Nutritional Status of Exclusive Compared to Non Exclusive Breastfeeding Mother

Dina Rahayuning Pangestuti1*
1Department of Public Health Nutrition, Faculty of Public Health, Diponegoro University, Semarang 50239, Indonesia

ABSTRACT

This study aimed to compare the nutritional status of exclusive and non-exclusive breastfeeding mothers with cross-sectional study design. Study location was Gayamsari public health center working area, Semarang city, Central Java Province, Indonesia. Sixteen exclusive breastfeeding mothers and 16 non exclusive breastfeeding mothers were recruited. Mothers with infant aged 4 months were assessed for their anthropometry (weight, height, mid-upper-arm-circumference, and body fat percentage), dietary intakes (24 hours recall in week day and week end) and hemoglobin level. Nutrition fulfillment of dietary intake was calculated based on Indonesia RDA according to age group. Univariate analysis was used to calculate the frequency, independent T-test and Mann-Whitney test were used to analyze differences in assessment results between groups. The results showed that mean aged of subject was 28.3±5.4 years, median parity was 2 childrens, mean BMI was 23.0±4.2 kg/m^2. In total, 12.5%, 40.6%, and 46.9% of the subjects were classified as underweight, normal, and overweight respectively. There is no significant difference (p>0.05) in nutritional status between groups. Subjects who fulfill the daily intake recommendation was only 16.1% for protein, 9.7% for fat, 12.9% for vitamin A, 6.5% for vitamin C, 3.2% for folic acid, and 3.2% for calcium. There was no significant difference in daily intake between groups. Mean hemoglobin level of subject was 12.1±1.6 mg/dl. 50% of the subjects were considered as anemic and no significant difference was found between groups (p>0.05). In conclusion, there is no significant difference between exclusive and non-exclusive breastfeeding group in nutritional status, nutrition adequacy and hemoglobin level. Less than half of the subjects were categorized as having a normal nutritional status. None of subject fulfill the daily energy, Fe and Zn requirements.

Keywords: dietary intake, exclusive breastfeeding, maternal nutritional status

INTRODUCTION

World Health Organization (WHO) has recommended breastfeeding for all mothers until 24 month. Breastfeeding provides optimal nutrition for the baby as well as strengthen the bond between mother and their baby. Exclusive breastfeeding is a practice recommended for infants aged 0 to 6 months of birth in which the infant only receives breast milk without any additional food or drink, except for medications and vitamins that are recommended by doctors (WHO 2000). Exclusive breastfeeding has many benefits for babies, i.e. to protect from infections such as diarrhea (Lamberti et al. 2011) and respiratory infections (Mihrshahi et al. 2008) also for infant growth (Kuchenbecker et al. 2015).

In addition, exclusive breastfeeding also provides other benefits for mothers. It acted as a natural contraceptive during the 6 months of exclusive breastfeeding. It also helps mothers to lose weight because they dispenses considerable amount of energy (Hatsu et al. 2008) while the normal nutritional status of the mothers remains retained despite the weight loss (Tasnim et al. 2014).

Based on Indonesian Recommended Dietary Allowances (RDA) 2013, breastfeeding mother in their first 6 months requires additional energy of 330 calories more than those who do not breastfeed. They also have higher requirement for protein, fat, vit A, vit B, vit C, Fe, I, Ca, K, Cu, and Zn. To balance the need of the mother for milk production and their own body’s metabolism, adequate intake of maternal nutrition should be ensured. Apart from managing intakes, the mother attempts to maintain their nutritional status also influenced by other factors, such as

*Corresponding Author: dina.putranadya@gmail.com
food taboos in the local culture as well as their socio-economic status (Sanusi & Falana 2009). The practice of exclusive breastfeeding has also contributed to the dynamic of maintaining this normal nutritional status for lactating women (Okechukwu et al. 2009). Within the context of exclusive breastfeeding promotion, it is crucial to ensure both mother and baby are having adequate nutrition.

Research on the nutritional status of exclusive breastfeeding mothers in comparison to non-exclusive breastfeeding mothers in terms of their adequacy of nutrient intake and anthropometric status has shown a significant difference in earlier study (Okechukwu et al. 2009). However, similar study in Indonesia is still rarely done. Therefore, this study tried to describe the nutritional status of exclusive and non-exclusive breastfeeding mothers and compare the differences between groups.

**METHODS**

**Design, location, and time**

The study design was cross sectional, conducted in August 2014 in Puskesmas Gayamsari working area, Semarang, Central Java Province, Indonesia.

**Sampling**

Regarding timing of the assessment, Okechukwu et al. (2009) found that the weight disparity between exclusive and non-exclusive breastfeeding mothers was more marked in baby aged of 4 months. Minimal sample size was calculated for hypothesis testing for two population means (Lwanga & Lemeshow 1991) with power of the test 95%, population variance of body mass index of exclusive and non-exclusive breastfeeding group was 504.36 (Okechukwu et al. 2009), anticipated population mean was 2.5, and anticipation of drop out was 10%.

Therefore, purposively 16 mothers with 4 months old infants who breastfeed exclusively and 16 who do not, were recruited for anthropometric, nutrition intake and hemoglobin level assessments for this study. The inclusion criteria for all subjects are willing to become subjects and the babies were born with normal weight (>2,500 g). Subjects were assigned into exclusive breastfeeding group after screening through the questions of; whether the mother giving food/ drink other than breast milk 24 hours prior to the interview, ever give food/ drink other than breast milk from birth until the time of the interview, the baby has no abnormalities in which making baby difficult to suckle, and the mother is still breastfeeding.

**Data collection**

Data on anthropometric of subjects was gathered from body weight by using digital weighing scale and height by using microtoise. Nutritional status of subject was performed in Body Mass Index (BMI) (kg/m²). Standard from WHO (2000) classification according to the Asian population was used. The cut off for underweight was <18.5, 18.5 to 22.9 for normal, ≥23 for overweight, and 23 -24.9 for risk of obesity. Body fat percentage of subject was assessed by using Omron HBF 306 Body fat analyzer. Subject who was categorized as obese woman was those who have body fat percentage ≥30% (Okorodudu et al. 2010).

Reference for malnutrition in women used was standard upper arm circumference <22 cm (Tang et al. 2013). Upper arm circumference of humans generally consists of subcutaneous fat and muscle; reduction in measurable upper arm circumference showed a decrease in muscle mass or subcutaneous fat, or both. Therefore, these parameters are often used to determine the nutritional status of women with respect to the case of protein-energy malnutrition (PEM) (Gibson 2005). While for anemia, blood hemoglobin levels of less than 12 g/dl was used as the cut off point (Gibson 2005).

**Data analysis**

Nutrient intake data was collected by recalling the subject’s 24 hours intake prior to the survey. It was conducted twice to represent week day and week end. The data was analyzed using Nutrisurvey for windows software program. The percentage of nutrient fulfillment was calculated based on Indonesian Recommended Dietary Allowances (RDA) 2013. Data on frequency of snacking and the type of snacks were also gathered from recall. Univariate analysis was used to calculate the frequency. Bivariate analysis was used to analyze differences in assessment results between exclusive breastfeeding and non-exclusive group using independent T-test and Mann-Whitney test.
RESULTS AND DISCUSSION

The result shows that the mean age of subjects is significantly different between groups, where EBFs mothers are older. There is no difference in median parity between groups. According to parity alone, the data may reflect comparable experiences of the two groups of mothers related to breastfeeding. Likewise, the sex of the baby was not significantly different between groups (Table 1).

In contrast to previous findings by Okechukwu et al. (2009), the two groups of lactating mothers in this study showed no significant difference in weight based on the BMI standard for Asian women (WHO 2004). However, the mean BMI in the non-exclusive breastfeeding group was higher than in the exclusive breastfeeding group, which is classified as overweight (>23.0 kg/m²) (p=0.360).

According to Okechukwu et al. (2009), the weight reduction in the last 3 to 6 months of breastfeeding is related to prolactin level. During later lactation, when prolactin concentration starts declining despite the sustained high milk output, its appetite stimulating property will also be diminishing. Other reason is that it might relate to the higher energy demand among exclusive breastfeeding (EBF) mother, compared to non-exclusive breastfeeding (NEBF) group. Infants care activity and breastfeeding practice generally could considerably drain the energy reserve. However, this study did not examine any variables related to physical activity of the subjects thus we were unable to extrapolate further on energy use during the study.

The number of subject in EBF group who have normal nutritional status was better than in the counter parts group, and only a few was classified as overweight. However, the trend of underweight mothers was higher in EBF group (Table 1). Imbalance intake and energy demand during breastfeeding activity could deteriorate the maternal nutritional status. Nevertheless, since there is no specific recommendation for post partum body mass index, interpretation should be done carefully (WHO 2000).

According to nutrient intake result, in total, subject’s daily intake for energy was 1541.79±290.71 kcal, protein 53.8 (22-113.70) g, fat 47.65±21.59 g, carbohydrate 218.18±42.93 g, vitamin A 32.6(5.63-279) mg, vitamin C 32.5(6.33-279) mg, iron 5.67(3-30.77) mg, calcium 300.77 (116.27-2468.77) mg, and zinc 6.66±2.11 mg. Between the two groups, EBF mothers had better nutrient intake than the non EBF, except for energy and fat intake. However, the result showed that the energy intake of both groups was far below the recommendation, which is 2250 kcal per day plus extra 330 kcal per day for lactating mothers.

Similarly, studies also found that postpartum mother had lower intake than the recommendation (Kulkarni et al. 2011, Tavares et al.

Table 1. Characteristics and anthropometric profile of exclusive and non-exclusive breastfeeding mothers

| Variable                              | EBF*  (n=16) | Non EBF (n=16) | Total (n=32) |
|---------------------------------------|--------------|----------------|--------------|
| Age of mother (years old) (mean ± SD) | 30.4±5.8     | 26.1±4.0       | 28.3±5.4*    |
| Parity (children) (median, min-max)   | 2(1-4)       | 1.5(1-6)       | 2(1-6)       |
| Sex of baby (% (n,%))                 |              |                |              |
| Boy                                   | 5 (45.5)     | 6 (54.5)       | 11 (35.5)    |
| Girl                                  | 11 (55)      | 9 (45)         | 20 (64.5)    |
| Anthropometry                         |              |                |              |
| Body weight (kg) (mean ± SD)          | 54.7±11.3    | 57.4±8.8       | 56.1 ± 10.0  |
| Body height (cm) (mean ± SD)          | 156.7±4.1    | 155.6±4.8      | 156.1±4.4    |
| Body Mass Index (kg/m²) (mean ± SD)   | 22.4±4.8     | 23.7±3.5       | 23.0±4.2     |
| Nutritional status (n, %)             |              |                |              |
| Underweight                           | 3 (18.8)     | 1 (6.3)        | 4 (12.5)     |
| Normal                                | 8 (50.0)     | 5 (31.3)       | 13 (40.6)    |
| Overweight                            | 5 (31.3)     | 10 (62.5)      | 15 (46.9)    |
| Body fat percentage (mean ± SD)       | 25.7±5.5     | 29.3±5.3       | 27.5±5.6     |
| MUAC (cm) (mean ± SD)                 | 26.1±3.2     | 26.8±2.7       | 26.4±2.9     |
| Hb (g/dL) (mean ± SD)                 | 12.2±0.7     | 11.9±1.3       | 12.1±1.6     |

*EBF= Exclusive Breast Feeding, # 1 baby data was missing, *p<0.05, Independent T-test
A research which was conducted in Cianjur, West Java Province, also revealed that in average, lactating mother could not fulfil the energy and protein intake recommendation (which was only 60% and 87%, respectively) (Mudjajanto & Sukandar 2007).

This study revealed that even though mothers tried to consume additional food between meals, their nutrient intake still did not reach the recommendation. About half of them (54.8%) snacked between breakfast and lunch at least once; the rest did it twice a day. The EBF group snacked more frequently than the Non EBF group (p= 0.006). The foods preferred as snack were fruit (watermelon, mango), fried snack such as bakwan (consist of flour and vegetables), fried banana, and siomay (consist of cassava flour) in which contributed about 7 kcal to 539 kcal per 100 gram consumed. Since the main meal was still below the nutrient requirement, the snack contribution was only slightly increased the nutrient intake fulfillment, especially in energy, fat and vitamin A.

Overall, subjects who fulfilled the daily intake recommendation was only 16.1% for protein, 9.7% for fat, 12.9% for vitamin A, 6.5% for vitamin C, 3.2% for folic acid, and 3.2% for calcium of total respondence. None of study subject fulfilled the daily requirement for energy, iron and zinc. Between the two groups, the percentage of nutrient fulfillment based on Indonesia RDA was higher among EBF group, except for energy (p>0.05) (Table 2). According to Indonesia RDA 2013, women in lactating period require more nutrient intake, especially energy, protein, fat, iron, zinc, calcium, vitamin A, vitamin C, folic acid, need extra about 330 kcal, 20 g, 5 mg, 5 mg, 200 mg, 350 mcg, 25 mg, 100 mcg, respectively. Similar to this study, Durham et al. (2011) found that during postpartum period, mothers were lacking in nutrient intake for calcium, vitamin A, vitamin C and folic acid.

Mean hemoglobin level of subject was 12.1±1.6 mg/dL. Anemic subject was 50% and no significant difference was found between groups (p>0.05). Data from Riskesdas 2013 pointed that 21.7% of the population over 1 year old was suffering from anemia. Among women, the percentage was higher than man (23.9% vs 18.4%). But, no specific data in the Riskesdas available for anemia among breastfeeding mother. Studies found that the prevalence of anemia in breastfeeding mothers was as high as 30% (Stuetz et al. 2012).

Nutrition program launched in Indonesia called “1000 Hari Pertama Kehidupan” (the first 1000 days of life) has included exclusive breastfeeding practice promotion for better child nutrition. In order to reach the official target of 50% of all babies will be exclusively breastfeed in 2025, this study results may offer an insight that in parallel to promoting exclusive breastfeeding it is also important to improve the breastfeeding mother nutritional status.

Table 2. Nutrient intake and percentage of RDA fulfillment among breastfeeding and non-breastfeeding mothers

| Component | Nutrient Intake | % RDA fulfillment |
|-----------|----------------|------------------|
|           | EBF (n=16) | Non EBF (n=15)* | EBF (n=16) | Non EBF (n=15)* |
| Energy (kcal)** | 1532.29±227.61 | 1551.92±354.09 | 60.31±9.22 | 60.62±13.69 |
| Protein (g) | 55.35 (22-106.93) | 41.63 (22-113.7) | 72.36 (28.57-138.87) | 54.06 (30.13-149.61) |
| Fat (g)** | 47.37±12.96 | 52.80±15.94 | 59.42±17.35 | 64.21±20.78 |
| Vitamin A (mcg) | 408.90 | 278.23 | 48.11 | 32.73 |
| Vitamin C (mg) | 35.0 (7.9.119.87) | 22.8 (6.3.279) | 35 (7.9-119.87) | 22.8 (6.3-279) |
| Folic acid (mcg) | 128.48 (58.97-577.67) | 117.1 | 25.69 | 23.42 |
| Iron (mg) | 6.17 (3-30.77) | 5.43 (3.37-17.23) | 19.27 (9.38-96.16) | 16.97 (10.53-53.84) |
| Ca (mg) | 333.53 (116.27-592.5) | 281.80 (129.8-2468.77) | 25.66 | 21.68 |
| Zn (mg)** | 7.0±2.02 | 6.30±2.20 | 46.7±13.48 | 42±14.67 |

*Data was presented in median (min-max),** Mean±SD

14 J. Gizi Pangan, Volume 13, Number 1, March 2017
CONCLUSION

Breastfeeding mothers, both EBF and Non EBF can be malnourished or overweight within the postpartum period. This research had pictured the condition at 4 months postpartum. Nutritional status and nutrition adequacy of almost all subject of this study were not meeting the daily recommendation, both for macro and micronutrient. Since this research was conducted in lactating mother of 4 months after delivery, the difference of nutritional status between EBF and Non EBF mothers need to be explored further at the end of the EBF periods (infant at 6 months of aged). Nevertheless, in order to improve the exclusive breastfeeding practice in Indonesia, nutritional insufficiency among breastfeeding mother needs to be prevented.

ACKNOWLEDGEMENTS

Appreciation goes to the Faculty of Public Health, Diponegoro University for the financial support, Head of Puskesmas Gayamsari, enumerators (Bertin, Nadini, Naintina, Himma, Nadya, Indah, Verani) and all subjects of this study.

REFERENCES

Durham HA, Lovelady CA, Brouwer RJN, Krause KM, Østbye T. 2011. Comparison of dietary intake of overweight postpartum mothers practicing breastfeeding or formula feeding. J Am Diet Assoc 111(1):67-74.
Gibson RS. 2005. Principles of Nutritional Assessment. Second Edition. New York: Oxford University Press.
Hatsu IE, McDougald DM, Anderson AK. 2008. Effect of infant feeding on maternal body composition. International Breastfeeding Journal 3(18).
Kemenkes RI] Kementerian Kesehatan Republik Indonesia. 2013. Peraturan Menteri Kesehatan Republik Indonesia. No. 75: Recommended Dietary Allowance for Indonesians. Jakarta: Kemenkes RI.
Kemenkes RI] Kementerian Kesehatan Republik Indonesia. 2013. Riset Kesehatan Dasar. Jakarta: Kemenkes RI.
Kuchenbecker J, Jordan I, Reinbott A, Herrmann J, Jeremias T, Kennedy G, Muehlhoff E, Mtimuni B, Krawinkel MB. 2015. Exclusive breastfeeding and its effect on growth of Malawian infants: results from a cross-sectional study. Paediatrics and International Child Health 35(1):14-32.
Kulkarni B, Shatrugna V, Nagalla B, Rani U. 2011. Regional body composition changes during lactation in Indian women from the low-income group and their relationship to the growth of their infants. J Am Coll Nutr 30(1):57-62.
Lamberti LM, Walker CLF, Noiman A, Victora C, Black RE. 2011. Breastfeeding and the risk for diarrhea morbidity and mortality. BMC Public Health 11 (Suppl 3):S15. http://doi.org/10.1186/1471-2458-11-S3-S15
Lwanga SK, Lemeshow S. 1991. Sample size determination in health studies. A practical manual. Geneva: World Health Organization.
Mihrshahi S, Oddy WH, Peat JK, Kabir I. 2008. Association between infant feeding patterns and diarrhoeal and respiratory illness: A cohort study in Chittagong, Bangladesh. International Breastfeeding Journal 3:28. http://doi.org/10.1186/1746-4358-3-28.
Mudajanto ES, Sukandar D. 2007. Food consumption and nutritional status of breastfeeding mothers and infant. J Gizi Pangan 2(2):13-25.
Okechukwu AA, Okpe EC, Okolo AA. 2009. Exclusive breastfeeding and postnatal changes in maternal anthropometry. Nigerian Journal of Clinical Practice 12(4):383-388.
Okorodudu DO, Jumean MF, Montori VM, Romero-Corraal A, Somers VK, Erwin PJ, Lopez-Jimenez F. 2010. Diagnostic performance of body mass index to identify obesity as defined by body adiposity: a systematic review and meta-analysis. International Journal of Obesity 34:791-799.
Sanusi RA, Falana OA. 2009. The nutritional status of mothers practicing breast feeding in Ibadan, Nigeria. Afr J Biomed Res 12(2):108-112.
Stuetz W, Carrara VI, McGready R, Sue JL, Erhardt JG, Breuer J, Biesalski HK, Nosten FH. 2012. Micronutrient status in lactating mothers before and after introduction of fortified flour: cross-sectional surveys in Maela refugee camp. Eur J Nutr 51(4):425-434.
Tang AM, Dong K, Deitchler M, Mei C, Maalouf-Manasseh Z, Tumilowicz A., Wanke C. 2013. Use of Cutoffs for Mid-Upper Arm
Nutritional status on breastfeeding mothers
Pangestuti

Circumference (MUAC) as an Indicator or Predictor of Nutritional and Health Related Outcomes in Adolescents and Adults: A Systematic Review. Washington DC: FHI 360/FANTA.

Tasnim S, Akhtar SN, Haque FA. (2014). Nutritional status and breast feeding practice among mothers attending lactation management centre. Pediatrics Research International Journal. DOI:10.2014.790373.

Tavares M. Paulichenco, Devincenzi M. Urrestarazu, Sachs A, de Vilhena AACF. 2013. Nutritional status and diet quality of nursing mothers on exclusive breastfeeding. Acta Paul Enfemm, 26(3):294-298.http://dx.doi.org/10.1590/S0103-21002013000300015.

[WHO] World Health Organization. 2000. Obesity: preventing and managing the global epidemic. Report of a WHO Consultation. Geneva: WHO. (WHO Technical Report Series, 894).

[WHO] World Health Organization Expert Consultation. 2004. Appropriate body-mass index for Asian population and its implications for policy and intervention strategies. Lancet 363:157-163.

[WHO] World Health Organization/IASO/IOTF. 2000. The Asia-Pacific perspective: redefining obesity and its treatment. Health Communications Australia: Melbourne.