1%. The same study also found 91.7% and 51.6% of the children aged 6-8 months and 9-23 months met MMF, respectively [17]. The present study finding was also higher than that reported by WHO found that less than one-fourth of the children aged 6-23 months in developing countries had good consumption quality [5]. Udoh et al. [20] found that consumption quality of Nigerian children was still poor: only 31.5% met MAD, 36.7% met MMF and 23.1% met MAD. A study in Ethiopia found that the MAD was slightly higher (59.9%), but MAD was very low (7%) [22]. Another study conducted by Saaka et al. [26] found a very similar result with only 57.3% of the children met MMF, 35.3% met MAD, 25.2% met MAD and 14.3% met appropriate CF criteria (timely introduction to CF, MMF, MDD, and MAD). A lower proportion was found by Mekbib et al. [23] and only 17.8% of the children met MDD, 40% of them were fed 2 times a day, 11.9% of them met MAD and 10.7% of them met the appropriate CF practices. Another study showed a very result with 47.7% met MMF, 33.0% met MDD and 20.5% met MAD [24]. A study in Pakistan found that 63% of children aged 6-23 months met the criteria for MMF, 22% met MDD and 15% met MAD [19]. A study done in Southern Ethiopia also found a very similar result, which was MMF 94.5%, MDD 16.5%, MAD 16.3% and appropriate CF practice with 4 indicators (timely introduction to CF, MMF, MDD, MAD) 11.4% [27].

Other recommended indicators were iron supplementation or iron-fortified and iron and vitamin A-rich food consumption [4,6,12,13]. The present study result (Fig. 1) showed that supplementation for children aged 6-23 months was still rare, with only 25.5% and 18.9% of the children receiving iron/multivitamin syrup supplementation and fortified food, respectively. Moreover, consumption of protein and iron-rich food, such as meat, eggs, fish, legumes, green leafy and orange vegetables, in the previous month was also still poor. The analysis result showed that meat was consumed the least, only 8.7% of the children consumed it ≥ 3 times/week, followed by 36.2% of ≥ 4 times/week of eggs. Fish was consumed slightly more than other food with 53.6% of the children consuming it ≥ 4 times/week. Legumes consumption was very low with 14.8% of them consuming ≥ 3 times/week. More than one-third (38.5% and 36%) of the children were given vegetables ≥ 4 times/week and fruits ≥ 3 times/week (Table 3). This result was very similar with a study in South Asia mentioning that 33.2% of the children consumed vitamin A fruits and vegetables, while 17.1% of them consumed CF containing meat, fish, poultry, and eggs [24]. Also, a similar study done in Kenya found that fruits and vegetables consumption frequency among children 6-23 months was less than 25.4% consumed one time in a week [28]. Mbithi et al. [29] also found only 20% of the children aged 6-23 months were given vegetables and fruits. Moreover, Na et al. [19] mentioned that consumption of legumes, fruits and vitamin A-rich vegetables in Pakistan was very low (6-19%).

Poor CF practice of children aged 6-23 months was caused by many factors. Chandrasekhar et al. [30] stated that children from middle and low food security families had low food...
diversity score in Maharashtra India. On the other hand, the CF practice of children more than 6 months old was related to the knowledge, perception, attitude, belief, and skill of the mother, health service and home environment [31]. Na et al. [19] also found that younger age (6-11 months old), mother’s age, low socio-economic status and poor health and nutrition service affected poor CF practice, particularly on MDD and MAD in Pakistan. Areja et al. [27] similarly found that CF practice was influenced by health service, namely antenatal care and birth order. In the period of the first child, the mother tends to lack experience in child care, including CF practice. However, cultural factors and social norms in the society also affected CF practice [32]. The low proportion of proper CF practice in Aceh was related to community socio-cultural factors, such as the introduction of food taste to the newborn by giving honey, sugar, salt and fruit extract at the age of 7 days [33].

This study found a significant association between the age of the mother, completion of age-appropriate vaccination, and fish consumption with the odds of wasting. In addition, the age of the child, birth weight, and fever were significantly associated with lower odds of underweight. Similarly, the age of the child and fever were also associated with the odds of stunting. However, this study found no association on indicators of CF, namely MMF, MDD, MAD and timely introduction to CF, with wasting, underweight and stunting.

This result was not in line with Kimiywe et al. [28] who found that CF practices were significantly correlated with nutritional status, particularly MDD. Kenya’s study also found that low MAD significantly correlated with wasting [34]. Moreover, Krasevec et al. [35] stated that MDD was correlated with stunting, mentioning that children aged 6-23 months consuming zero food groups in the previous day had a 1.345-fold higher odds of being stunted compared to children consuming ≥ 5 food groups. Moreover, children not consuming animal food had a 1.436-fold higher risk of stunting than children consuming 3 types of animal food. Similarly, this study found that fish (animal food) consumption was correlated with wasting. Udoh et al. [20] found that early (< 6 months old) introduction to CF increased the risk of stunting by 5.15 times, low MDD increased the risk of underweight by 2.07 times, and low MMF raised the risk of stunting by 1.57 times. Chandrasekhar et al. [30] found that household food security significantly correlated to stunting and underweight.

In summary, CF practices of children aged 6-23 months were sub-optimal. Among eight indicators of CF practices recommended by WHO, only MMF had a high proportion (74.4%). The other 7 indicators, namely exclusive breastfeeding, timely introduction to complimentary food, MDD, MAD, and iron- and vitamin A-rich food consumption, were still suboptimal. Underweight, wasting and stunting remained crucial problems categorized as acute and chronic malnutrition. The birth order, age of the mother’s, education level of father’s, family size, completion of age-appropriate vaccine and fish consumption were associated with wasting, while the age of the child, birth order of child, birth weight status, mother and father’s education level, fever and diarrhea in the previous 2 weeks were associated with underweight and age of child, fever and ARI in the previous 2 weeks and fortified food consumption in the last 3 months were associated with stunting. An effective nutrition education model based on behavior change theory is necessary for the mother and family to improve CF practices and to prevent nutritional problem among children 6-23 months old.

The results of this study can use as a reference for planning the development of nutritional education programs to improve the CF and nutritional status and can also be used as inter-regional comparisons related to CF practices among children 6-23 months old. The data related to the practice of giving CF in Indonesia are still very limited, so the strength of this study is that the CF practices were analyzed by referring to the WHO recommended IYCF standard for children aged 6-23 months.

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CONFLICT OF INTERESTS

The authors declare no potential conflicts of interests.

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