

# Prevalence of Atopic Dermatitis in Korea: Analysis by Using National Statistics

Jung-Seok Yu<sup>1,2</sup>, Chang-Jong Lee<sup>3</sup>,  
Ho-Seok Lee<sup>1,2</sup>, Jihyun Kim<sup>1,2</sup>,  
Youngshin Han<sup>1,2</sup>, Kangmo Ahn<sup>1,2</sup>,  
and Sang-Il Lee<sup>1,2</sup>

<sup>1</sup>Department of Pediatrics, Samsung Medical Center, Sungkyunkwan University School of Medicine, Seoul; <sup>2</sup>Environmental Health Center for Atopic Diseases, Samsung Medical Center, Seoul; <sup>3</sup>Health Insurance Policy Research Institute, National Health Insurance Corporation, Seoul, Korea

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Address for Correspondence:  
Kangmo Ahn, MD

Department of Pediatrics, Samsung Medical Center, Sungkyunkwan University School of Medicine, 81 Irwon-ro, Gangnam-gu, Seoul 135-710, Korea  
Tel: +82-2-3410-3530, Fax: +82-2-3410-0043  
E-mail: [kmaped@skku.edu](mailto:kmaped@skku.edu)

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We attempted to investigate the prevalence of atopic dermatitis (AD) in Korea by using national statistics. Data on AD patients who received medical service at least once a year from 2003 through 2008 were collected from health insurance research team of National Health Insurance Corporation. Data of estimated populations during the same period were obtained from the Statistics Korea. In 2008, the prevalence of AD was 26.5% in aged 12-23 months and decreased substantially to 7.6% at age 6 yr, 3.4% at age 12 yr and to 2.4% at age 18 yr. In males, the prevalence was higher than females until 2 yr of age, while the opposite was shown in children aged 2 yr or older. In children aged less than 24 months, the prevalence of AD has increased from 19.8% to 23.8% between the years 2003 and 2008, while the prevalence showed no increase in the older age group. In conclusion, the prevalence of AD in 2008 peaked during infancy up to 26.5% and decreased thereafter. Our findings also suggest that increasing prevalence of AD in children less than 24 months might be responsible for the recent increase in the prevalence of AD in Korean children.

**Key Words:** Prevalence; Dermatitis, Atopic; Korea

## INTRODUCTION

Atopic dermatitis (AD) has already become a social concern because it lowers quality of life in the affected families and also increases economic burden. Therefore, it is necessary to assess the prevalence and to attempt to establish a proper strategy for management at a society level. The prevalence of AD among children and adolescents is known to be increased worldwide (1-5). In Korea, nationwide surveys were conducted among elementary and middle school students in 1995 and 2000 to investigate the prevalence of allergic diseases using the ISAAC (International Study of Asthma and Allergies in Childhood) questionnaires (6). Unfortunately, these surveys did not include all age groups, although most of AD appears in infancy and early childhood (7, 8). In addition, the prevalence of AD varies according to different methodologies (9-12).

In Korea, the National Health Insurance Corporation (NHIC) has covered all parts of medical fees for the whole population as a compulsory social insurance system (13). Objective and reliable data are available in the NHIC because patient's clinical information is accumulated for reimbursing health care services covered. Using these national statistics, we can obtain objective data on AD patients from infants to adults. In this study, we at-

tempted to investigate the prevalence of AD according to the age and gender in all age groups by using Korean national statistics and examine the prevalence change from 2003 through 2008.

## MATERIALS AND METHODS

We asked health insurance research team of the NHIC for data on AD (base code L20 of the International Classification of Diseases-Tenth Revision) by age and gender from 2003 through 2008. The data were collected with a standard of principle diagnosis out of claims which clinics and hospitals made to NHIC after examining patients. The clinics and hospitals included department of pediatrics, internal medicine, dermatology, otolaryngology, and oriental medicine. The number of patients was determined by the number of diseased patients among beneficiaries tallied for the current year and actually examined by physicians. Those who visited either medical care institutions or pharmacies more than once a year were counted as 'one number of patient' in this study. Estimated population data from 2003 through 2008 were collected from the homepage of the Statistics Korea (<http://www.kostat.go.kr>). The total estimated population in 2008 was 48,606,787 (24,415,883 males and 24,190,904

females) and the estimated population of children and adolescents aged 18 yr or younger was 11,119,894 (5,843,178 males and 5,279,716 females). The prevalence of AD by age and gender was calculated by dividing the number of patients with the estimated population in each age group. The main results of this study were 1) the point prevalence of AD by age and gender in 2008 and 2) changes in the prevalence of AD in children and adolescents from 2003 through 2008.

**RESULTS**

**The number of patients with AD in 2008**

The total number of AD patients in 2008 was 1,086,982 (516,785 [47.5%] males and 570,197 [52.5%] females). The number of female patients was more than male patients by 53,412 (4.9%).

The number of patients aged less than 12 months was 94,253 (50,258 [53.3%] males and 43,995 [46.7%] females) and the number of male patients was more than female patients by 6,263 (6.6%). The number of patients aged 12-23 months was 117,988 (63,912 [54.2%] males and 54,076 [45.8%] females) and the number of male patients outnumbered female patients by 9,836 (8.3%). This age group accounted for the highest number of patients by age among all age groups. The number of patients at age 2, 3, 4 and 5 yr were 71,856, 51,879, 47,640, and 44,805, respectively and it decreased with age. The number of male patients at the age of 9 yr or younger was higher than for female patients, but by the age of 10 yr or older, female patients outnumbered male patients until middle age (Fig. 1). The number of patients aged 18 yr or younger was 764,569 and they accounted for 70.3% of the total number of patients with AD in 2008.

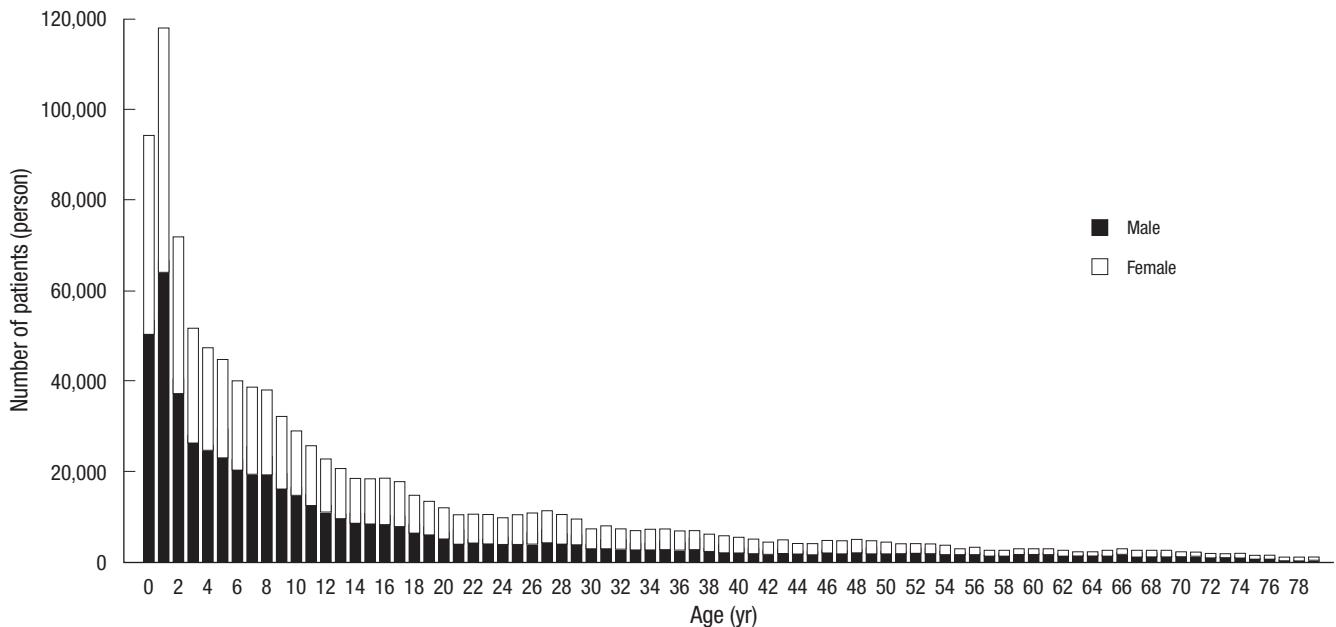


Fig. 1. The number of patients with AD by age and gender in Korea in 2008.

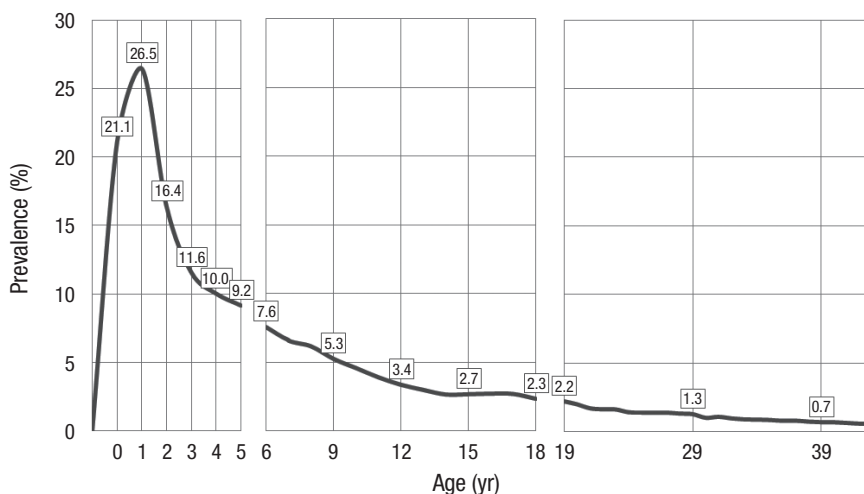


Fig. 2. The prevalence of AD by age in Korea in 2008.

**The prevalence of AD by age and gender in 2008**

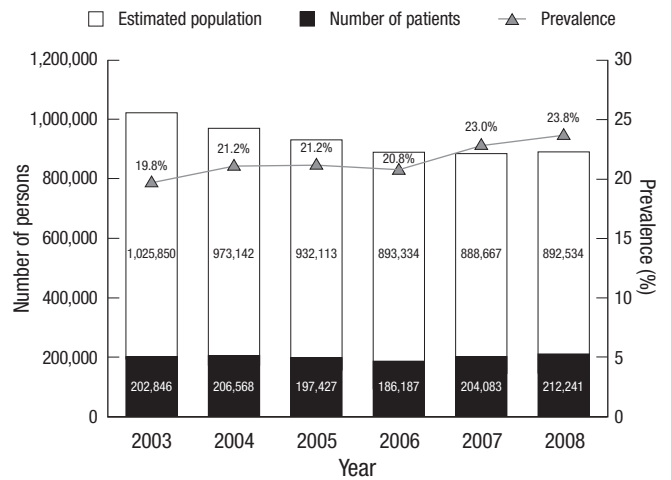
The total prevalence of AD in Korean children and adults in 2008 was 2.2% (males, 2.1%; females, 2.4%). The prevalence of children and adolescents was 6.9% and the prevalence among females (7.2%) was higher than that of males (6.6%). The prevalence of AD aged less than 12 months was 21.1%. The highest prevalence of AD by age was 26.5% in the age group of 12-23 months. The cumulative prevalence of AD aged less than 24 months was 23.8%. Thereafter, the prevalence decreased substantially to 7.6% at age 6 yr, 3.4% at age 12 yr and to 2.4% at age 18 (Fig. 2).

In children aged less than 24 months, the prevalence of AD in males was higher than that of females, while the opposite results were found in children aged 2 yr or older. The difference in the prevalence by gender became more significant with age so that the prevalence of males and females at age 18 yr were 1.9% and 2.9%, respectively. The prevalence at pre-school age (5 yr or younger) was 15.6% (males, 15.8%; females, 15.4%) and the prevalence at elementary (6-12 yr of age), middle (12-15 yr of age) and high (15-18 yr of age) school ages were estimated as 5.3% (males, 5.0%; females, 5.6%), 2.9% (males, 2.6%; females 3.4%) and 2.6% (males, 2.2%; females 3.2%), respectively (Table 1).

**Changes in the prevalence of AD with children and adolescents from 2003 through 2008**

The prevalence of AD in Korean children and adolescents aged under 18 yr slightly decreased from 7.2% in 2003 to 6.9% in 2008. After the patients were divided into 3 different age groups (less

than 24 months, 2-5 yr, 6-18 yr), we analyzed the prevalence change in each age group. The estimated populations aged less than 24 months were 1,025,850 in 2003, 973,142 in 2004, 932,113 in 2005, 893,334 in 2006, 888,667 in 2007 and 892,534 in 2008. The number of patients was 202,846, 206,568, 197,427, 186,187, 204,083, and 212,241, respectively, from 2003 through 2008. When comparing years 2003 and 2008, the estimated population aged less than 24 months decreased by 133,316 (13.0%), but the AD prevalence of this age group increased significantly from 19.8% to 23.8% (Fig. 3). In contrast, the prevalence was slightly decreased from 12.3% to 11.7% in children aged 2-5 yr (Fig. 4), and



**Fig. 3.** The number of patients, estimated population and prevalence of AD in children aged less than 24 months from 2003 through 2008.

**Table 1.** The prevalence of children and adolescents with AD by age and gender in 2008

Age (yr)	Number of patients (person)			Estimated population (person)			Prevalence (%)		
	Total	Male	Female	Total	Male	Female	Total	Male	Female
0	94,253	50,258	43,995	446,738	231,719	215,019	21.1	21.7	20.5
1	117,988	63,912	54,076	445,796	231,349	214,447	26.5	27.6	25.2
2	71,856	37,014	34,842	438,576	227,279	211,297	16.4	16.3	16.5
3	51,879	26,233	25,646	448,625	232,459	216,166	11.6	11.3	11.9
4	47,640	24,427	23,213	475,449	247,039	228,410	10.0	9.9	10.2
5	44,805	22,935	21,870	489,413	255,024	234,389	9.2	9.0	9.3
6	39,872	20,293	19,579	526,480	274,875	251,605	7.6	7.4	7.8
7	38,708	19,362	19,346	587,646	306,395	281,251	6.6	6.3	6.9
8	38,152	19,189	18,963	618,004	323,097	297,907	6.2	5.9	6.4
9	32,420	16,049	16,371	616,016	323,231	292,785	5.3	5.0	5.6
10	29,186	14,452	14,734	635,360	331,589	303,771	4.6	4.4	4.9
11	25,832	12,444	13,388	659,297	344,657	314,640	3.9	3.6	4.3
12	22,915	11,061	11,854	679,424	359,103	320,321	3.4	3.1	3.7
13	20,757	9,723	11,034	692,760	368,587	324,173	3.0	2.6	3.4
14	18,595	8,477	10,118	698,514	373,061	325,453	2.7	2.3	3.1
15	18,676	8,300	10,376	696,402	370,780	325,622	2.7	2.2	3.2
16	18,555	8,049	10,506	681,074	360,373	320,701	2.7	2.2	3.3
17	17,699	7,627	10,072	654,960	347,214	307,746	2.7	2.2	3.3
18	14,781	6,376	8,405	629,360	335,347	294,013	2.4	1.9	2.9
≤ 18	764,569	386,181	378,388	11,119,894	5,843,178	5,279,716	6.9	6.6	7.2
> 18	322,413	130,604	191,809	37,486,893	18,572,705	18,911,188	0.9	0.7	1.0
Total	1,086,982	516,785	570,197	48,606,787	24,415,883	24,190,904	2.2	2.1	2.4

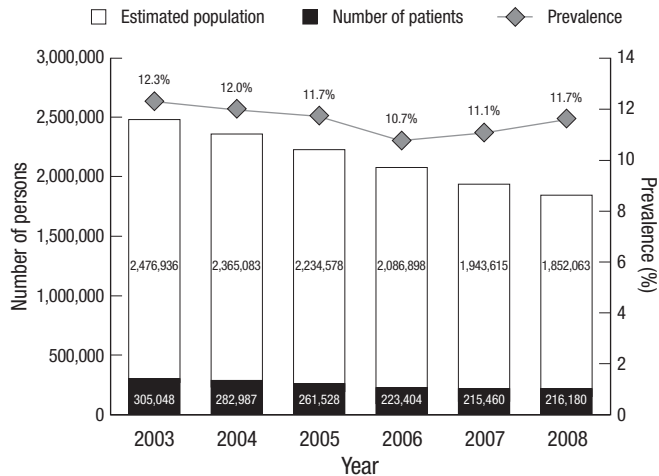


Fig. 4. The number of patients, estimated population and prevalence of AD in children aged 2-5 yr from 2003 through 2008.

also slightly decreased from 4.2% to 4.0% in children and adolescents aged 6-18 yr old (Fig. 5).

## DISCUSSION

In this study, the prevalence of AD was calculated by using the number of AD patients from data obtained from the NHIC and the estimated population from data of the Statistics Korea. Compared with questionnaire surveys depending on the parental report, this study has some advantages. We could collect data on the patients with physician-diagnosed AD and consequently avoid the recall bias. In addition, sampling error was excluded because these data include the whole population of Korea and little financial support was needed for investigation. In this regard, our study suggests that the analysis by using the data from national statistics could be useful to investigate annual prevalence of AD.

According to a birth cohort study where 562 children were followed from birth to age 6 yr, the point-prevalence peaked at 18 months of age (10%) and decreased at 36 and 72 months to slightly below 7%, while boys had earlier onset of AD than girls (14). Another birth cohort study in Germany showed that the cumulative prevalence of AD in the first 2 yr of life was 21.5% and of these children with early AD, 43.2% were in complete remission by age 3 yr (15). In our study, the prevalence of AD by age in 2008 reached 21.1% in children aged less than 12 months and 26.5% in children between 12-23 months. The cumulative prevalence of AD in the first 2 yr of age was 23.8%, and thereafter, the prevalence decreased with age, especially within the preschool period. This finding suggests that AD developed during infancy in most of cases and disappeared spontaneously over time, which is consistent with previous studies (14, 15).

In the questionnaire surveys using the ISAAC protocol in school children in Korea (5) and other countries (16-19), the prevalence

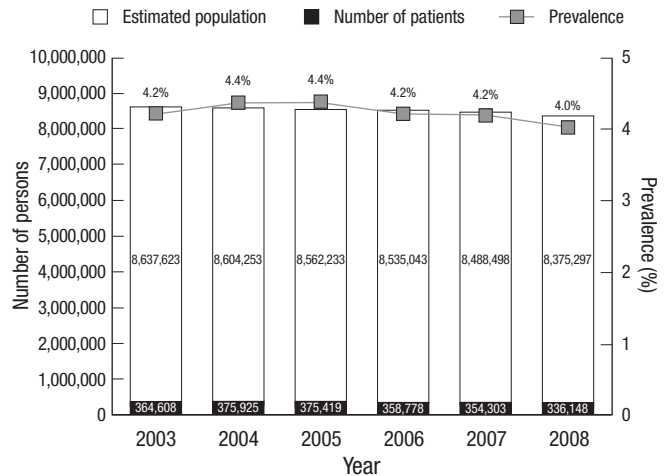


Fig. 5. The number of patients, estimated population and prevalence of AD in children aged 6-18 yr from 2003 through 2008.

of females was higher than that of males. In contrast, boys are more likely to develop atopic dermatitis in early childhood (15, 20). In the present study where infants and preschoolers were included, we also found that the prevalence in males was higher than females aged less than 24 months, while this sex difference changed over time. Although the exact mechanism remains unclear, sex hormones, different gene-environment interactions, or possibly misclassification of irritant contact dermatitis or allergic contact dermatitis, which could be more common in adolescent girls, has been suggested as possible explanations (21-24).

We found that the prevalence of AD in Korean children and adolescents under 18 yr old was slightly decreased from 2003 through 2008, but was significantly increased in infants aged less than 24 months. Increased prevalence of AD in early childhood might be due to exposure to environmental irritants, development of food allergies or increased awareness of the disease. In order to reduce the development of AD in Korean children, it seems to be important to elucidate the causative factor for the development of AD in children less than 2 yr.

Some limitations need to be considered in this study. Although the number of AD patients who were diagnosed by physicians was counted in national statistics, there is a concern of diagnostic accuracy because of the inter-observer variability in diagnosing AD. Clearly national statistics provide more objective data on AD rather than questionnaire surveys. However, this figure might be underestimated because those who do not use medical facilities were not included. Further studies are needed to evaluate the prevalence by comparing different methodologies.

In conclusion, the prevalence of AD in 2008 peaked during infancy up to 26.5% and decreased thereafter. Our findings also suggest that increasing prevalence of AD in children younger than 24 months might be responsible for the recent increase in the prevalence of AD in Korean children.

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