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The effect of exclusive breastfeeding on reducing acute respiratory infections in low birth weight infants

Karolina Trigemayanti Tallo[1], I Kompiyang Gede Suandi[1], Setya Wandita[2]

Abstract

Background Infants who are breastfed receive natural protection against certain infections. Despite the known benefits of exclusive breastfeeding, many Indonesian mothers choose to supplement with formula. There have been few Indonesian studies on the effect of exclusive breastfeeding in reducing acute respiratory infections in low birth weight infants in their first four months of life.

Objective To investigate the effect of exclusive breastfeeding in reducing the incidence of acute respiratory infections in low birth weight infants during their first four months of life.

Methods We conducted a prospective cohort study on low birth weight babies in Sanglah Hospital, Denpasar. The total number of subjects was 181. The incidence of acute respiratory infections during the first 4 months of life and the duration of breastfeeding were assessed by questionnaires. Data was analyzed with Chi square and logistic regression tests.

Results Infants who were exclusively breastfed for 4 months had a lower risk of acute respiratory infection than those who were not exclusively breastfed (RR 0.07; 95% CI 0.03 to 0.14; P=0.001). After adjustment for gestational age, parity, maternal nutritional status, family size, smoke exposure, and history of atopy, infants who were exclusively breastfed still had a lower risk for acute respiratory infection than those who were not exclusively breastfed (RR 0.06; 95% CI 0.03 to 0.13; P = 0.001)

Conclusion Exclusive breastfeeding reduced the risk of acute respiratory infection in low birth weight infants in the first four months after birth. **[Paediatr Indones. 2012;52:229-32]**.

Keywords: *low birth weight, breastfeeding, acute respiratory infection*

Birth weight is a strong predictor for growth and survival of infants.[1] Low birth weight babies have specific problems caused by immaturity of multiple organ systems. Therefore, low birth weight babies have a higher risk of infection, especially respiratory infections. Acute respiratory infection is a cause of high infant mortality and morbidity in Indonesia (24-25%).[2]

Breastfeeding practices differ among Indonesians. Based on data from the 2002 Indonesian Demographic Health Survey (SKDI - *Survei Demografi Kesehatan Indonesia*), only 3.7% of newborns received breast milk on the first day of their lives.[2] Data from the Ministry of Health reported the exclusive breastfeeding rate in 2008 to be 37.98% in Bali.[3]

Breast milk can protect infants from certain infections, such as respiratory infection, gastrointestinal infection, and sepsis.[4] We aimed to determine the effect of exclusive breastfeeding on reducing acute respiratory infections in low birth weight infants during the first four months of life.

From the Department of Child Health, Udayana University Medical School, Sanglah Hospital Denpasar[1] and Gadjah Mada University Medical School/Sardjito Hospital Yogyakarta[2], Indonesia.

Reprint requests to: Karolina Trigemayanti Tallo, Department of Child Health, Udayana University Medical School/Sanglah Hospital, Denpasar, Jalan Kesehatan, Denpasar 80119, Indonesia. Tel. +62-21-244038, Fax. +62-21-244038. E-mail: *carol_robby13@yahoo.com.*

Methods

This prospective cohort study was performed in Sanglah Hospital, Denpasar, from January 2010 to April 2011. Subjects were low birth weight infants born in the hospital, with birth weight of 2,000 - 2,500 grams and gestational age ≥ 34 weeks. They were singletons and received breast milk or breast milk and formula combination either directly or by bottle, spoon, or nasogastric catheter. Subjects who got breastmilk combined with formula milk and/or additional food or only formula milk were classified as not exclusively breastfed. Subjects' parents provided written informed consent. Subjects were excluded if they suffered from complications during labor, infections during their time in the hospital nursery, or had contraindications for breastfeeding or congenital anomalies. The required number of subjects was 181, based on α=5% and power 80%. Subjects were recruited by consecutive sampling and assigned to either the exclusively breastfed group or the non-exclusively breastfed group.

At the time of hospital discharge, mothers were given diaries to record their breastfeeding practices and their child's illnesses. They were asked to visit the Outpatient Clinic of the Department of Child Health, Sanglah Hospital, Denpasar, on a monthly basis. During each visit, mothers filled questionnaires on the episodes of acute respiratory infections in their child, as well as the continuity of their breastfeeding practice. Parents were requested to take their infants immediately to the Pediatric Outpatient Clinic if their infants were ill. Sick infants were then examined by eligible pediatric residents. If the parents and infants were unable to attend the monthly clinic visit, a research assistant would call or make a home visit on a suggested day. Questionnaires would then be filled at the subject's residence.

We used Chi square and logistic regression tests to analyze the data. A P value of < 0.05 was considered to be statistically significant. This study was approved by the Ethics Committee of the Udayana University Medical School/Sanglah Hospital, Denpasar.

Table 1. Baseline characteristics of subjects

Characteristics	Exclusively breastfed for 4 months (n = 90)	Not exclusively breastfed for 4 months (n = 91)
Infant characteristics		
Male gender, n (%)	46 (51)	44 (48)
Small for gestational age, n (%)	43 (48)	36 (39)
Family characteristics		
Mean maternal age, years (SD)	25.57 (4.71)	26.02 (4.75)
Parity, n (%)		
First parity	51 (57)	41 (45)
Multiparity	39 (43)	50 (55)
Maternal nutritional status, n (%)		
Undernourished	17 (19)	19 (21)
Well-nourished	67 (74)	65 (71)
Overweight	6 (7)	6 (7)
Obese	0 (0)	1 (1)
Mean monthly family income, Rupiah (SD)	1,390,000 (688,464)	1,350,000 (580,684)
Family size, n (%)		
≤ 4 people	51 (57)	39 (43)
Combination contraception, n (%)		
Yes	1 (1)	12 (13)
Smoke exposure, n (%)		
Yes	55 (61)	66 (73)
Ethnicity, n (%)		
Balinese	63 (70)	61 (67)
Javanese	19 (21)	23 (25)
Others	8 (9)	7 (8)
DPT immunization, n (%)		
Yes	87 (97)	91 (100)
Family history of atopy, n (%)		
Yes	32 (35)	38 (42)

Results

One hundred eighty-six subjects fulfilled our inclusion criteria. Three subjects were lost to follow up and two dropped out the study due to change of residence and death. Hence, 181 subjects completed the study. The baseline characteristics for each group are shown in **Table 1.**

In unadjusted analysis, infants who were exclusively breastfed for four months were at lower risk for having acute respiratory infection than those who were not exclusively breastfed for four months (RR 0.07; 95% CI 0.03 to 0.14) (**Table 2**).

Table 3 shows the risk of acute respiratory infection after adjustments for gestational age, parity, maternal nutritional status, family size, smoke exposure, and family history of atopy. We found that infants who were exclusively breastfed for four months had a lower risk of acute respiratory infection compared to those who were not exclusively breastfed for four months (Adjusted RR 0.06; 95% CI 0.03 to 0.13).

Table 2. Risk of acute respiratory infection (ARI)

	Incidence of ARI	RR	95% CI	P value
Exclusively breastfed (n= 90)	23	0.07	0.033 to 0.140	0.001
Not exclusively breastfed (n= 91)	76			

Table 3. RR for ARI adjusted for size for gestational age, parity, maternal nutritional status, family size, smoke exposure, and history of atopy

	Adjusted RR	95% CI	P value
Exclusively breastfed	0.06	0.03 to 0.13	0.001
Size for gestational age			
Small gestational age	0.84	0.39 to 1.79	0.649
Parity			
First parity	0.59	0.23 to 1.46	0.254
Maternal nutritional status			
Under-nourished	1.60	0.79 to 3.22	0.186
Family size			
≤ 4 people	2.01	0.79 to 5.10	0.140
Smoke exposure			
Yes	1.14	0.52 to 2.50	0.739
Family history of atopy			
Yes	0.96	0.45 to 2.07	0.923

Discussion

There have been few Indonesian studies on the relationship between exclusive breastfeeding and acute respiratory infection, particularly in low birth weight infants. Most studies used normal weight, newborn infants as subjects. In previous studies, infants given formula milk for four months were reportedly at greater risk for acute respiratory infections compared to those who were exclusively breastfed.[6-9] Another study reported that shorter duration of breastfeeding increased the risk of acute respiratory infections.[5]

We found that exclusively breastfed low birth weight infants had a lower risk of acute respiratory infection compared to those who were not exclusively breastfed for the first four months of life.

It is thought that bioactive components in breast milk protect against acute respiratory infections. Passive protection from breast milk affects the immune system's response by various mechanisms, such as the immune system's maturation, anti-inflammation, immunomodulation, and anti-microbial activity.

Immune components found in breast milk, such as secretory immunoglobulin A (sIgA) and interferon, protect low birth weight infants from infection. Also, skin-to-skin contact during breastfeeding stimulates the production of specific antibodies from mothers against infection.[10]

Secretory Ig A is one of three main classes of immunoglobulins found in colostrum and breast milk.

Secretory Ig A concentration in breast milk of mothers with low birth weight infants is higher than in mothers with normal birth weight infants.[11] Secretory Ig A can activate the complement system through alternative pathway and in cooperation with macrophages can also phagocytize various microorganisms. Secretory Ig A also plays an important role in the defense against syncytial virus, and macroglobulin-like substance can inhibit influenza and parainfluenza viruses.[12]

The relatively short duration of follow-up was a limitation of this study. The effects of exclusive breastfeeding were studied only until the infants were four months of age. The recommended minimum duration of exclusive breastfeeding for low birth weight infants is four months. Further research with a longer duration of breastfeeding is needed to determine the long-term effect of breastfeeding on acute respiratory infections.

In conclusion, in low birth weight infants, subjects who were exclusively breastfed for the first four months of life had reduced risk of acute respiratory infection compared to subjects who were not exclusively breastfed.

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