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Original Article

The prevalence of atopic dermatitis history in asthmatic children

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ABSTRACT

Background Atopic dermatitis (AD) is a risk factor of asthma. There is still limited information about its prevalence and characteristics in asthmatic children.

Objective To find out the prevalence of AD history in asthmatic children.

Methods This was a cross-sectional study conducted at the Department of Child Health, Cipto Mangunkusumo Hospital, Jakarta, from July until December 2004. Patients with asthma who were at or less than 5 years of age were included in the study. The parents had completed study questionnaire about asthma, AD, and some information about atopic family history, the food history in infant period and environment factors.

Results Ninety children met the inclusion criteria. Male and female ratio was 1.5:1. Most of subjects reported onset of asthma in 12-36 months of age. The history of AD was found in 26% of asthmatic children with quite similar number for both sexes. All subjects had atopic family history with asthma as the most common manifestation. The environment factors contributed to this event were mother's diet containing allergen and smoking history in family during pregnancy and lactation period. More than half of subjects had no breast-feeding. Solid food and formulated milk had been early-introduced.

Conclusion History of AD is found in 26% asthmatic children. The percentage of characteristic distribution of factors which had been assumed has a role in asthma and AD was similarly equal between subjects with and without history of AD **[Paediatr Indones 2006;46:164-169]**.

Keywords: *atopic dermatitis, asthma, atopy, allergic*

Asthma is one of chronic respiratory allergic diseases most frequently found in children, and is still a main health problem in the community. The prevalence of asthma in children varies. In the United State, it has a range of 3.6-9.5%.[1] Many studies in Indonesia, which had been conducted between 1991-2002, indicated the prevalence of asthma in children with a range of 3-17.4%.[2]

Various studies about asthma in children indicate a continuous pattern between sensitization process against allergen and the development as well as natural history of allergic diseases, which is known as allergic march.[3] Clinically, allergic march begins as skin allergy (atopic dermatitis). With increasing age, this may become respiratory tract allergy (asthma and allergic rhinitis).[4] Atopic dermatitis (AD) which is usually called as atopic eczema is one of the most common skin disorder in infants and children.[3,4] Although the prognosis of AD is usually good, AD is known as a risk factor of asthma.[5] The objective of this study was to determine the prevalence of history of AD in asthmatic children and their characteristics.

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Methods

This was a cross-sectional, descriptive study which involved 90 children with asthma diagnosed at or less than 5 years of age. Asthma diagnosis was established based on Asthma National Consensus in Children/ *Konsensus Nasional Asma Anak (KNAA)*. The diagnosis of AD was based on Hanifin-Rajka criteria. Parents of all children who fulfilled the study criteria and had been treated in Allergy-Immunology, Respirology outpatient clinic, Medical School, University of Indonesia, Cipto Mangunkusumo Hospital, Jakarta, were asked to participate this study. The study was conducted during the period of July 2004 until December 2004. Parents were accompanied by the investigator to complete the study questionnaire about asthma, AD, information about atopic family history, food history in infancy, and environment factors. The study was approved by The Committee of The Medical Research Ethics of Medical School, University of Indonesia.

Results

Complete history of AD was obtained in 23 (26%) of subjects. The majority of AD onset was at less than 12 months of age, which was found in 22 (96%) of subjects. There was one subject with the onset of AD at 30 months of age **(Table 1)**.

Table 1. The prevalence and the onset of atopic dermatitis

Atopic dermatitis history	n (%)
Non atopic dermatitis (NAD)	67 (74)
Atopic Dermatitis (AD)	23 (26)
Onset of age:	
<12 months	22
>12 months	1

The mean age of subjects was 38 months with age distribution between 9 to 60 months. Male subjects were greater compared to female, with the ratio of 1.5:1. The ratio of male and female subjects with AD was similarly equal, but there were greater amount of male subjects compared to female subjects of non atopic dermatitis (NAD) with the ratio of 1.7:1. The greatest number of asthma onset was at 12-36 months of age. It was found in 18/23 of AD subjects and 58 (87%) of NAD subject. Early asthma onset (age less than 12 months) was found in 7 subjects; including 3 AD subjects and 4 NAD subjects. The atopic family history was found in all of subjects. Family history of asthma was found in 47 (52%) of the subjects, giving the percentage of AD subjects greater than NAD subjects. AD history in family was found only in 13 (14%) of subjects consist of 3/23 of AD subjects and 10 (15%) of NAD subjects **(Table 2)**.

From **Table 3**, it could be seen that there were fewer subjects with $\geq$2 siblings and subjects who had a pet, with similarly equal percentage of AD

Table 2. Characteristics of subjects based on age, sex, asthma onset, atopic history and atopic manifestation in family

Characteristics	AD n (%)	NAD n (%)	Total n (%)
Mean age (months) (range)	38.3 (11-60)	37.5 (9-60)	38 (9-60)
Sex			
Male	12/23	42/67	54/90 (60%)
Female	11/23	25/67	36/90 (40%)
Asthma onset			
<12 months	3/23	4/67	7/90 (8%)
12-36 months	18/23	58/67	76/90 (84%)
>36 months	2/23	5/67	7/90 (8%)
Atopy in family			
Positive	23/23	67/67	90/90 (100%)
Negative	0/23	0/67	0/90 (0%)
Atopic manifestation in family			
Asthma	14/23	33/67	47/90 (52%)
AD	3/23	10/67	13/90 (14%)
Other manifestations (urticaria, allergic rhinitis)	6/23	24/67	30/90 (33%)

AD: atopic dermatitis, NAD: Non atopic dermatitis
Family: father,mother,grand-father,grand-mother, siblings

TABLE 3. CHARACTERISTICS OF SUBJECTS BASED ON ENVIRONMENT FACTORS

Characteristics	AD n (%)	NAD n (%)	Total n (%)
The amount of siblings			
0-1	18 (78.3)	47 (70.1)	65 (72.2)
≥2	5 (21.7)	20 (29.9)	25 (27.8)
Having pet (dog, cat, bird)			
Yes	8 (34.8)	20 (29.9)	28 (31.1)
No	15 (65.2)	47 (70.1)	62 (68.9)
Mother's diet containing allergen during pregnancy and lactation period			
Yes	23 (100)	67 (100)	90 (100)
No	0	0	0
Smoking in family during pregnancy			
Yes	14 (60.9)	46 (68.7)	60 (66.7)
No	9 (39.1)	21 (31.3)	30 (33.3)
Smoking in family during lactation period			
Yes	15 (65.2)	44 (65.7)	59 (65.6)
No	8 (34.8)	23 (34.3)	31 (34.4)
Basic immunization status			
Complete	20 (87.0)	52 (77.6)	72 (80)
Incomplete	2 (8.7)	14 (20.9)	16 (17.8)
No immunization	1 (4.3)	1 (1.5)	2 (2.2)

and NAD subjects. More than half of subjects had smoking history in their families, either during pregnancy or lactation period. Most of subjects have had completed basic immunization status with greater percentage in AD subjects compared to NAD subjects. The mother's diet during pregnancy and lactation period in all subjects contained allergenic ingredients such as cow's milk, egg, seafood, and peanuts.

More than half of the subjects had no breast-feeding; or if they had, it was only given for less than 4 months. In most subjects, formulated milk and solid food had been given since less than 4 months of age. Egg had been given after 4 months of age in most of the subjects **(Table 4)**.

Discussion

Diagnosis of AD in this study was established using Hanifin-Rajka criteria. History of AD was found in 23 (25.6%) of subjects, consisted of 12 male subjects and 11 female subjects. The onset of AD in this study was mostly found at less than 12 months of age **(Table 1)**. The prevalence history of AD in this study (25.6 %) is lower than the study results of Cafarelly *et al*[6] (38%). This difference seems as a consequence of different methods used in the previous study.

From **Table 2**, it could be seen that the mean age of all subjects was 38 months, with the range of 9 to 60 months of age. The mean age of AD subjects was 38.5 months with the range of 12 months to 59

TABLE 4. THE DISTRIBUTION OF SUBJECTS BASED ON BREAST FEEDING AND WEANING FOOD

Characteristics	AD n (%)	NAD n (%)	Total n (%)
Duration of exclusive breast-feeding			
<4 months/no breast-feeding	16 (69.6)	41 (61.2)	57 (63.3)
≥4 months	7 (30.4)	26 (38.8)	33 (36.7)
The age of formulated-milk feeding			
<4 months	16 (69.6)	54 (80.6)	70 (77.8)
≥4 months	7 (30.4)	13 (19.4)	20 (22.2)
The age of solid-food feeding			
<4 months	16 (69.6)	52 (77.6)	68 (75.6)
≥4 months	7 (30.4)	15 (22.4)	22 (24.4)
The age of egg-feeding			
<4 months	3 (13.1)	3 (4.5)	6 (6.7)
≥4 months	20 (86.9)	64 (95.5)	84 (93.3)

months of age, slightly higher than the mean age of non AD subjects.

More than half of subjects were male with male to female ratio 1.5:1. The ratio of male and female in this study is similar to study result of Cafarelly *et al*[6] and Rahajoe *et al*.[7] Cafarelly *et al*[6] conducted a study in 75 asthmatic children who came to the outpatient clinic. They found male to female ratio 1.7:1. In the year of 1998, Rahajoe *et al*[7] retrospectively studied about acute asthmatic children who came to the emergency room. They found male to female ratio 1.6:1. Based on literature, we could say that there is different asthma incidence in boys and girls. Some studies reported that girls have lower risk of asthma in childhood, compared to boys. The relationship between asthma and sex is correlated to the anatomy of airway.[8]

Most of asthma onset in this study was at 12-36 months of age. The asthma onset at less than 12 months of age was found in 3 (13%) of AD subjects and 4 (6%) of NAD subjects. The result of this study is similar to the study of Matondang *et al*,[9] in Pediatric Allergy-Immunology outpatient clinic, Cipto Mangunkusumo Hospital; i.e. 70.2% of subjects had asthma onset at less than 5 years of age and the greatest number is found between 2-4 years age by 45.2%.

Characteristics of subjects based on environmental factors is shown in **Table 3**, subjects with $\geq$2 siblings were found only in 25 (27.8%) of subjects. Some epidemiological studies reported that the risk of sensitization against allergen is inversely proportional to the amount of an infant's siblings in the family. The greater amount of siblings, the more frequent the risk of having infection, hence it decreases the risk of allergic diseases development.[10] The small number which was mostly found in this study was because most of subjects are in small family that averagely only has 1 child.

Ohshima *et al*[11] stated that specific IgE against mites which was found earlier is the main risk factor of asthma development in AD patients, as well as fairy-animals (fairy pet) exposure. In this study the role of mite can not be evaluated because there are no data. The examination of specific IgE or skin prick test may objectively determine whether one has been sensitisized by mites. Both of those examinations were not conducted in this study.

The mother's diet during pregnancy or lactatin period of all subjects in this study contained allergenic ingredient **(Table 3)**. Various studies have proven that sensitization against allergen has been occurred since fetal period because they have proven that allergic reaction may occur in neonates at first contact of certain food protein.[12]

In this study, most of patients had a complete immunization status. Gruber *et al*[13] found that children with complete immunization had lower risk of allergic diseases development in their first year of life. In this study, the effect of immunization on allergic disease development had not been known yet.

There was quite high cigarette smoke exposure during pregnancy and lactation period in this study **(Table 3)**. The cigarette smoke exposure is one of risk of asthma development. The pollutant in cigarette has been proven to cause asthma attack, increase the risk of lower respiratory tract infection, and decrease the lungs function.[14] Asterina[15] reported that there was significant correlation between smoking and the severity of asthma attack in children.

More than half of the subjects had no breast-feeding, or if they had, it was only given for less than 4 months **(Table 4)**. Breast-feeding in infant period may prevent the development of allergic disease in childhood until adolescence period. Saarineen[16] indicate the benefit of breast-feeding to prevent the development of allergic diseases. The benefit of breast-feeding could be seen in long-lasting breast-feeding, i.e. over than 6 months breast-feeding. Kull *et al*[17] followed a group of infants since neonates until 2 years of age. They found that exclusive breast-feeding for 4 months or more might significantly decrease the asthma, AD, and allergic rhinitis prevalence.

In this study, most of the subjects had been given formulated milk since neonates until 4 months of age, while egg had been given at the age of 4 and up **(Table 4)**. Adisasmito[18] found that the risk factor of respiratory tract allergy development (allergic rhinitis and asthma) in children with AD was egg feeding in early age (less than 1 year of age). In this study, we have not known yet whether egg feeding is a risk factor of asthma development or not.

Most patients had been fed by solid food since less than 4 months of age. Zieger[19] in Germany reported that formulated hydrolyzed protein feeding and the delay of solid food feeding for infants at or over than 4 months of age had been proven to significantly

decrease the AD prevalence. But Gustafsson *et al*[20] reported that the food pattern in infant period was not a significant risk of asthma development in children with AD.

Atopy in family (including asthma, AD, allergic rhinitis, and urticaria) was found in all of the subjects. More than half of the subjects had asthma as their atopic manifestation in family. The percentage of asthma in family of AD subjects was greater than the NAD subjects. Manifestation of AD in family was found only in some subjects either AD or NAD subjects **(Table 2)**. Literature stated that if both of parents have allergic diseases, than there is 60% of possibilities for their children to have allergic diseases. This statement had also been proven by some researchers.[21] Although this study did not use any control groups, but the high percentage of atopic history in family support the opinion that allergic diseases is inherited.

In conclusion, history of AD was found in 25.6% asthmatic children. The characteristic factors which had been assumed playing a role in asthma and AD was distributed equally between subjects with and without history of AD.

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