Consumption of Formula Milk Caused Infant's Greater Body Weight and Upper Arm Circumference

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Abstrak

Latar Belakang. Di Indonesia, banyak ibu yang memberikan susu formula pada bayinya yang berumur kurang dari 6 bulan, meskipun pemerintah telah menganjurkan agar memberikan ASI saja sampai umur 6 bulan. **Tujuan**. Penelitian ini bertujuan untuk mengetahui apakah ada perbedaan yang signifikan antara beberapa ukuran antropometris (berat badan, panjang badan, lingkar kepala, dan lingkar lengan) pada bayi yang diberi ASI saja (Group1), dibandingkan dengan bayi yang diberi ASI dan susu formula (Group2). **Metode dan sampel**. Sampel terdiri dari 100 bayi berumur 5 bulan, yang terdiri dari 50 (19 laki-laki, 31 perempuan) bayi Group1, dan 50 (21 laki-laki, 29 perempuan) bayi Group2. Independent sample *t*-test dan Mann Whitney digunakan untuk membandingkan variabel-variabel yang diukur. **Hasil**. Rata-rata berat badan dan lingkar lengan atas Group2, baik pada laki-laki maupun perempuan berbeda (lebih besar) secara signifikan dari Group1. Rata-rata panjang badan dan lingkar kepala Group1 berbeda (lebih besar) secara signifikan jika dibandingkan dengan Group2. **Kesimpulan**. Nutrisi dari susu formula mempunyai efek pada berat badan yang cenderung berlebih pada bayi, seperti yang direfleksikan oleh rata-rata berat badan dan lingkar lengan atas Group2. Sementara itu ASI memberikan efek yang positif terhadap rata-rata panjang badan dan lingkar kepala, seperti yang digambarkan pada Group1.

Kata kunci: antropometri, ASI, Indonesia, panjang badan, lingkar kepala.

Abstract

Background. In Indonesia, many mothers have given additional formula milk to their infants that were younger than 6 months old, despite government's suggestion of exclusive breastfeeding. **Aim**. This research aimed to find whether there were significant differences between the anthropometric measurements (height, weight, upper arm and head circumferences) of infants who were exclusively breastfed (Group1), compared to infants who were breastfed and consumed formula milk as well (Group2). **Subjects and methods**. The sample consisted of 100 infants aged 5 months. There were 50 (19 males, 31 females) infants of Group1, and 50 (21 males, 29 females) infants of Group2. Independent sample *t*-test and Mann Whitney were used to compare the variables. **Results**. The averages of weight and upper arm circumference of Group2, both in males and females, were significantly greater than those of Group1. The averages of height and head circumference of Group1 were significantly greater than those of Group2. **Conclusion**. The nutrition from the formula milk seems to give the overweight effect, as reflected by the averages of weight and upper arm circumference of Group2. Meanwhile, the breast-milk gives a positive effect as reflected by the averages of height and head circumference of Group1.

Keywords: anthropometry, breast-feeding, Indonesia, body length, head circumference.

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Introduction

The assessment of growth in infants is very important, especially in the early months. Their growth is the indication of their health, nutritional status, and well being. A good quality of life—bodily and psychologically—is a starting point for later growth and development, immunity, and productivity[1]. One of the sensitive indicators of nutritional status change in infants is the anthropometric measurements[2]. The weight of an infant may increase and decrease according to the health status, such as infections, illnesses, the decrease of appetite, the decline of the quality or quantity of consumed food, etc. The weight of an infant is affected by how much intake of breastfeeding she obtains, and how much of other liquid (water, formula milk, juice, etc.) that she consumes.

It has been known that many Indonesian mothers have given foodstuff (liquid and/or solid food) to infants under 6 months old. Those mothers expected that the baby would be less cranky when she was satiated. According to Indrawati[3], additional food/liquid for infants, which is given too early, is very common in Indonesia. She said further that additional food/liquid that was being given too early to the baby had caused diarrhea, growth stunting, obesity, or malnutrition. The additional liquid (other than breast-milk) that are being given to one month old Indonesian babies usually are formula milk, tea, and fruit juice; while two months old babies usually are given more additional food beside the supplementary liquid above, such as banana, porridge, and biscuits. Iskandar and Mewita[4] found that formula milk was given to 36.3% of infants in the urban area, and to 17.3% of infants in the rural area. He added further that exclusive breastfeeding had not reached half the target of the Indonesian Health Department,

because 3%-4% of mothers did not give breast-milk to their babies, and only 85% of mothers breastfed their babies until the age of 6 months.

Those facts above are disappointing when it has been known that breast-milk has many benefits to the baby[5, 6, 7, 8]. Furthermore, Barker[9] said that malnutrition in infants can cause chronic diseases in the old age. Many research had proven that breast-milk was more beneficial compared to formula milk because of its content (such as arachidonic acid or AA, and docosahexaenoic acid or DHA), it has long chain polyunsaturated fatty acids or PUFA, *Lactobacillus bifidus,* whey and enzymes. The substances that are contained by breast-milk have not been contested by formula milk. The aim of this research was to gain information regarding the breastfeeding practice in Indonesia, especially in Surabaya, which is the second largest city in Indonesia. This research analyzed the effects of breastfeeding practice and the consumption of formula milk to the anthropometric measurements that had been suggested by Soetjiningsih[1] as the 4 parameters in assessing infant's health—weight, height, upper arm circumference, and head circumference—of 5 month old infants. This research intended to observe whether there were significant differences between the anthropometric measurements of infants who were exclusively breastfed (Group1), compared to infants who were breastfed and also consumed formula milk (Group2).

Material and Methods

The sample was measured in William Booth Hospital, in Surabaya, after the ethical clearance and informed consent were permitted. The sample consisted of 100 infants aged 5 months—ranging from 4.8 to 5.2 months. There were 50 (19 males, 31 females) infants of Group1, and 50 (21 males, 29 females) infants of Group2. The variables of this research were weight, length, upper arm circumference, and head circumference.

The statistical analyses of this research were independent sample *t*-test and Mann Whitney. The normality of distribution was analyzed using Kolmogorov Smirnov. When the data were not distributed normally, Mann Whitney was used to test the significance difference between the two groups. Normally distributed data was analyzed using independent sample *t*-test, after the homogeneity was tested using Levene's test. The homogenous data were tested using the *t* for equal varians assumed, and non homogenous data were tested using the *t* for equal varians not assumed.

Results

Seven out of ten respondents who have low level of education chose to exclusively breastfeed their children (Table 1). The respondents from middle and high level of education chose around 50% chance of exclusive breastfeeding and around 50% chance working mothers had troubles in preferring exclusive breastfeeding, because they could only have 3 months off work. The number of working mothers who exclusively breastfeed their babies were only 26.53 % (Table 2).

Table 1. The percentage of exclusively breastfed (Group1) and non-exclusively breastfed (Group2) infants in various educational levels of the mothers

	Educational level						Total
	Low	%	Middle	%	High	%	
Group1	7	70.00	29	44.62	14	56.00	50
Group2	3	30.00	36	55.38	11	44.00	50
	10		65		25		100

Note: Low = Primary School, Middle = Junior and Senior High School, High = college, university

Table 2. The percentage of mothers' job status of exclusively breastfed (Group1) and non-exclusively breastfed (Group2) infants

Job status	Group1	%	Group2	%	Total
Working	13	26.53	36	73.47	49
Housewives	37	72.55	14	27.45	51
	50		50		100

Note: Group1= exclusively breastfed infants, Group2= non-exclusively breastfed infants

As many as 54% of the respondents said that working was the reason why they gave formula milk to their babies (Table 3). The second reason (32%) was that those mothers thought that their breast-milk was not enough (too little) for the baby. The third reason (14%) was that the baby did not want to suckle. Most babies who were introduced to milk bottle became too lazy to "work" for the breast-milk. Those babies preferred bottle, which secrete milk easily, instead of her mother's breasts. Meanwhile, the secretion of breast-milk also depends on the reaction to the baby.

Table 3. The reasons of giving formula milk

Reasons	Frequency	%
Very little breast-milk	23	32 %
Baby does not want to suckle	10	14 %
Working	39	54 %
Total	72	100 %

The results of this research showed that both in males and females the averages of weight and upper arm circumference were significantly greater in Group2 compared to

those of Group1. On the other hand, the averages of body length and head circumference of Group1 were significantly greater than those of Group2, both in males and females.

Group2 were heavier than those of the exclusively breastfed babies (Group1). Furthermore, the average of weight of female infants who consumed formula milk was heavier than those of the male infants who did not consume formula milk (Table 4).

Table 4. Weight, body length, upper arm circumference, and head circumference averages of males and females exclusively breastfed (Group1) and non-exclusively breastfed (Group2) infants

	Group1			Group2		
Males	**mean**	**n**	**s**	**mean**	**n**	**s**
Weight (Grams)	7021.29	31	297.00	7913.10	29	531.21
Body Length (mm)	628.26	31	12.20	595.86	29	9.83
Upper Arm Circumference (mm)	135.16	31	6.39	141.03	29	7.72
Head Circumference (mm)	437.58	31	9.21	395.86	29	6.56
Females						
Weight (Grams)	6982.11	19	288.15	8099.52	21	489.53
Body Length (mm)	624.74	19	14.38	601.90	21	10.78
Upper Arm Circumference (mm)	135.26	19	5.65	146.67	21	7.30
Head Circumference (mm)	436.05	19	8.43	402.38	21	6.45

Note: Group1= exclusively breastfed infants, Group2= non-exclusively breastfed infants

The weight averages (Table 4) of males in Group1 and Group2 were significantly different (t = -7.95, sig.=0.00). Group1 (7021.29 gr) was significantly lighter than those of Group2 (7913.10 gr). Similarly, females of Group1 (6982.11 gr) was significantly lighter than females of Group2 (8099.52 gr), t = -8.89, sig.=0.00.

The average of body length (Table 4) of males in Group1 (628.26 mm) was significantly higher than those of Group2 (595.86 mm), t = 11.28, sig. = 0.00. Meanwhile, the average of body length of females in Group1 (624.74 mm) was also significantly higher than those of Group2 (601.90 mm), t = 5.72, sig. = 0.00.

The average of upper arm circumference (Table 4) of males in Group1 (135.16 mm) was significantly lower than those of Group2 (141.03 mm), z = -2.91, sig. = 0.00. Females' averages of upper arm circumference differed significantly between Group1 (135.26 mm) and Group2 (146.67 mm), *t* = -5.48, sig. = 0.00.

Males' average of head circumference (Table 4) of Group1 (437.58 mm) was significantly greater than those of Group2 (395.86 mm), z = -6.7, sig. = 0.00. Females' head circumference of Group1 (436.05 mm) was also significantly greater than those of Group2 (402.38 mm), *t* = 14.27, sig. = 0.00.

Discussion and Conclusions

The status of social-economy of the family may influence the decision whether a mother breastfeed the baby. It involves the knowledge of the mother regarding the benefit of breastfeeding for the mother and the baby. In this research, the biggest influence to the mother, to exclusively breastfeed her baby, was her working status. Working mothers prefer to introduce milk bottle in the early months after the baby was born, so that it would be easy to leave the baby when the time has come for the mother to go back to work. Meanwhile, when the baby is full, she would not want to take breast-milk as often as exclusively breastfed babies, hence less breast-milk to be excreted. Besides, most babies who know how easy it was to obtain the milk from a bottle, preferred the bottle instead of her mother's breast. Ironically, in Indonesia the hospital usually is the institution who introduces the milk bottle to the baby. The mother is told that the formula milk is given to the baby to ease her hunger before the breast-milk is excreted in a large amount.

There was another reason for recent Indonesian mothers to prefer giving formula milk, instead of exclusive breastfeeding. There is a myth that healthy babies mean fat babies. Therefore mothers like to give formula milk to their babies to have them look more chubby.

The enzyme in breast-milk has helped the baby to dispose of excessive fat. The formula milk does not have the enzyme, and it contains more casein, so that those will cause over weight in the long run. Therefore the averages of weight and upper arm circumference of Group2 were significantly greater than those of Group1.

The nutrition that was consumed by Group2 was the "wrong" kind, that mostly were not needed by the babies, so that they caused over weight, as reflected by the significantly greater averages of body weight and upper arm circumference in Group2, compared to those of Group1. This may cause some health problems when the individuals are older—Barker's Hypothesis[9]. On the other hand, the "right" kind of nutrition, that was consumed by Group1, was reflected in significantly greater averages of body length and head circumference in Group1, compared to those of Group2.

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