

Nutritional Status of Exclusive Compared to Non Exclusive Breastfeeding Mother

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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/m². 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 (Mihirshahi *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

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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/m^2). 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 $\geq 30\%$ (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 ($>23.0 \text{ kg/m}^2$) ($p=0.360$).

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 spesific 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 $1541.79 \pm 290.71 \text{ kcal}$, protein $53.8 (22-113.70) \text{ g}$, fat $47.65 \pm 21.59 \text{ g}$, carbohydrate $218.18 \pm 42.93 \text{ g}$, vitamin A $381(52.37-2901.20) \text{ mcg}$, folic acid $117.1(55.37-577.67) \text{ mcg}$, vitamin C $32.5(6.33-279) \text{ mg}$, iron $5.67(3-30.77) \text{ mg}$, calcium $300.77 (116.27-2468.77) \text{ mg}$, and zinc $6.66 \pm 2.11 \text{ mg}$. 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 $2250 \text{ kcal per day}$ 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 \pm SD)	30.4 \pm 5.8	26.1 \pm 4.0	28.3 \pm 5.4 ^a
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 \pm SD)	54.7 \pm 11.3	57.4 \pm 8.8	56.1 \pm 10.0
Body height (cm) (mean \pm SD)	156.7 \pm 4.1	155.6 \pm 4.8	156.1 \pm 4.4
Body Mass Index (kg/m ²) (mean \pm SD)	22.4 \pm 4.8	23.7 \pm 3.5	23.0 \pm 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 \pm SD)	25.7 \pm 5.5	29.3 \pm 5.3	27.5 \pm 5.6
MUAC (cm) (mean \pm SD)	26.1 \pm 3.2	26.8 \pm 2.7	26.4 \pm 2.9
Hb (g/dL) (mean \pm SD)	12.2 \pm 0.7	11.9 \pm 1.3	12.1 \pm 1.6

*EBF= Exclusive Breast Feeding, [#] 1 baby data was missing, ^ap<0.05, Independent T-test

2013). 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 respondents. 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, 11 g, 6 mg, 5 mg, 200 mcg, 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 breastfed 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^a

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 (136.6-2901.2)	278.23 (52.37-1032.6)	48.11 (16.07-341.32)	32.73 (6.16-121.48)
Vitamin C (mg)	35.0 (7.90-119.87)	22.8 (6.33-279)	35 (7.9-119.87)	22.8 (6.33-279)
Folic acid (mcg)	128.48 (58.97-577.67)	117.1 (55.37-208.73)	25.69 (11.79-115.53)	23.42 (11.07-41.75)
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 (8.94-48.46)	21.68 (9.98-189.91)
Zn (mg)**	7.0±2.02	6.30±2.20	46.7±13.48	42±14.67

^aData was presented in median (min-max),*1 mother absence at nutrient intake survey,** Mean±SD

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.

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