

# Prevalence Rate and Factors Associated with Atopic Dermatitis among Korean Middle School Students

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**Purpose:** The purpose of this study was to verify prevalence rates of atopic dermatitis (AD) in middle school students in Korea and to define AD and associated factors. **Methods:** This study was conducted using secondary analysis of raw data from the 'The 6th Korean National Adolescent Health Behavior Survey, 2010' conducted by the Korea Centers for Disease Control. The participants were 37,570 students. General characteristics and health behavior-related characteristics were analyzed using descriptive statistics,  $\chi^2$ -test and logistic regression analysis. **Results:** Results are as follows. 1. There were 8,494 middle school students (22.6%), who had been diagnosed with AD during the last 12 months. 2. Factors associated with AD in middle school students were gender ( $p < .001$ ), grade level ( $p = .001$ ), father's education ( $p < .001$ ), mother's education ( $p = .032$ ), regular dietary habits (breakfasts,  $p = .025$ ; lunches;  $p = .003$ ), stress ( $p < .001$ ), recognition of subjective awareness of one's health conditions ( $p < .001$ ), hand washing before meals at school ( $p = .013$ ), and cessation education for both smoking ( $p = .002$ ) and alcohol ( $p = .031$ ). **Conclusion:** Results of the study indicate that in order to alleviate AD symptoms in these students, there is a need to develop nursing interventions and education programs taking into consideration these variables and verifying the effects of interventions and programs.

**Key words:** Dermatitis; Atopic; Prevalence; Adolescent; Health behavior

## INTRODUCTION

Atopic dermatitis (AD) is an allergic skin disease that is chronically recurrent and it displays the characteristics of clinical findings such as severe pruritus, erythema and scaling, etc. Although the pathogenesis has not been identified as yet, AD occurs as a result of complex actions of aggravating factors and a number of causes, including immunological dysfunctions and genetic factors, environmental factors and skin barrier dysfunctions, etc. (Akdis et al., 2006; Sung, Lee, Lee, & Kim, 2006). AD has been known to display high prevalence rates during the infant stage through the childhood stage (Lee & Hwang, 2008). AD is also recognized as a typical allergic disease of the youth stage that can progress into, along with the child's growth into, asthma about 50% of the time

and into rhinitis about 75% of the time (Barnetson & Rogers, 2002). However, of recent, its prevalence rate has been increasing rapidly among adolescents and adults. Because it shows a tendency of becoming severe, attention on AD for adolescents and adults is required (Ministry of Health and Welfare, 2010; Sandstrom Folk & Faergemann, 2006).

In general, not only can physical problems such as fatigue and sleep disturbances that are caused by severe itching can occur often in subjects affected with AD, but also psychological problems such as poor self-esteem, loss of self-confidence, anxiety, etc. can accompany them (Kwon & Seo, 2009). And large skin lesions, skin detachment and others can cause secondary infections through bacteria, virus or fungus, whereby requiring in-hospital treatments (Kang, Jung, Lee, & Kim, 2009). The urgency of management of AD can be seen from the fact that,

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during the adolescent stages, AD can act as an interference factor (e.g., by being a learning disability due to poor ability to concentrate or by causing absence) and, after adolescence, it can even become a cause for contemplating a suicide (Kimata, 2006).

Due to the fact that it is not a simple disease that can be attributed to one single cause and the fact that it shows low rates of a complete cure and high recurrence rates, instead of a complete cure, AD would need to be treated with combination therapies of drug therapy, desensitization therapy, immunotherapy, etc. And it is important for the patient to try to improve one's conditions through the improvement of one's self-care skills at home for managing the lifestyle or environment that can affect or worsen AD (Lee, Cho, & Park, 2005). For middle school students, in particular, since they are at the stage of starting adolescence and their health behaviors learned and developed during this stage can continue throughout lifetime, habits of correct health behaviors can be formed and self-management can be achieved; therefore, this stage can be effective for undertaking efforts for improvement and the prevention of the worsening of AD.

AD-related studies that were released in Korea were focused on the children in most cases, and they were concentrated on examining AD in childhood, by gender, parents' educational background, dietary habits, environmental factors and stress (Jee et al., 2009; Lee, Kim, & Pyun, 2002; Oh et al., 2003). For this reason, a few studies dealing with youths were focused on those living in a specific area or those visiting hospitals, and they centered on youths' lifestyles or dietary habits (Cho et al., 2011; Lee et al., 2005; Park, Song, & Won, 2011). In addition, some studies in 2010 (Sung, 2010) were conducted to determine AD-related factors on the part of youths nationwide based on source data of the Korea National Health & Nutrition Examination Survey (KNHNES). However, the subject samples numbered about 800, and the related factors were focused on dietary habits of the subjects. Simultaneously, it is concluded that the continuously changing phases of the times may not be properly reflected when the source data was collected in 2005.

In the case of children, a method of treatment is selected by parents, and lifestyle or environmental factors are controlled. In the meantime, while middle school students are more proactive and have curiosity, they want to be emotionally independent from their interfering parents and they engage in risky behavior due to their lack of self-control. Given that they go through a phase in which they are highly likely to be exposed to environments detrimental to health, it is necessary to pay more attention in conducting studies on youths' AD. As the number of AD patients is

rapidly and continually growing among youths, and sound health behavior created during middle school-aged could play an important role in controlling and reducing AD, which is a chronic disease, it is necessary to comprehensively analyze the risk factors and the health behavior in regards to AD's appearance during middle school-aged.

As such, in this study, by verifying the prevalence rates of AD in middle school students in Korea and by finding out about AD and the associated factors, we will attempt to provide the basic materials for the development of effective nursing intervention programs for alleviating AD in middle school students.

## METHODS

### 1. Study design

This study is a cross-sectional descriptive study for identifying the factors that affect the onset of AD, by using the raw data from the 'The 6th Korean National Adolescent Health Behavior Survey, 2010' conducted by the Centers for Disease Control (Korea Centers for Disease Control and Prevention [KCDC], 2010).

### 2. Sample and setting

The participant subjects of this study were middle school students. Of the results of the Adolescent Online Survey of Health Behavior, a secondary analysis was conducted on the raw data from the 'The 6th Korean National Adolescent Health Behavior Survey, 2010' that was collected from September 1, 2010 through October 24, 2010. The survey is an anonymous type of self-administered online survey method that is conducted to identify the health behaviors of youths and adolescents in Korea, and it is undertaken annually as government-approved statistics (Korea National Statistical Office, the approval number, No. 11758) directly by the Ministry of Education, Science and Technology, Department of Health and Human Services. The researcher of this paper asked the mentioned institution for permission to use this data on June 3, 2012 and obtained permission on June 4, 2012. In the population stratification, in order to minimize errors in the samples, the population was separated into a total of 135 strata by using 45 regional population groups and school levels as stratification variables. The 45 regional population groups were separated into large cities, midsize and small cities and counties comprised of 16 cities, cities within provinces, counties and

townships, and after considerations were given to geographical access, the number of schools and population size, living environment, percentage of smokers, percentage of alcohol drinkers, etc. In the sample allocation stage, sample sizes were made to be 400 middle schools and they were primarily separated into 5 samples for each of the 16 cities and provinces. In order to match the composition ratio of the population by stratification variables with the composition ratio of the samples, proportional allocations were applied to distribute the number of schools in accordance with the cities-provinces, sizes of cities, population of regions, types of school (male-only / female-only / co-ed).

For the extraction of samples, a two-stage cluster sampling was used. For the unit of the 1st level extraction, schools were used, and for the unit of the 2nd level extraction, classes were used. For the 1st level extraction, after sorting the school list of the population by strata, sample schools were selected using systematic sampling by calculating the extraction intervals. For the 2nd level extraction, from the selected sample schools, by grade levels, 1 class was randomly extracted. The entire student population of the classes that were selected as sample classes was examined, and a total of 37,570 students were used as materials for this study, while being excluded were the cases of long-term absence, special needs students and students with literacy problems.

### 3. Instrument

The measurement instruments were comprised of a total of 28 questions. The general characteristics were comprised of gender, grade level, education level of parents and economic status. The health behavior-related characteristics were comprised of smoking, alcohol intake, Body Mass Index, regular dietary habit, mental health, washing hands, status of receiving health education. Among these, by using the height and weight and by applying the criteria defined in the guidelines of the 'The Korea Youth Health Risk Behavior Web-based Survey (KYHRBWS) raw data' (KCDC, 2009), the BMI was calculated in terms of weight(kg)/height(m) and was separated into the following: "obese" in the cases of BMI being greater than 95 percentile or greater than 25; "over-weight" in the cases of BMI being greater than 85 percentile but lower than 95 percentile; "normal" in the cases of BMI being greater than 5 percentile but lower than 85 percentile; and "under-weight" in the cases of BMI being lower than 5 percentile. Stress was classified into high, medium and low for stress usually felt, and depression was identified through whether or not sadness or despair was experienced during the past 1

year. The subjective awareness of one's health conditions was classified into healthy, average and unhealthy, through comparing one's health conditions with those of friends.

In this study, sentences suggested for generation of the prevalence rate of AD by The International Study of Asthma and Allergies in Childhood (ISAAC) Steering Committee (1998) were used to check out AD diagnosis. Considering the fact that AD is influenced by rapidly changing living environments and that the purpose of the study is aimed to confirm characteristics of health behavior related to AD diagnosis on the part of youths, AD diagnosis was checked through the use of a question "A", to which 8,494 people answered "yes", and 29,076 people answered "no".

### 4. Data analysis

The collected data was analyzed by using the SPSS WIN 19.0 program.

First, the differences in the general characteristics of the AD diagnosed group and the non-diagnosed group were analyzed using a  $\chi^2$ -test. Second, the differences in the health behavior-related characteristics of the AD diagnosed group and the non-diagnosed group were analyzed using a  $\chi^2$ -test. Third, in order to identify the risk factors that affect AD, a logistic regression analysis was conducted.

## RESULTS

### 1. Differences in the general characteristics between groups

As a result of analyzing the differences in whether or not AD had been diagnosed in accordance with the general characteristics of the study participants, the variables that showed differences were found to be the gender ( $\chi^2 = 287.26, p < .001$ ), grade level ( $\chi^2 = 8.34, p = .015$ ) and education level of parents ( $\chi^2 = 86.46, p < .001; \chi^2 = 54.35, p < .001$ ) (Table 1).

### 2. Differences in the health behavior-related characteristics between groups

As a result of analyzing the differences in whether or not AD had been diagnosed in accordance with the health behavior-related characteristics of the study participants, the variables that showed differences were found to be the "whether or not a smoker" ( $\chi^2 = 14.47, p < .001$ ), BMI ( $\chi^2 = 18.83, p < .001$ ), the number of times breakfasts / lunches / dinners

were eaten ( $\chi^2 = 25.71, p < .001; \chi^2 = 51.98, p < .001; \chi^2 = 30.93, p < .001$ ), the number of times the participant drank milk ( $\chi^2 = 21.83, p < .001$ ), stress ( $\chi^2 = 83.04, p < .001$ ), depression ( $\chi^2 = 31.19, p < .001$ ), subjective awareness of one's health conditions ( $\chi^2 = 190.21, p < .001$ ), washing hands before a meal at school / after a restroom visit at home ( $\chi^2 = 41.20, p < .001; \chi^2 = 13.21, p = .004$ ), status of receiving smoking / alcohol cessation education ( $\chi^2 = 37.12, p < .001; \chi^2 = 23.54, p < .001$ ), and status of receiving personal hygiene education ( $\chi^2 = 12.83, p < .001$ ) (Table 2).

### 3. Factors that affect AD onset

The risk factors that affect the prevalence rates of AD were evaluated by using a logistic regression analysis by making the variables that appeared to be significant in the general characteristics and the health behavior-related characteristics into independent variables. In this analysis, the value of the -2LL (-2 log likelihood) of the logistic regression model was found to be 38139.10; the Nagelkerke's  $R^2$  was found to be .030; the Chi-square was found to be 715.56 ( $p < .001$ ); and the prediction accuracy was found to be 77.4%. And the associated factors that affect the prevalence rates of AD of the participants were found to be gender, grade level, education level of parents, the number of times breakfasts / lunches were eaten, stress, subjective awareness of one's health conditions, washing hands before a meal at school and the status of receiving smoking and alcohol cessation education.

More specifically, in terms of the prevalence rates of AD, female students were found to be 1.52 times higher than male students, the 2nd-year middle school students and the 3rd-year middle school students

were, respectively, 1.10 times and 1.07 times higher than the 1st year middle school students. For the subjective awareness of one's health conditions, in terms of the prevalence rates of AD, the case of awareness of "average" and the case of awareness of "unhealthy" were 1.20 times and 1.66 times higher than the case of awareness of "healthy".

For the education level of parents, in terms of the prevalence rates of AD, the cases of college educated parents were 0.87 times and 0.93 times lower than the cases of middle school educated parents, cases where breakfast was eaten 6-7 times per week were 0.83 times lower than 0 times, cases where lunch was eaten 1-2 times per week were 0.81 times lower than 0 times, and the 3-5 times was 0.84 times lower than 0 times. For stress, in terms of the prevalence rates of AD, the cases of stress being "average" was 0.83 times lower than the cases of being "high", and for the prevalence rate of AD, the cases of "always washed hands before a meal at school" were found to be 0.87 times lower than the cases of "never washed hands before a meal at school". In the cases of the status of receiving smoking and alcohol cessation education, the prevalence rate of AD were seen to be 0.90 times and 0.94 times lower than the cases of not receiving the education (Table 3).

## DISCUSSION

This study was conducted to verify the prevalence rates of AD of middle school students in Korea and to identify AD and the associated factors, through a secondary analysis of the raw data from the 'The 6th Korean National Adolescent Health Behavior Survey, 2010' conducted by the Korea Centers for Disease Control (KCDC, 2010).

**Table 1.** Differences in General Characteristics between Groups

( $N = 37,570$ )

Characteristics	Categories	n (%)	Atopic dermatitis	Non-atopic dermatitis	$\chi^2$ (p)
			(n = 8,494)	(n = 29,076)	
			n (%)	n (%)	
Gender	Male	19,956 (53.1)	3,826 (45.0)	1,6130 (55.5)	287.26 (< .001)
	Female	17,614 (46.9)	4,668 (55.0)	1,2946 (44.5)	
Grade level	1st	12,468 (33.2)	2,892 (33.0)	9,756 (32.9)	8.34 (.015)
	2nd	12,499 (33.3)	2,861 (33.7)	9,638 (33.1)	
	3rd	12,603 (33.5)	2,741 (32.3)	9,862 (33.9)	
Father's education level	≤ Middle school	1,763 (4.7)	319 (3.8)	1,444 (5.0)	86.46 (< .001)
	High school	20,674 (55.0)	4,405 (51.9)	16,269 (56.0)	
	≥ College	15,133 (40.3)	3,770 (44.4)	11,363 (39.1)	
Mother's education level	≤ Middle school	1,580 (4.2)	302 (3.6)	1,278 (4.4)	54.35 (< .001)
	High school	24,236 (64.5)	5,273 (62.1)	18,963 (65.1)	
	≥ College	11,754 (31.3)	2,929 (34.4)	8,835 (30.4)	
Economic status	High	12,643 (33.7)	2,917 (34.3)	9,726 (33.5)	2.80 (.247)
	Average	17,398 (46.3)	3,872 (45.6)	13,526 (46.5)	
	Low	7,529 (20.0)	1,705 (20.1)	5,824 (20.0)	

**Table 2.** Differences in Health Behavior-related Characteristics between Groups

Characteristics	Categories	n (%)	Atopic dermatitis	Non-atopic dermatitis	$\chi^2$ (p)		
			(n=8,494)	(n=29,076)			
			n (%)	n (%)			
Smoking status	No	29,649 (78.9)	6,829 (80.4)	22,820 (78.5)	14.47 (<.001)		
	Yes	7,921 (21.1)	1,665 (19.6)	6,256 (21.5)			
BMI	Under-weight	12,662 (33.7)	2,705 (32.9)	9,957 (35.4)	18.83 (<.001)		
	Normal	21,013 (55.9)	4,894 (59.5)	16,119 (57.4)			
	Over-weight	2,541 (6.8)	604 (7.3)	1,937 (6.9)			
	Obese	99 (0.3)	21(0.3)	78 (0.3)			
Regular dietary habit	Number of breakfasts (days/week)	none	3,511 (9.3)	735 (8.7)	2,776 (9.5)	25.71 (<.001)	
		1~2	5,665 (15.1)	1,174 (13.8)	4,491 (15.4)		
		3~5	6,868 (18.3)	1,646 (19.4)	5,221 (18.0)		
		6~7	21,526 (57.3)	4,939 (58.1)	16,587 (57.0)		
	Number of lunches (days/week)	none	840 (2.2)	147 (1.7)	691 (2.3)		51.98 (<.001)
		1~2	2,881 (7.7)	523 (6.2)	2,358 (8.1)		
		3~5	3,749 (10.0)	834 (9.8)	2,915 (10.0)		
		6~7	30,100 (80.1)	6,990 (82.3)	23,110 (79.5)		
	Number of dinners (days/week)	none	881 (2.3)	152 (1.8)	729 (2.5)		30.93 (<.001)
		1~2	3,519 (9.4)	728 (8.6)	2,791 (9.6)		
		3~5	6,808 (18.1)	1,643 (19.3)	5,165 (17.8)		
		6~7	26,362 (70.2)	5,971 (70.3)	20,391 (70.1)		
Number of times of to drink milk (times/week)	none	4,521 (12.0)	1,133 (13.3)	3,388 (11.7)	21.83 (<.001)		
	1~2	6,415 (17.1)	1,488 (17.5)	4,927 (16.9)			
	3~4	7,721 (20.6)	1,696 (20.0)	6,025 (20.7)			
	5~6	6,201 (16.5)	1,383 (16.3)	4,818 (16.6)			
	≥7	12,712 (33.8)	2,794 (32.9)	9,918 (34.1)			
Mental health	Stress	High	15,392 (41.0)	3,824 (45.0)	11,568 (39.8)	83.04 (<.001)	
		Normal	15,329 (40.8)	3,312 (39.0)	12,017 (41.3)		
		Low	6,849 (18.2)	1,358 (16.0)	5,491 (18.9)		
Depression	No	24,633 (65.6)	5,354 (63.0)	19,279 (66.3)	31.19 (<.001)		
	Yes	12,937 (34.4)	3,140 (37.0)	9,797 (33.7)			
Subjective awareness of one's health conditions	Healthy	24,631 (65.6)	5,164 (60.8)	19,467 (67.0)	190.21 (<.001)		
	Normal	10,414 (27.7)	2,547 (30.0)	7,867 (27.1)			
	Unhealthy	2,525 (6.7)	783 (9.2)	1,742 (6.0)			
Washing hands	before meals (at school)	Never	2,619 (7.0)	663 (7.8)	1,956 (6.7)	41.20 (<.001)	
		Sometimes	11,281 (30.0)	2,714 (32.0)	8,568 (29.5)		
		Often	12,517 (33.3)	2,766 (32.6)	9,751 (33.5)		
		Always	11,152 (29.7)	2,351 (27.7)	8,801 (30.3)		
	After a restroom visit (at home)	Never	609 (1.6)	140 (1.6)	469 (1.6)		13.21 (.004)
		Sometimes	3,217 (8.6)	761 (9.0)	2,456 (8.4)		
		Often	8,190 (21.8)	1,734 (20.4)	6,456 (22.2)		
		Always	25,554 (68.0)	5,859 (69.0)	19,695 (67.7)		
Status of receiving health education	Smoking cessation	No	13,049 (34.7)	2,715 (32.0)	10,334 (35.5)	37.12 (<.001)	
		Yes	24,521 (65.3)	5,779 (68.0)	18,742 (64.5)		
Alcohol cessation	No	20,245 (53.9)	4,381 (51.6)	15,864 (54.6)	23.54 (<.001)		
	Yes	17,325 (46.1)	4,113 (48.4)	13,212 (45.4)			
Personal hygiene	No	21,332 (56.8)	4,679 (55.1)	16,653 (57.3)	12.83 (<.001)		
	Yes	16,238 (43.2)	3,815 (44.9)	12,423 (42.7)			

BMI=Body mass index.

The total number of participants of this study was 37,570 persons and among them were 22.6% middle school students who had been diagnosed with AD during the past 12-months. Oh et al. (2003) reported that the prevalence rates of AD among adolescents in Korea increased from 7.5% in 1995 to 12.8% in 2000, thereby bringing to attention the

fact that the occurrence rates of AD among adolescents were on the rise. Considering the fact that AD in adolescents is a cause of obstacles for school life such as poor academic performance, absences, etc., and the fact that it can cause various physical and mental problems including sleep disorder, fatigue, wound infections, depression, stress, etc., the

**Table 3.** Factors that Affect the Occurrence of Atopic Dermatitis

(N=37,570)

Variables	Categories	$\beta$	SE	Wald	$p$	Odds ratio	95% CI*	
							Lower	Upper
Gender (male)	Female	.41	.02	285.27	<.001	1.52	1.45	1.59
Grade level (1st)	2nd	.10	.03	10.21	.001	1.10	1.04	1.18
	3rd	.07	.03	5.07	.024	1.07	1.01	1.14
School record (high)	Medium	.15	.03	23.49	<.001	1.16	1.09	1.24
	Low	.06	.03	3.79	.052	1.07	1.00	1.14
Father's education level ( $\leq$ Middle school)	High school	-.31	.07	17.69	<.001	0.73	0.63	0.85
	$\geq$ College	-.14	.03	20.29	<.001	0.87	0.82	0.92
Mother's education level ( $\leq$ Middle school)	High school	-.22	.07	8.11	.004	0.80	0.69	0.93
	$\geq$ College	-.06	.03	4.57	.032	0.93	0.88	0.99
Number of breakfasts (none) (days/week)	1-2	-.03	.04	0.60	.436	0.96	0.87	1.05
	3-5	-.03	.04	0.88	.346	0.96	0.88	1.04
	6-7	-.07	.03	5.03	.025	0.83	0.77	0.96
Number of lunches (none) (days/week)	1-2	-.20	.10	4.38	.036	0.81	0.66	0.98
	3-5	-.16	.05	8.61	.003	0.84	0.75	0.94
	6-7	-.06	.04	1.98	.159	0.94	0.86	1.02
Stress (high)	Normal	-.18	.02	45.09	<.001	0.83	0.79	0.87
	Low	-.29	.03	66.47	<.001	0.74	0.69	0.80
Subjective awareness of one's health conditions	Normal	.18	.02	45.86	<.001	1.20	1.14	1.27
	Unhealthy	.51	.04	124.22	<.001	1.66	1.52	1.82
Washing hands before meals (at school) (never washed)	Sometimes	-.10	.05	1.25	.262	0.94	0.85	1.04
	Often	-.02	.05	3.66	.056	0.90	0.81	1.00
	Always	-.04	.05	6.19	.013	0.87	0.78	0.97
Smoking cessation education status (no)	Yes	-.09	.03	9.65	.002	0.90	0.85	0.96
Alcohol cessation education status (no)	Yes	-.06	.03	4.64	.031	0.94	0.88	0.99

\*CI= Confidence interval.

proper management of AD in adolescents requires urgent attention. However, in the science of nursing, since the studies on AD in adolescents are inadequate at this point, efforts need to be undertaken first of all to raise the level of interest, nursing science wise, and there is a need to look for utilization ideas, in the view of nursing science, that take into consideration the factors that affect the characteristics of middle school students affected with AD and the prevalence rate.

In this study, among the factors that affect AD in adolescents, as general characteristics gender, grade level and education level of parents were verified. In accordance with gender, 55% of the participants diagnosed with AD were female students and their prevalence rate was found to be 1.52 times higher than that of the male students. This is similar to the results of the analysis conducted by Lee et al. (2005) and Park et al. (2011) that looked at adolescents affected with AD in the Seoul and Busan areas, which showed that female students were 62.9% and 61.4%, respectively. In regard to grade levels, the 2nd-year middle school students were found to be diagnosed with AD most often at 33.7%; in the case of the 2nd-year middle school students and the 3rd-year middle school students were 1.10 times and 1.07 times higher than the cases of

1st-year middle school students, whereby showing differing results with those of the previous study (Lee et al., 2005; Park et al., 2011) that did not show any difference with respect to grade levels. In our study, the results of the previous study (Almqvist, Pershagon, & Wickman, 2005; Lee et al., 2009), which found that the prevalence rates of AD were lower in students whose parents' education levels were college graduates as compared to students whose parents' education levels were middle school graduates or lower, are supported. However, in the study by Kim et al. (2009), it was reported that parents' education level was not related to the occurrence rate of AD in infants. Williams (1994) and Lee (2011) reported that, when the children's mothers are highly educated, they tend to be more alert about managing immunizations and the surrounding environment, and this resulted in less of a chance for infection, and at the same time, reduced chances to gain immunity, whereby reporting results that are different from the results of our study, which suggest that AD occurrence rate is lower with higher education levels. The reason for such results of AD occurrence rates in terms of grade levels and parents' education levels is thought to be associated with the fact that the study subjects of the aforementioned previous studies were children or infants.

As such, it seems necessary to re-confirm the relationship between parents' educational background and the prevalence rate of AD among youths through repeated studies in which adolescents' tendencies of becoming independent of their interfering parents are reflected.

In examining the health behaviors of the participants, among the regular dietary habit related factors, it is seen that the result of the low AD prevalence rates of participants who have regular meals is similar to the previous study that reported that AD patients were having irregular meals (Lee et al., 2005) and, when regular meals were eaten, the risk level of AD decreased (Park et al., 2009; Shin, Park, & Oh, 2006). Meanwhile, in our study, the number of times participants drank milk, the number of times they had fast food, etc. were found to have no direct effects on the AD prevalence rate. And this is deemed to be attributable to the fact that food allergies occur 4 times more commonly in young children than adults, and as age increases, the sensitivity to food allergens decreases, which is an AD characteristic. However, the reasons for the development of AD have not been accurately defined, and there are differences among individuals, so disputes on diet causing AD continue. In this regard, food allergy factors need to be confirmed by age group through repeated studies on food allergy. In terms of mental health, the AD prevalence rates were seen to be lower for participants who perceived their stress level as being average than the participants who perceived as being high, and the participants who recognized their health conditions to be unhealthy were found to have AD prevalence rates that are 1.66 times higher than the participants who recognized their health conditions to be healthy. Emotional anxieties such as stress compromise the immunological changes of AD and neuroendocrine function and can become aggravating factors of AD (Raap, Werfel, Jaeger, & Schmid-Ott, 2003), and in the cases of participants affected with AD, there are changes involving decreasing Th1/Th2 ratio and the number of NK cells (Pallanti, Lotti, & Urpe, 2005). Corticotrophin-releasing hormone, a stress hormone, reduces functions of acquired T cells releasing IL-10 among AD patients to further worsen AD (Oh et al., 2012), and a vicious cycle, in which deteriorated AD induces a new stress, is repeated. Accordingly, stress needs to be managed first in order to reduce prevalence rates of AD, and complementary adjustment aimed to reduce stress caused by AD is required. Washing hands, among the total 5 items, was seen to lower the prevalence rates of AD only in the cases of washing hands before a meal at the school. Although it is hard to confirm accurate relationships between hand washing and AD due to an absence of previous studies, hand washing, one of general health behaviors, is ex-

pected to prevent secondary infection caused by viruses and reduce AD symptoms. As it was reported that an excessive use of soap causes dry skin and may deteriorate AD, it is necessary to educate and practice proper hand washing on the part of AD subjects. Therefore, together with the explanations for accurate mechanisms for lowering the prevalence rates of AD, a review of the correct ways of washing hands is thought to be necessary. Unlike the reports that stated that smoking is related to the development of AD, as defined in Cohort Study on relationships between adult lifestyle and AD (Park, 2004), this study found no significant relationships between smoking and the development of AD. It is believed to be due to the fact that the subjects to the study, middle school students, are less exposed to smoking than adults in terms of period and frequency of exposure. Additionally, as anti-smoking education was found to reduce AD, it seems necessary to proactively introduce healthcare education to schools in order to develop a habit of controlling AD and prevent AD among middle school students. In addition, it appears necessary to repeatedly confirm direct/indirect effects that healthcare education has on changing health behavior and its prevalence rate of AD and to develop a nursing program aimed to reducing AD among youths.

Using the results discussed so far as the basis, it can be ascertained that, in order to lower the AD prevalence rates of middle school students, the associated factors of AD by gender would need to be considered while recognizing that female students' AD prevalence rates are higher and the ideas for improving the parents' management abilities by confirming the roles of parents in the family would need to be prepared.

In addition, education on dietary habits for sustaining regular dietary habit is needed; an approach from a mental health perspective for reducing stress and cultivating a positive perception about one's health is called for; and it is deemed necessary to explore ideas that can lower the occurrences of AD and alleviate the symptoms through health education for washing hands, smoking and alcohol cessation, among others.

## CONCLUSION

This study was conducted to verify the AD prevalence rates of middle school students in Korea and to identify the associated factors. The AD prevalence rates of middle school students in Korea was found to be 22.6%, and confirmed as the associated factors were gender, grade level, education level of parents, regular dietary habit, stress, subjective awareness of one's health conditions, washing hands, smoking and alcohol

cessation education.

Based on the results of this study, the following suggestions are made. First, concurrent to raising the level of interest in AD among middle school students from the perspective of science of nursing, policy measures that can effectively manage AD should be prepared via continued follow-up and comparison of the AD prevalence rates of middle school students and the associated factors. Second, this study has an advantage in that it identified the AD prevalence rates of middle school students and the associated factors by analyzing a large-scale nationwide data using the 6th Korean National Adolescent Health Behavior Survey. However, there is a shortcoming of not having considered all the detailed variables as associated factors of AD; therefore, granular analyses of the general characteristics and health behavior-related characteristics and the build-up of a comprehensive model are deemed warranted in the future. Third, it is suggested to seek utilization ideas with respect to science of nursing that take into consideration the variables confirmed in this study as the associated factors of AD for middle school students, and, by reviewing the nursing issues that occur in AD, systematic and independent nursing intervention programs be developed. Finally, it would be necessary to acquire the excellence and objectivity of nursing interventions, by evaluating the applicability and effects of the developed nursing intervention programs and clarifying the relationships and mechanisms of the variables.

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