



Duration of breastfeeding has a positive effect on infant weight gain

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ABSTRACT

With increasing maternal age hopefully the mother knows more about raising a baby and supervising their growth and development. With normal birth weight and adequate duration of exclusive breastfeeding the baby can be expected to have optimal growth and development. The goal of this historical-cohort prospective study was to analyze the relation between maternal age, infant birth weight and duration of breastfeeding on the one hand with infant weight gain on the other. The population under study were six-month-old infants in the catchment area of Pagar Gading Community Health Center, Pino Raya Region, South Bengkulu Regency. The total sample consisted of 31 six-month-old infants, selected by consecutive nonrandom sampling of subjects meeting the inclusion criteria. Statistical analysis was performed by means of the correlation-regression test. There was a significant correlation between duration of breastfeeding and infant weight gain using the correlation test ($p < 0.05$), whilst there was no correlation of infant weight gain with maternal age ($p > 0.05$). Furthermore, with the multiple linear regression test, duration of breastfeeding affected infant weight gain ($p < 0.05$), but infant birth weight and maternal age had no effect ($p > 0.05$). The conclusion of this study is that duration of exclusive breastfeeding affects infant weight gain. Breastfeeding of infants should be prolonged beyond the age of 6 months.

Keywords: Breastfeeding, maternal age, infant weight gain

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INTRODUCTION

The growth patterns of healthy infants during the first year of life and the standards for their assessment have been important subjects of research among nutritionists and child health workers in recent decades.⁽¹⁾

It is well-established that human milk is the optimal form of infant nutrition. Breastfeeding confers immunologic, psychological, and developmental benefits to the infant.⁽²⁾ Breastfed infants grow differently during the first year of life than do those fed infant formula. A growing body of evidence

shows that breastfeeding is associated with longterm benefits for the infant, such as a reduced risk of developing overweight and obesity during childhood.^(3,4)

The 2001 National Household Health Survey (NHHS) showed that only 47% children aged 0-3 months were exclusive breastfed, and 6% children 6-7 months old still had exclusive breastfeeding without food supplement.⁽⁵⁾ In rural areas the mother commonly breastfeeds her child, but study results indicate the influence of bad habits, such as giving the infant food/drink as breast milk substitute in the initial postpartum days before mother's milk is produced. The substitute foods are among others rice water, a kind of rice preparation (*nasi makmak*), honey, and coconut water, which may endanger the infant's health and reduce the opportunities for stimulating breast milk production as early as possible through the infant's nursing at the mother's breasts. In addition, there are many mothers who do not utilize the colostrum (breast milk secreted in the initial postpartum days), because it is viewed as unfit for infant consumption, as soured milk, etc. Furthermore, breast milk substitutes (BMS) are given at inappropriate times (too early or too late) and are qualitatively as well as quantitatively inadequate. It is recommended that BMS be given from the age of 4-5 months, so that at age 6 months and above all infants have been given BMS.⁽⁵⁾

Formula-fed infants are often introduced to complementary foods earlier than are their breastfed counterparts; these infants are exposed to a different feeding pattern than are infants who continue to breastfeed.^(6,7) This combination of short periods of breastfeeding and early introduction of complementary food may contribute to the altered growth patterns seen in nonbreastfed infants.

The age range of 0-24 months is a period of intense growth and development, such that it is frequently designated the golden period and also the critical period. The golden period may be realized if at this time period the infant

and child receives nutritional intakes that are appropriate for optimum growth and development. On the other hand, if in this period the infant and child do not receive food appropriate with the nutritional requirements, the golden period will turn into a critical period that disturbs their growth and development, either at the present stage or in subsequent stages. In Indonesian infants, birth weight and length have also been found to be important determinants of infant growth.⁽⁸⁾ Infant birth weight and length are determinants of future nutritional status as was shown in Bangladeshi infants who experienced very little catch-up growth after birth.⁽⁹⁾

In order to achieve optimal growth and development, in the Global Strategy For Infant and Young Child Feeding, the WHO/UNICEF recommend 4 important measures: firstly, breastfeeding newborn babies within the initial 30 minutes of birth; secondly, exclusive breastfeeding from birth up to the age of 6 months; thirdly, giving complementary foods at 6-24 months; and fourthly, continuing breastfeeding until the age of 24 months and over. These recommendations stress sociocultural norms; complementary foods should be prepared from inexpensive and indigenous food.⁽¹⁰⁾ This study was conducted to test the hypothesis that breastfeeding has a positive effect on the weight gain in infants 0 to 6 months of age.

METHODS

Research design

A historical-cohort observational study was conducted to assess the relation between breastfeeding and the growth performance of infants 0-6 months of age from November 2008 until April 2009.

Subjects

All infants recruited were born in a maternal and child care facility at the Puskesmas Pagar Gading, Pino Raya District,

South Bengkulu Regency. Infants were enrolled consecutively at birth if they were term, singleton, had a birth weight of between 2000 to 4000 g inclusive, and whose mothers agreed to participate in the study. Infants with congenital malformations or neonatal diseases were excluded from the study.

Sample size

An a priori calculation for sample size for multiple regression was performed, indicating that a sample of 31 subjects or more would achieve a power level of 0.80 with a level of $p < 0.05$, using as many as 3 predictor variables.⁽¹¹⁾

Data collection

The anthropometric data collected was infant birth weight, performed monthly by means of a beam balance (*dacin*) calibrated in kilograms, up to one digit after the decimal point. The weighing of the infants was performed at the Health Center. Information was obtained on maternal age, socioeconomic characteristics, and duration of breastfeeding.

Data analysis

Independent t-test was performed for comparing maternal age, infant birth weight, and gender between the group of infants breastfed for 4 months and those breastfed for 6 months. To adjust for additional explanatory variables while exploring the association between the main exposure (duration of breastfeeding) and the main outcome (infant weight gain), a multiple linear regression model was constructed that included the potential confounding variables maternal age

and infant birth weight. All statistical analyses were performed by means of SPSS version 11.0 at level of significance of 0.05.

RESULTS

Data for analysis were available for 31 infants participating in the study, consisting of 13 male and 18 female infants, whose mothers had a mean age of 26.1 ± 4.2 years with a range of 18-38 years. The mean infant birth weight was 2.9 ± 0.5 kg, with a range of 2.0 - 4.0 kg. Infants exclusively breastfed for 6 months amounted to 51.6% and those breastfed for 4 months 48.4%.

There was no difference in maternal age, infant birth weight and infant gender between infants breastfed for 4 months and those breastfed for 6 months (Table 1).

Figure 1 shows that after breastfeeding for more than 4 months there was a difference in infant weight gain. In infants breastfed for 6 months, the mean weights at 5 and 6 months were 7.1 kg and 7.6 kg higher than infants breastfed for 4 months, with mean weights at 5 and 6 months of respectively 6.7 kg and 7.1 kg.

From Figure 2 it is apparent that mean weight gain of infants breastfed for 6 months was greater than that of infants breastfed for 4 months. In month I there was no significant difference in mean infant weight gain. In month II mean infant weight gain of infants breastfed for 0-4 months was greater than that of infants breastfed for 0-6 months, but thereafter breastfeeding for 0-6 months led to a higher mean infant weight gain compared with breastfeeding for 0-4 months.

Table 1. Maternal age, infant birth weight, infant gender by duration of breastfeeding

Variables	Duration of breastfeeding		P
	6 months (n=16)	4 months (n=15)	
Maternal age (yrs)	25.5 ± 4.1	26.6 ± 4.4	0.451
Birth weight (kg)	3.1 ± 0.5	2.9 ± 0.6	0.268
Gender			
Male	5 (38.5%)	8 (61.5%)	0.268
Female	10 (55.6%)	8 (44.4%)	

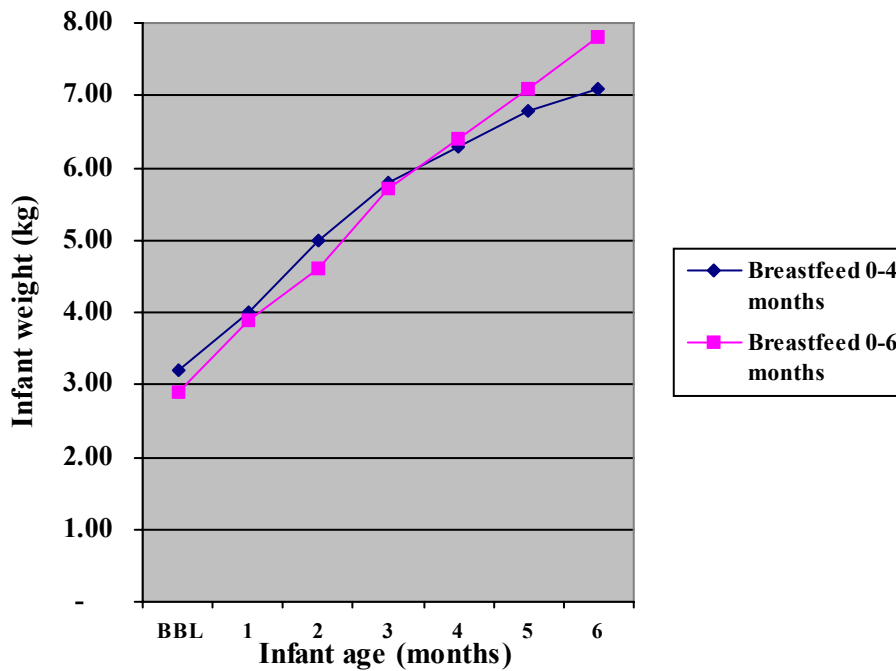


Figure 1. Mean monthly infant weight by duration of breastfeeding

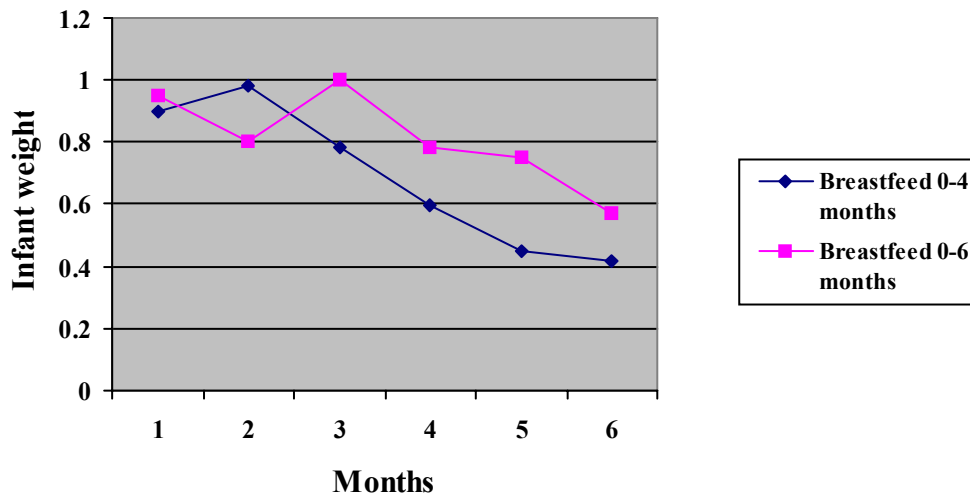


Figure 2. Mean monthly infant weight gain by duration of breastfeeding

Maternal age was inversely associated with infant weight gain, but this association was statistically not significant ($\hat{\alpha}=-0.024$, $p=0.981$). Infant birth weight had a statistically non-significant negative association with infant weight gain ($\hat{\alpha}=-1.693$, $p=0.102$).

Duration of breastfeeding had a statistically positive effect on infant weight gain. Additional breastfeeding for one month resulted in an increase in infant birth weight of 0.415 kg ($\hat{\alpha} = 0,415$, $p=0.048$) (Table 2).

Table 2. Adjusted multiple linear regression analysis of factors that contributed to the model

Variables	β	p
Maternal age	-0.024	0.981
Infant birth weight	-1.693	0.102
Duration of breastfeeding	0.415	0.048

DISCUSSION

The results of this study indicated that there was no correlation between maternal age and infant weight gain in the age range of 0-6 months. This finding was consistent with that obtained in a study in Mexico City on infants between 0 and 6 months of age, showing no significant association between maternal and household characteristics on the one hand, comprising maternal age, education, marital status, crowding, sewage disposal, and use of piped water, and weight gain of infants between 0 and 6 months of age.⁽¹¹⁾ Similar results were obtained in a Danish study indicating that maternal age had no significant association with infant weight gain.⁽¹²⁾ In addition, infant birth weight did not affect infant weight gain up to the age of 6 months, which finding was also obtained by Taveras et al.⁽¹³⁾ Our study results differed from those obtained in a study in Bangladesh on 1654 infants followed from birth up to the age of 12 months, showing that infant birth weight was significantly associated with infant weight gain from 0 to 12 months.⁽⁹⁾ The studies conducted by Villalpando et al.⁽¹¹⁾ and Taveras et al.⁽¹³⁾ obtained results similar to ours, viz. that infant birth weight was not significantly associated with infant weight gain. A longitudinal study of maternal feeding style throughout infancy showed that infant birth weight was not associated with infant weight gain from 6 to 12 months.⁽¹⁴⁾

The latter study revealed that duration of exclusive breastfeeding for 6 months affected infant weight gain, which was also seen in

infants from an Afro-Columbian community,⁽¹⁵⁾ thus once again demonstrating the superiority of exclusive breastfeeding in influencing infant weight gain. Consistent results were also found in a multicenter study involving 7 localities (Chengdu, China; New Delhi; Guatemala City; Sagamu, Nigeria; Santiago, Chile; Uppsala, Sweden; and Westmead, Australia), where 1252 infants were followed up from birth up to the age of 32 weeks.⁽¹⁶⁾ In contrast to our results, in the latter study it was found that infants who were breastfed gained less weight at 1 year than did formula or mixed-fed infants.⁽¹²⁾ Children exclusively breastfed for less than 6 months had a greater risk of elevated weight gain at the age of 2 years than children breastfed for 6 months and more.⁽¹⁷⁾ During the first 6 months of life the growth of exclusively breastfed infants was also similar to that of the infants regularly receiving formula at 12–16 weeks of age, mostly in addition to breast milk. The fact that exclusively breastfed infants showed the same growth as infants who were not exclusively breastfed may be partly due to the fact that there was also a high breastfeeding rate in the latter group. Many studies have shown more rapid growth during the second half of the first year in infants fed with formula during the first 6 months.⁽¹⁾ Complementary food in addition to breastfeeding turned out to have no great effect on infant growth and development.⁽¹⁸⁾


There were several limitations to this study. Firstly, diseases suffered by infants as confounding variables were not available and thus could not be analyzed. Secondly, data on infant feeding patterns were not collected and infant weight should preferably be collected minimally up to the age of one year.

CONCLUSIONS

This study demonstrates that exclusive breastfeeding is an ideal nutrition that can adequately support optimal growth in the first 6 months of life. Duration of exclusive

breastfeeding enhances infant weight gain optimally.

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