

Energy Consumption during Lactation and Duration of Breastfeeding At Puskesmas Margajaya Bekasi City in 2014

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Abstract

Despite recommendation for higher energy intake during lactation than during pregnancy, researches at Jakarta and Depok showed that energy consumption during lactation was lower than during pregnancy. The purpose of this study is to investigate the association between individual characteristics and energy consumption during lactation, and to assess the relationship between energy consumption during lactation to duration of breastfeeding among 60 mothers in the working area of Puskesmas Margajaya Bekasi City in 2014. This research used a *cross-sectional* design; data was collected through primary data collection by questionnaire and Semi-quantitative Food Frequency Questionnaire. Analysis was conducted using chi-square technique. The study found that mothers of sufficient age (≥ 27 years old), multiparous, and had low ($< 2,100$ kcal/day) energy intake during pregnancy had significant higher risk to low energy consumption during lactation. Mothers with low energy consumption during lactation had 4 times higher risk of short duration of breastfeeding. It is recommended to provide information on the importance of higher energy intake during lactation due to the higher need to support breastmilk production and also to shift forward the nutrition recommendation regarding additional energy intake during lactation period from month 6 to month 4 due to higher energy requirement that commences when lactating mothers enter the fourth month of lactation.

Abstrak

Konsumsi Energi Saat Laktasi dan Durasi Menyusui di Wilayah Kerja Puskesmas Margajaya Kota Bekasi Tahun 2014. Kendati rekomendasi angka kecukupan gizi menunjukkan lebih tingginya kebutuhan energi ibu saat laktasi dibandingkan saat hamil namun penelitian di Jakarta dan Depok menunjukkan konsumsi energi ibu laktasi justru lebih rendah. Penelitian ini bertujuan untuk mengetahui faktor yang berhubungan dengan konsumsi energi ibu laktasi serta hubungan antara konsumsi energi ibu laktasi dengan durasi menyusui di Puskesmas Margajaya Kota Bekasi tahun 2014. Penelitian dilakukan secara *cross sectional* terhadap 60 orang ibu menggunakan kuesioner termasuk *Semi-quantitative Food Frequency Questionnaire*. Analisis dilakukan menggunakan uji chi-square. Hasil penelitian menunjukkan adanya hubungan bermakna antara umur ibu, paritas, dan konsumsi energi ibu hamil dengan konsumsi energi ibu menyusui. Ibu cukup umur (≥ 27 tahun), multipara dan konsumsi energi hamil rendah (< 2.100 Kal/hari) berisiko untuk memiliki konsumsi energi laktasi yang rendah. Selain itu, ditemukan hubungan bermakna antara konsumsi energi ibu laktasi dengan durasi menyusui. Ibu yang konsumsi energinya saat laktasi rendah berpeluang 4 kali lebih besar untuk memiliki durasi menyusui yang singkat. Direkomendasikan perlunya informasi kepada ibu tentang pentingnya konsumsi energi saat laktasi karena kebutuhannya yang tinggi untuk mendukung produksi ASI. Disarankan juga agar peningkatan rekomendasi angka kecukupan energi untuk ibu laktasi bulan ke 6-12 dimajukan menjadi bulan ke-4 mengingat kebutuhan gizi memasuki bulan ke-4 tersebut sudah sangat besar.

Keywords: energy intake, energy recommendation, exclusive breastfeeding, lactating consumption, pregnancy consumption

Introduction

Various recommendations on sufficient nutrition requirements, nationally as well as internationally, indicate that nutrition requirements for lactating mothers are higher than pregnant mothers. In Indonesia, the 2004

Angka Kecukupan Gizi (AKG/Indonesian Recommended Dietary Allowances) recommended an energy of 2,450 kcal/day for lactating mothers (to support nutrition requirements of exclusive breast feeding mothers) and for pregnant mothers a requirement of 2,400 kcal/day [1]. The 2013 recommendation for AKG of lactating

mothers increased to 2,530 kcal/day and 2,500 kcal/day for pregnant mothers [2]. Several researches also indicate that the daily energy consumption of mothers during the lactation period is higher compared to that of pregnant mothers [3,4]. However, research in Jakarta and Depok shows that the consumption of lactating mothers (1,959 kcal/day) decreases compared to their pregnancy period (2,241kcal/day) [5]. It is suspected that consumption decrease is caused by several factors, e.g. lack of knowledge and an attitude which dismisses the high nutrition requirement during lactation, time consuming care of the baby which causes a mother to become too tired to cook and eat, decrease in consumption of milk and supplements, retention of food intake, and lack of information obtained from the medical staff concerning nutrition requirements of lactating mothers [6].

During pregnancy, a mother stores 2-4 kg fat stores that will be used to meet lactation energy requirements. This fat store provides approximately 200-300 kcal/day of energy to produce exclusive breastmilk during the first three months. To be able to provide exclusive breastmilk until 6 months, additional energy must be prepared by a mother during the first three months of lactation by consuming nutritious food in sufficient amounts [7]. The total energy required for breastfeeding per day is 500-600 kcal or approximately equal to ¼ or 1/3 more than nutrition consumed by a mother when she is not pregnant or lactating.

Results of research on eating habits of lactating mothers within the BejiDepok Public Health Center in 2013 concluded that the consumption of lactating mothers has not met the AKG requirements. A research by Fikawati (2013) indicates that a mother who succeeds to predominantly give breastfeeding for 24 weeks has a daily energy consumption which is significantly higher (2,131 kcal/day) compared to those who breastfeed for less than 24 weeks (1,830 kcal/day)[5]. This means that in order to succeed in predominant breastfeeding for 24 weeks sufficient energy is required. Mothers with deficit energy consumption will find it difficult to implement 24 weeks of predominant breastfeeding.

To encourage the success of 6-months exclusive breastfeeding, it is most important to be specifically aware of factors related to under nutrition of lactating mothers. WHO (2003) also endorses that breastfeeding should be continued until the child is at least 2 years old (prolonged breastfeeding) [9]. The objective of this research is to find the relation between a mother's characteristics (age, education, job, parity and energy consumption during pregnancy) and the consumption of lactating mothers in the working area of the Technical Implementation Unit of *Pusat Kesehatan Masyarakat* (Puskesmas/Community Health Center) Margajaya in Bekasi City in 2014. A further aim is to find the relation

between energy consumption during lactation with the duration of breastfeeding.

This research uses energy consumption cut-off during lactation at 2,100 kcal/day. This is based on: first, this figure is 80% of the energy requirement for women between 19-49 years old which is 2,024 kcal/day further rounded up to 2,100 kcal/day [2]. Second, 2,101 kcal/day is the result of an ROC analysis which is the most sensitive and specific value (sensitivity = 0.654 and specificity = 0.884) based on energy consumption requirements and duration of predominant breastfeeding at 24 weeks in Fikawati's research [5]. Third, Butte *et al.* (1984) reported that mothers require a daily input of 2186 kcal/day in order to successfully support lactation and decrease of sufficient postpartum body weight [10].

Methods

This research was implemented using a quantitative approach with a cross sectional study plan. The research population was 60 mothers with babies aged between 6 to 11 months old domiciling in the area of Puskesmas Margajaya, Bekasi City. Data collection was done between May till June 2014. Primary data collection was implemented using a questionnaire and semi-quantitative food frequency questionnaire (SFFQ) [11]. The questionnaire had the objective to recognize individual characteristics (age, education and parity) whereas SFFQ aimed to obtain a description of the total energy consumed by mothers during pregnancy and lactation based on mother's retrospective report and consumption servings. Filling SFFQ questionnaire was implemented independently by the mothers but monitored by the research team. Data are then manually converted so that the weight of the food consumed by the mother per day can be calculated and its nutritional value is further calculated through the *Nutrisurvey* program.

Data on a mother's energy consumption during lactation is divided into 2 categories: 1st trimester (0-3 months) lactation period known as Lactation 1 and 2nd trimester lactation (4-6 months) known as Lactation 2. The purpose of this division is to find out the difference in the mother's consumption throughout each period since the energy requirements during the two periods differ. The energy requirement of a mother to produce breastmilk in the first 3 months is relatively less since the mother still has post-pregnancy fat supply while, on the other hand, not much breastmilk is required yet. During the Lactation 2, the fat supply has decreased while the mother's energy requirement to produce breastmilk increases in line with the increase in the baby's requirement due to rapid growth. The fat a mother has stored during pregnancy is able to provide the energy needed to produce breastmilk during the first 3 months; the remaining must be obtained from the

mother's daily consumption during lactation. Currently researches or articles discussing this difference are still very limited.

Results and Discussion

This research confirms Fikawati's research (2013) which indicates a decrease in the consumption of lactating mothers compared to consumption during pregnancy [5]. It shows that the average respondent's consumption during pregnancy is 2,370 kcal/day and decreases during lactation to 2,143 kcal/day. The average energy consumption during Lactation 1 is 2,163 kcal/day and 2,124 kcal/day during Lactation 2. The analysis of consumption during pregnancy and lactation shows that there is an obvious decrease in consumption especially regarding staple food, supplements and milk. In Lactation 2, where energy requirements increase to produce more breastmilk (since the baby is now quite large), it shows that the mother's consumption is even lower.

The average consumption rate of lactating mothers is only 2,143 kcal/day or 86.4% of AKG. This number is almost equal to a research in Ontario, Canada of 183 lactating mothers (3 months postpartum) of low social-economic class which shows that energy intake of lactating mothers are low with an average of 2,148 kcal/day. It is also noted that lactating mothers have a high risk in the lack of intake of energy and other nutrients [12]. A cohort study result towards 53 couples of babies-lactating mothers during 6 months postpartum at Tambora, West Jakarta indicates an even lower result. The average energy consumption of lactating mothers 6 months postpartum is only 2,010 kcal/day (81.0% of AKG) and many mothers (45.5%) have a lower energy consumption of less than 2,100 kcal/day [13].

Breastmilk production requires quite a high-energy requirement of approximately 500 kcal/day. During Lactation 1, this requirement is met by 2 components which is approximately 200 kcal of fat stores accumulated during pregnancy (about 2-4 kg of body fat) and 300 kcal obtained from the mother's daily food intake. In Lactation 2, mother's fat store has decreased and the baby's nutrition requirement increases. Therefore, during Lactation 2 a higher energy consumption is needed compared to Lactation 1. If Lactation 1 requires additional energy of approximately

300 kcal/day, then Lactation 2 requires more additional energy.

However, this situation seems to have escaped our attention. AKG (2013) has only recommended increase of energy for mothers in the second semester from 330 kcal/day during the first 6 months to 400 kcal/day during the second 6 months (Table 1). This recommendation is not quite accurate and also too late considering that a mother's fat stores will already have decreased by the first 3 months postpartum (and not the first 6 months). If a mother is recommended to increase her consumption commencing 6 months postpartum it is highly possible that exclusive breastfeeding will fail as it is related to insufficiency in meeting energy requirements 3-4 months postpartum. The effect is that the mother feels her breastmilk is beginning to decrease and, in the end, she will face a dilemma of continuing exclusive breastfeeding or not (weanling dilemma) [14].

Table 2 indicates the decrease in average consumption of lactating mothers of about 235 kcal/day compared to pregnancy. This result is similar with the previous research that finds a decrease of 236 kcal/day [5]. Decrease also occurs during Lactation 1 in comparison with the period of Lactation 2 amounting to 39 kcal/day. Analysis results in a $p\text{-value} < 0.05$ which means the difference in energy consumption during pregnancy and lactation is significant but between Lactation 1 and Lactation 2 as insignificant.

Table 3 indicates the relationship of independent variables (age) with energy consumption during lactation. Age is divided into 2 (two) categories: young mothers (<27 years) and mothers of sufficient age (≥ 27 years). Redburn in Cheung (2000) mentions a physiological factor indicating that at the age of 27 a woman reaches the peak of her metabolism speed. After 27 years, metabolism slows down and fat accumulation occurs more easily [15]. This study also finds that the average lactation energy consumption in young mothers is higher ($2,325 \pm 633$ kcal/day) compared to mothers of sufficient age ($2,053 \pm 768$ kcal/day). Table 3 also shows that the chance of mothers of sufficient age in consuming lactation energy is low (<2,100 kcal/day) which is 3.1 times (CI 1.01- 9.49; $p\text{-value}$ 0.04) compared to young mothers.

Table 1. Recommended Dietary Allowances for Lactating Mothers

Period	Additional Required Nutrients per Day			
	Energy (kcal)	Protein (g)	Fat (g)	Carbohydrate (g)
First 6 months	+ 330	+ 20	+ 11	+ 45
Second 6 months	+ 400	+ 20	+ 13	+ 55

Table2. Difference in Energy Consumption of Mothers during Pregnancy and Lactation (FAQ Data)

Difference	Decrease (kcal)	<i>p-value</i>	Decrease (%)
Pregnant and Lactating	-235	0.00*	9.3%
Pregnant and Lactating First Trimester	-216	0.01*	8.5%
Pregnant and Lactating Second Trimester	-255	0.01*	10.1%
Lactating First and Second Trimester	-39	0.62	1.5%

**p-value*<0.05

This finding may be caused by three phenomena: first, the group of mothers of sufficient age has a higher parity than young mothers so that they probably are weight more due to fat accumulation between conceptions which may further motivate them to eat less [16]. Second, mothers of sufficient age are generally multiparous. The larger number of children causes the mothers to have limited time to cook, take care of themselves and consume food compared to young mothers who are generally primiparous. Third, there is a suspicion that within the group mothers of sufficient age there is a motivation to limit energy consumption due to metabolism slow down at approximately 27 years of age which causes fat to accumulate more easily (mothers feel that they gain weight quickly).

Besides age, a variable that indicates a significant connection with lactating energy consumption is parity. Apparently the risk of multiparous mothers suffering low lactation energy consumption almost three times higher (CI 1.02-8.45, *p-value* 0.04) than primiparous mothers. This finding stresses previous presumptions that mothers-of-sufficient age group which are mostly (75%) multiparous tend to reduce energy consumption because they feel overweight due to fat accumulation between conceptions and the possibility of limited time to cook and eat as they have to take care of the baby and other children born earlier.

Anther variable significantly related to energy consumption during lactation is energy consumption during pregnancy. Mothers with low consumption during pregnancy (<2100 kcal/day) are 12 times (CI 3.03-48.89, *p-value* 0.000) more likely to suffer from low energy consumption during lactation. This shows a consistent low consumption pattern data where those taking insufficient energy consumption during pregnancy will consistently consume insufficient energy consumption during lactation, or there may even be a decrease in energy consumption such as found in this study and other studies [6]. In this case, it becomes even clearer that the effort to increase energy consumption of mothers must begin since pregnancy.

Furthermore, although statistically insignificant, it has been found that low energy consumption during lactation is more often found in mothers with high education (54.3%) compared to mothers with low

education (50.0%) and in working mothers (54.9%) compared to non-working mothers (44.4%). These two facts reflect the community situation in research areas with a relatively urban condition. High education causes more openness towards new values and ideas, as is also the case with acces to information [17]. In relation to lactation energy consumption, mothers with high education are more prone to low lactation energy consumption; this probably reflects the lack of information on energy requirements during lactation is so that mothers with high education, who are generally able to acces information, are not exposed to this matter.

Level of education is also related to jobs. A mother's job status is also one of the obstacles in implementing exclusive breastfeeding. Fein and Roe in their research found that mothers who, 3 months postpartum must begin full-time work, usually implement breastfeeding for only 8.6 weeks [18] as these women have to prepare their infants for the time when they return to work. Hence, they start feeding formula milk to their infants when babies are 2 months old. Research by Seward and Serdula mentions that the status of working mothers is one of the reasons of giving formula milk to infants and reduces the frequency of breastfeeding [19]. But findings also show that non-working mothers have a higher percentage of low lactation energy consumption compared to working mothers. It is presumed that consumption patterns in working mothers returns to normal while non-working mothers actually have to do more work at home and tend to have no time to prepare and consume food.

Following, is an advanced analysis to find the relationship between energy consumption and lactating period (Table 4). Findings indicate that more mothers with low energy consumption during lactation end breastfeeding (40.6%) compared to mothers with sufficient energy consumption (14.3%). The OR value is 4.11 (CI 1.15-14.65, *p-value* 0.02). Thus, mothers with sufficient energy consumption will have a bigger chance to continue breastfeeding until 2 years in accordance with the suggestion of WHO.

The findings are in line with Fikawati's research which reports that mothers who successfully give predominant breast feeding for 24 weeks have a high daily energy consumption (2,108 kcal/day) compared to others who

Table3. Relation of Individual Characteristic Variables with Lactation Energy Consumption

Individual Characteristic	Average Energy Consumption				Total		p-value	OR (95% CI)
	Insufficient (< 2100 kcal/day)		Sufficient (≥ 2100 kcal/day)		n	%		
	n	%	n	%				
Age								
Sufficient age (≥27 years old)	25	62.5	15	37.5	40	100.0	0.04*	3.10 (1.01-9.49)
Young age (<27 years old)	7	35.0	13	65.0	20	100.0		
Education								
High education	25	54.3	21	45.7	46	100.0	0.51	1.19 (0.36-3.94)
Low education	7	50.0	7	50.0	14	100.0		
Working Status								
Unemployed	28	54.9	23	45.1	51	100.0	0.41	1.52 (0.37-6.33)
Employed	4	44.4	5	55.6	9	100.0		
Parity								
Multiparous	22	64.7	12	35.3	34	100.0	0.04*	2.93 (1.02-8.45)
Primiparous	10	38.5	16	61.5	26	100.0		
Pregnant Energy Consumption per Day								
Insufficient (<2100 kcal)	19	86.4	3	13.6	22	100.0	0.00*	12.18 (3.03-48.89)
Sufficient (≥2100 kcal)	13	34.2	25	65.8	38	100.0		

*p-value<0.05

Table 4. Relation between Lactation Energy Consumption and Duration of Breastfeeding

Variable	Breastfeeding Status				Total		pvalue	OR (95% CI)
	Stop		On-going		n	%		
	n	%	n	%				
Energy Consumption								
<2100 kcal/day	13	40.6	19	59.4	32	100.0	0.02*	4.11 (1.15-14.65)
≥2100 kcal/day	4	14.3	24	85.7	28	100.0		

*p-value<0.05

predominantly breast feed for less than 24 weeks (1,830 kcal/day)[5]. So mothers with higher energy consumption are more able to continue breast feeding. This finding is also supported by other researches that indicate that mothers with a high energy consumption are more able to provide exclusive breast feeding for a longer period compared to mothers with low energy consumption [20-23].

Conclusions

Results show a significant decrease in energy consumption of mothers during lactation compared to during pregnancy. Mothers of sufficient age (≥ 27 years old), multiparous and with low (<2,100 kcal/day) energy consumption during pregnancy have a higher risk to undergo low energy consumption during lactation compared to young mothers, primiparous, and with

enough energy consumption during pregnancy. Mothers with low lactation energy consumption (<2100 kcal/day) have a higher chance of not being able to breastfeed till 6 months. The low energy consumption of mothers during lactation compared to pregnancy indicates that the issue of consumption during lactation has not received the deserved attention. Therefore, we suggest that a program is designed, whether in the form of nutrition intervention as well as education with stress on the importance of increasing nutrition of lactating mothers, especially for multiparous mothers of sufficient age. The increase of energy consumption for mothers should begin at pregnancy and continued until termination of exclusive breastfeeding. A more comprehensive review is required to revise recommendations on AKG energy consumption for lactating mothers because: first, the lactating periodization used by AKG in terms of semester should be changed to trimester which is Lactation 1 (0-3

months old) and Lactation 2 (4-6 months old) which is more accurately based on the decrease in the mother's fat stores and the energy requirement to produce breastmilk; second, recommendation for additional energy in AKG should be maintained but the period division shifted in accordance with the suggestion above which is to use the trimester period. It is recommended that mothers take additional daily energy consumption of 330 kcal/day during Lactation 1 (0-3 months old) and 400 kcal/day during Lactation 2 (4-6 months old).

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