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# Early allergy symptoms in infants aged 0-6 months on breast milk substitutes

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## Abstract

***Background*** Atopic diseases are common in children and a serious health problem worldwide. Atopic dermatitis, food allergies, asthma and allergic rhinitis, have been described as the natural progression of allergic diseases, also known as the "allergic march". Cow's milk protein is known to be a common trigger of food allergies and hypersensitivity reactions during infancy.

***Objective*** To give an overview of the breast milk substitutes (BMS) and incidence of early allergy onset (allergic march) in atopic infants aged 0-6 months.

***Methods*** This cross-sectional study included a total of 40 atopic infants collected by consecutive sampling. A questionnaire was used for interview that inquired information on the type of BMS used, initial allergy complaints, the age of the emergence of early allergic symptoms, and the breakdown for BMS type. Univariate analysis was carried out to describe their characteristics as frequency distributions and percentages of each variables.

***Results*** Atopic dermatitis and wheezing were more common in boys (62.5%). Atopic dermatitis was the most common initial symptom to occur in atopic infants (52.5%). Atopic dermatitis and wheezing occurred together in 27.5% subjects. Early allergy symptoms that first occurred at the age of 1 month were seen in 42.9% for atopic dermatitis category, 37.5% for wheezing category, and 63.6% for both symptoms category, respectively. Cow's milk was the most common type of BMS given to atopic infants in the first 6 months of life (47.5%).

***Conclusion*** Early symptoms of allergies, such as atopic dermatitis and wheezing, are more common in boys than girls. Atopic dermatitis is the most common early symptom to arise, but both symptoms occur at an early age, often during the first month of life. **[Paediatr Indones. 2015;55:13-7.]**

*Keywords: atopic disease, breast milk substitutes, infant atopy*

Breast milk should be the main food given to infants in the first 6 months of life. Many studies have suggested that exclusive breastfeeding may protect infants against allergic responses. Exclusive breastfeeding can reduce the risk of atopic allergy in infants.[1,2] Atopic disease is common in children and caused serious health problem worldwide. Atopy was found in 39.8% of children whose mothers had a history of atopy, and in 30.2% of children whose fathers had a history of atopy.[1] Atopic dermatitis, food allergies, asthma and allergic rhinitis have been described as a natural progression of allergic disease, known as the "allergic march".[3] Sensitization to food allergens during infancy may be followed by sensitization to inhaled allergens in the future, so that symptoms that arise early in life such as atopic dermatitis could be followed by asthma and allergic rhinitis in the future.[4]

There are more than 170 types of food known to cause allergic reactions mediated by immunoglobulin

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E (IgE), but a number of prevalence studies only focused on the most common causes of food allergies, such as cow's milk, eggs, gliadin found in wheat, and the proteins found in nuts and seafood.[2,5,6] Cow's milk formula is known to be the most common cause of food allergy in infants. The emergence of early allergy symptoms in infants depends on the timing of the introduction of food to the diet. Several prospective studies have shown that early allergy symptoms in infants mostly appear in the first year of life and rarely after the age of two years.[7] We aimed to evaluate the early onset of allergy symptoms (allergic march) in atopic infants aged 0-6 months who were fed breast milk substitutes (BMS).

## Methods

This cross-sectional study was conducted in Dr. Zainoel Abidin Hospital, Banda Aceh, from May 2011 to February 2012. Subjects were collected by consecutive sampling. There were 40 infants who fulfilled the inclusion criteria: younger than 6 months of age, who were fed BMS, suffering early onset of allergies such as atopic dermatitis and/or wheezing and treated in the pediatric polyclinic.

Primary data were collected directly from respondents through interviews with parents/caregivers, with guidance of a questionnaire that inquired information on the type of BMS used, initial allergy complaints, the age of the emergence of early symptoms allergy, and the breakdown for BMS type. Primary data collected included the type of BMS used, such as cow's milk, soya milk, partially hydrolyzed formula, or extensively hydrolyzed formula. Initial allergy complaints included atopic dermatitis, wheezing, or both symptoms at the same time and were checked and confirmed by a pediatric allergist/immunologist. Subject's age at the time of the emergence of early allergy symptoms such as atopic dermatitis, wheezing, or both symptoms in the first 6 months of age were categorized as 1, 2, 3, 4, 5 or 6 months of age and the breakdown for BMS type were categorized according to each months. Secondary data was derived from the patient's medical records were used to obtain further subject biodata, including age, sex, and history of previous treatment.

Univariate analysis was carried out for all variables to describe their characteristics as frequency distributions and percentages of each variables.

## Results

During the period of data collection, we included 40 infants with atopic dermatitis and wheezing. The baseline characteristics of subjects are shown in **Table 1.** Early allergy symptoms were more common in boys than in girls, 25 (62.5%) vs. 15 (37.5%), respectively.

All infants in our study were on infant formula, none were on UHT or other types of milk. Formula in the study included cow's milk, soy milk, partially hydrolyzed milk and extensively hydrolyzed milk. The distribution of formula used as replacement feeding in infants with early symptoms of allergy can be seen in **Table 1**. Cow's milk was the most common type of BMS given to atopic infants in the first 6 months (47.5%), followed by partially hydrolyzed formula (32.5%). Soy milk was the least common type of BMS given to our subjects (5%). Atopic dermatitis alone was the most common initial symptom (52.5%), while wheezing alone was the least common (20%). The combination of the initial symptoms of atopic dermatitis and wheezing at the same time occurred in 11 infants (27.5%) **(Table 1)**.

**Table 2** shows the emergence of initial allergy complaints in the first 6 months of age. Atopic dermatitis was occurred at the earliest age of 1 month in 42.9%, wheezing in 37.5% and 63.6% for both symptoms category, where cow's milk was the most type of BMS given to atopic infant in the 1

**Table 1.** Baseline characteristics of subjects (n=40)

| Characteristics | n | % |
|---|---|---|
| Gender | | |
| Males | 25 | 62.5 |
| Females | 15 | 37.5 |
| BMS used | | |
| Cow's milk | 19 | 47.5 |
| Soy milk | 2 | 5 |
| Extensively hydrolyzed formula | 6 | 15 |
| Partially hydrolyzed formula | 13 | 32.5 |
| Early symptoms | | |
| Atopic dermatitis | 21 | 52.5 |
| Wheezing | 8 | 20 |
| Both symptoms | 11 | 27.5 |

**Table 2.** Age of the emergence of initial allergy complaints in the first 6 months of age and the breakdown for BMS type according to each months.

| Age of the emergence of initial allergy complaints | n | BMS type | | | |
|---|---|---|---|---|---|
| | | Cow's milk | Soy milk | EHF* | PHF** |
| Atopic dermatitis (n=21) | | | | | |
| 1 month | 9 | 5 | | 1 | 3 |
| 2 months | 5 | 3 | | 1 | 1 |
| 3 months | 2 | 1 | | | 1 |
| 4 months | 3 | | 1 | | 2 |
| 5 months | 2 | | | 1 | 1 |
| 6 months | 0 | | | | |
| Wheezing (n=8) | | | | | |
| 1 month | 3 | 2 | | 1 | |
| 2 months | 2 | 1 | | | 1 |
| 3 months | 0 | | | | |
| 4 months | 1 | 1 | | | |
| 5 months | 1 | | 1 | | |
| 6 months | 1 | | | 1 | |
| Both symptoms (n=11) | | | | | |
| 1 month | 7 | 5 | | | 2 |
| 2 months | 2 | 1 | | | 1 |
| 3 months | 0 | | | | |
| 4 months | 1 | | | | 1 |
| 5 months | 1 | | | 1 | |
| 6 months | 0 | | | | |

*EHF = extensively hydrolyzed formula. **PHF = partially hydrolyzed formula

month of age category according to each early allergy symptoms.

## Discussion

Early onset of allergies during the first 6 months of life may be influenced by many factors, such as a family history of atopy, gender, and age of the infant.[8,9] Previous studies showed that early allergy symptoms in infants (atopic wheezing and atopic dermatitis) are more common in boys than in girls.[10,11,12] Our study also showed that early symptoms of allergy was more common in boys than girls.

Early allergy symptoms such as wheezing and atopic dermatitis usually appear within the first year of life and continue to decline with age.[13,14,15] Several prospective studies have shown that early allergy symptoms in infants mostly appeared in the first year of life, and rarely at the age of two years.[7] In fact, we found that atopic dermatitis and wheezing symptoms have emerged in the first month of age, which symptom development to decrease with age. Early onset of allergy symptoms may be due to irregularities in immune system development in newborns, such as imbalanced T-helper cells.[16] Newborn infants, especially in atopy, would be expected to have enhanced Th-2 immunity with a depressed Th-1 response. Domination of the Th-2 cytokines would lead to aberrant IgE production in response to allergens and sensitizations.[17,18] Furthermore, some reports suggest that skin manifestations such as atopic dermatitis, are early symptoms of the most common allergy in the first 2 years of life, usually appearing earlier than the other allergy symptoms. The skin of atopic dermatitis patients contains Langerhans cells that have a high affinity to bind to foreign antigens and IgE via Fc$\varepsilon$RI receptors on the surface, serving to present allergens to Th-2 and activate Th-0 to Th-2 in the circulation.[2,13]

Studies suggest that exclusive breastfeeding may significantly reduce the risk of developing early atopic allergy symptoms in infants, especially those with a family history of atopy.[1,12] However, to date, these results are inconclusive.[19]Cow's milk allergy caused by a protein in cow's milk.[20] Past studies have shown that cow's milk formula was known to be the most common cause of food allergy; and was suspected in early symptoms of allergy in infants.[7,12,21] An Italian study noted that infants allergic to cow's milk can tolerate extensively hydrolyzed formula. Other studies also noted that partially hydrolyzed formula

can be used to prevent the initial symptoms of atopic allergy in infants and for infants with mild allergy symptoms.[22,23] But in our study, the prevalence of early symptoms of atopic dermatitis in atopic infants who had consumed partially hydrolyzed formula remained high.

In conclusion, early allergy symptoms such as wheezing and atopic dermatitis are more common in boys than girls who are fed BMS at an early age. Atopic dermatitis is the most common early symptom during the first month of age.

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