

Perceived Unmet Need and its Associated Factors in Atopic Dermatitis

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<Abstract>

**Perceived Unmet Need and Associated Factors
in Atopic Dermatitis**

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Atopic dermatitis (AD) is chronic eczematous skin disorder characterized by itching sensation and dryness of skin. Although there are many studies on epidemiology of AD patients, there are no previous reports of literature focusing on the unmet need in AD.

We investigated Korea National Health and Nutrition Examination Survey from 2007 to 2011. In this survey, the questionnaires for unmet need and basic demographic information are contained.

A total number of 860 patients diagnosed as atopic dermatitis were

enrolled. Among them, a total of 227 patients experienced at least one episode of unmet need during the last year. Bivariate analysis between the patients with unmet need and those without revealed statistical difference in sex, age, employment, physical discomfort, and depressive mood during the previous 2 weeks; also difference was noted in the presence of abnormal breath sound on exercise related to the severity of pulmonary diseases and limited routine activities. In addition, on multiple logistic regression analysis, there was statistical difference in sex, employment, physical discomfort, presence of asthma, abnormal breath sound on exercise, and stress on routine life.

This is the first report regarding unmet need in Korean AD patients and we have to pay more attention to unsatisfied medical supports.

Key words : Atopic dermatitis, Unmet need, Socioeconomic factor

I. INTRODUCTION

Unmet need is defined as a condition that someone cannot use medical service despite of certain conditions which require medical treatment. In terms of strengthening medical coverage in chronic diseases, unmet need is focused in public health realm.

Atopic dermatitis (AD) is a chronically relapsing disease that occurs most commonly during early infancy and childhood with eczematous skin lesions. It is frequently associated with abnormalities in skin barrier function, allergen sensitization, and recurrent skin infections.¹

Since the 1960s, there has been more than a threefold increase in the prevalence of AD². AD is a major public health problem worldwide, with prevalence in children of 10-20% in the United States, Northern and Western Europe, urban Africa, Japan, Australia, and other industrialized countries³. The prevalence of AD in adult is

approximately 1-3%. Interestingly, the prevalence of AD is much lower in agricultural regions of countries such as China and in Eastern Europe, rural Africa, and Central Asia. However, the most recent data from the International Study of Asthma and Allergies in Childhood (ISAAC) Phase Three study confirms that AD is a disease with high prevalence—affecting patients in both developed and developing countries. There is also a female preponderance for AD, with an overall female / male ratio of 1.3:1.0.

The basis for this increased prevalence of AD is not well understood. However, wide variation in its prevalence has been observed within countries inhabited by similar ethnic groups, suggesting that environmental factors are critical in determining disease expression. Some of the potential risk factors that may be associated with a rise in atopic disease include small family size, increased income and

education both in whites and blacks, migration from rural to urban environments, and increased use of antibiotics.^{4,5}

Although there are relatively many epidemiologic studies regarding the associated factors to the presence of AD, there are no articles on the unmet need in AD patients.

Thus, we will investigate the presence of unmet need in Korean AD patients and analyze its associated factors.

II. PATIENTS AND METHODS

1. Patients

After receiving an approval from Korea Centers for Disease Control and Prevention (KCDC), which has a copyright for Korea National Health and Nutrition Examination Survey from 2007 to 2011, we selected patients in a period of last five years. In between July 1st, 2007 and December 31st, 2011, a total of 40,956 people were included in this survey. Among them, 2,181 patients were diagnosed as AD by doctors. We excluded patients who did not answer independent variables and the presence of unmet need in their survey (Fig.1). After excluding such patients, a total of 860 patients were chosen to be suitable for our study.

2. Methods

Among the selected patients, we surveyed for presence of perceived unmet need as a dependent variable. To determine independent variables, we reviewed all questionnaires carefully before processing criteria which sought to reflect the economic, social, and clinical status of patients. All of the independent variables are mentioned as follows; sex, age group, year, region, accommodation, income of household, employment, education level, physical and mental discomfort during last 2 weeks, presence of asthma and abnormal breath sound during exercise, level of stress on routine life, limitation of routine activities, sleep hours, and number of days on intensive physical activities a week.

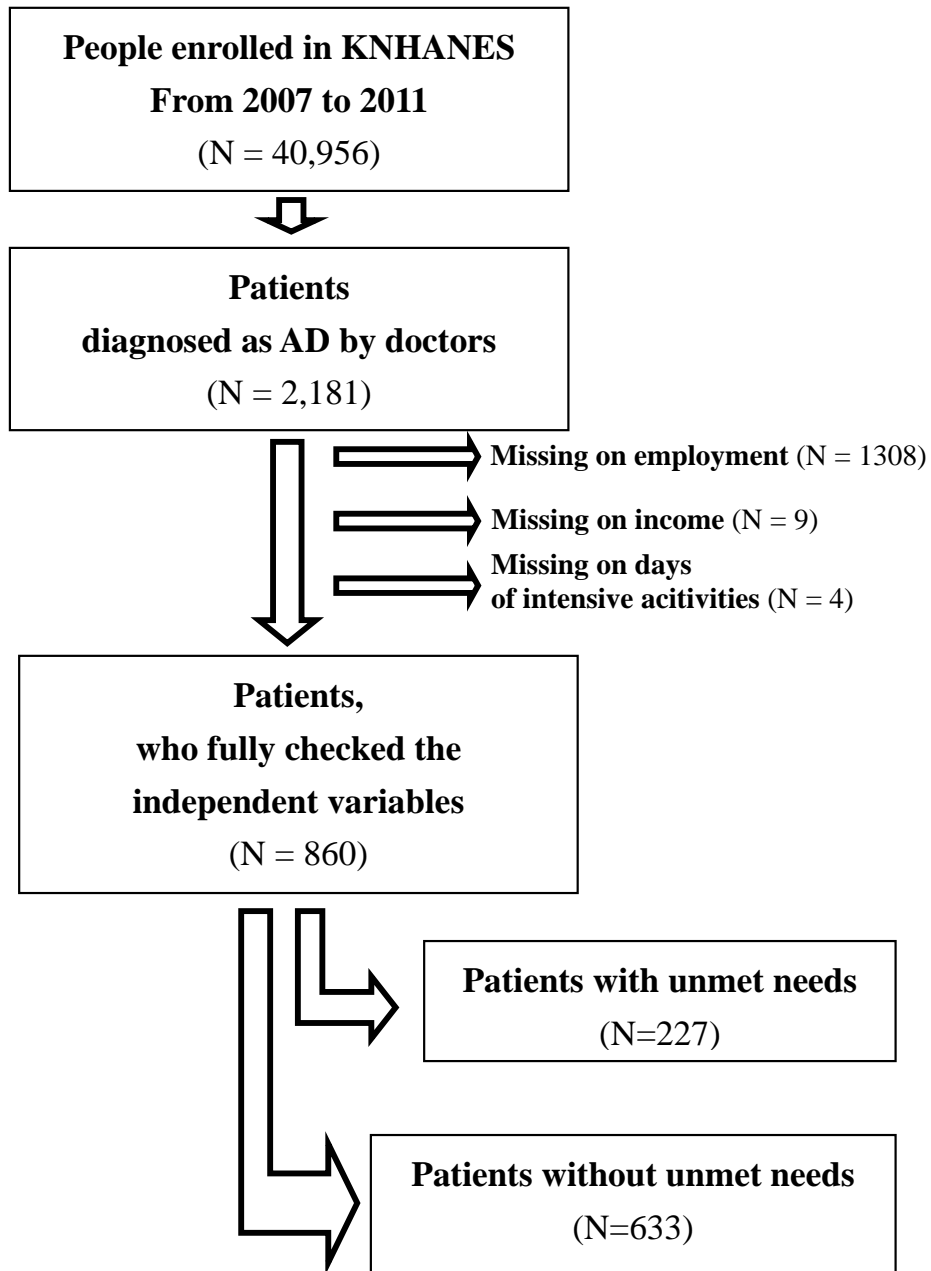
With the carefully chosen patients above, we performed bi- and multi-variate analysis to verify the association and the causality of the variables. As we hoped to see the results draw near to data of the

general population, we weighted specific values to the raw data on each year's national survey.

To clarify the main cause associated with the presence of unmet need, we performed subgroup analysis among the AD patients with unmet need. Unmet need patient group was further divided into groups with problem, accessibility, and others.

Economic problem means that a patient cannot visit a clinic due to their low-income or the high cost of medical service. Further, accessibility was defined as inability to use medical service due to temporal and spatial accessibility. The others factors such as minor severity of disease are included in "others" category.

Fig 1. Flowchart for the selection of AD patients with unmet need



3. Statistical analysis

The chi-square, Fisher's exact test and multiple logistic regression tests were performed to determine significant differences among distinct categories. SAS version 9.3 (SAS Inc., Cary, NC, USA) was used for the statistical analyses. Differences were considered statistically significant when the p -value was less than 0.05.

III. RESULTS

1. Clinical features of AD patients and their characteristics

In 860 enrolled patients, the age range of the subjects was from 15 to 92 years with average 35.1 years and standard deviation 17.3 years. 366 males and 494 females were included. 724 patients lived in urban areas and 136 patients in rural areas. 408 patients lived in apartments. 442 patients had a job while 418 patients were unemployed. 49 patients had concomitant asthma, and 77 patients complained of abnormal breath sound during exercise.

A total of 227 AD patients with unmet need (65 males and 162 females) were included in this study. The mean age was 37.4 and 38.3 years for men and women respectively. The age ranged from 15 to 79 years for men and 15 to 84 years for women. Among the patients with

unmet need, 186 patients lived in urban areas and 41 patients in rural areas. 131 patients were residents in apartment and 96 patients resided in other accommodations such as villa, and mansions. 137 patients were employed at the time on survey and 90 patients were unemployed. We divided the level of education into three groups: below elementary school, middle school to high school, and beyond high school. A number of 39, 36 and 152 patients were in the first, the second, and the third group. In addition, the survey on the mood of the patients prior to 2 weeks of the survey revealed that 71 patients had suffered from physical discomfort and 171 from depressive mood. 14 patients reported a medical history of asthma, and 33 patients reported abnormal breath sound during exercise. 109 patients were stressful in routine life and 118 patients were not. 49 patients had some limitation on routine life and 178 patients did not. Most of patients slept between six to eight

hours a day appropriately, but 40 patients were sleeping less than six hours and 21 patients slept for more than eight hours on average.

We also investigated the AD patients without unmet need. A total of 633 patients (301 males and 332 females) were enrolled, and the mean age was 34.1 and 33.9 years for men and women respectively. The age ranged from 15 to 80 years for men and 15 to 78 years for women.

The concrete demographic characteristics of the patients are presented in table 1.

2. Bivariate analysis between AD patients with and without unmet need

The associated factors on the presence of unmet need were figured out by using chi-square test and Fisher's exact test.

Females with AD had some limitation on the use of medical service which showed statistically significant difference ($p < 0.001$). Among the age groups divided into three groups of ages under 19, 19 to 64, and over 64, there was statistical difference ($p = 0.029$). Employed patients complained more unmet need compared unemployed ones ($p = 0.013$).

The patients who answered that they experienced physical discomfort during the recent two weeks were more frequently included in the group with unmet need having a statistically significant difference ($p < 0.001$). And the patients with depressive mood during the last two weeks also had deprivation of medical service ($p = 0.002$). Although the

medical history of asthma did not show any association to the dependent variable, abnormal breath sound during exercise was associated with independent variable ($p = 0.001$). Both the extent of stress on routine life and the limitation on routine life showed a statistically significant difference ($p < 0.001$).

Table 1. Bivariate analysis on the presence of unmet need

Table 1. Bivariate analysis, based on the presence of unmet need in atopic dermatitis patients

	Presence		Absence		Total n	p-value
	n	%	n	%		
Sex						<0.001
male	65	17.8	301	82.2	366	
female	162	32.8	332	67.2	494	
Age group						0.029
< 19	24	14.5	141	85.5	165	
19 - 64	178	28.7	443	71.3	621	
>65	25	33.8	49	66.2	74	
Year						0.301
2007	14	23.0	47	77.0	61	
2008	71	30.3	163	69.7	234	
2009	64	29.5	153	70.5	217	
2010	40	22.3	139	77.7	179	
2011	38	22.5	131	77.5	169	
Region						0.550
urban area	186	25.7	538	74.3	724	
rural area	41	30.1	95	69.9	136	
Accommodation						0.122
non-apartment	131	29.0	321	71.0	452	
apartment	96	23.5	312	76.5	408	
Income of household						0.254
Lower than 25%	43	33.3	86	66.7	129	
25-50%	60	30.2	139	69.8	199	
50-75%	55	20.7	211	79.3	266	
75-100%	69	25.9	197	74.1	266	
Employment						0.013
employed	137	31.0	305	69.0	442	
unemployed	90	21.5	328	78.5	418	
Level of education						0.263
below elementary school	39	31.5	85	68.5	124	
graduation from middle school	36	20.5	140	79.5	176	
graduation from high school	152	27.1	408	72.9	560	
Physical discomfort during last 2						<0.001
absence	136	22.0	483	78.0	619	
presence	91	37.8	150	62.2	241	
Depressive mood during last 2weeks						0.002
absence	171	23.7	550	76.3	721	
presence	56	40.3	83	59.7	139	
Asthma						0.317
absence	213	26.3	598	73.7	811	
presence	14	28.6	35	71.4	49	
Breathsound on exercise						0.001
absence	194	24.8	589	75.2	783	
presence	33	42.9	44	57.1	77	
Level of stress on routine life						<0.001
low	118	21.9	422	78.1	540	
high	109	34.1	211	65.9	320	
Limitation of routine activities						<0.001
absence	178	24.1	561	75.9	739	
presence	49	40.5	72	59.5	121	
Sleep hours						0.180
under 6 hours	40	29.9	94	70.1	134	
between 6 to 8 hours	166	25.9	476	74.1	642	
over 8 hours	21	25.0	63	75.0	84	
Days of intense physical activities a						0.226
none	146	27.4	387	72.6	533	
1- 3 days	49	21.7	177	78.3	226	
more than 4 days	32	31.7	69	68.3	101	
Total	227	26.4	633	73.6	860	

3. Subgroup analysis between patients with unmet need due to economic problem and patients without unmet need

Among all the patients with unmet need, a number of 49 patients (21.6%) answered that their economic state caused their unmet need in health care. 10 males and 39 females were included in this subgroup. The concrete demographic characteristics in this subgroup are demonstrated in table 2.

We analyzed this subgroup compared to the group without unmet need, and we figured out some dependent variables showing statistical difference. There was statistical difference in sex ($p = 0.029$) and the presence of abnormal breath sound during exercise. ($p = 0.046$) Moreover we could analyze significant statistical difference in age, accommodation, income of household, education level, physical and mental psychological discomfort, limitation on routine activities, sleep

hours, and the number of days with intense physical activities (p
<0.001).

4. Subgroup analysis between patients with unmet need caused by accessibility and patients without unmet need

A total number of 102 patients (44.9%) complained that spatial and temporal accessibility hindered their use of medical service. 34 males and 68 females were included in this subgroup. The demographic characteristics of the group are listed in

We also analyzed these patients, compared to the group without unmet need. There was statistical difference in sex ($p = 0.024$) and abnormal breath sound during exercise ($p = 0.010$). In addition, we could find out significant statistical difference in employment and the extent of stress on routine life ($p < 0.001$).

5. Subgroup analysis between patients with unmet need caused by other problems and patients without unmet need

There were 76 AD patients with unmet need (33.4%) who answered that the unmet need was induced by problems excluding economy and accessibility. The patients self-judged their symptoms either as a mild degree or et cetra on the survey. According to this analysis, there was a statistical difference in sex ($p = 0.004$), year ($p = 0.002$), physical discomfort during the last two weeks ($p = 0.045$), presence of asthma ($p = 0.024$), and presence of abnormal breath sound on exercise ($p = 0.024$).

The unmet need has steeply decreased in 2011 both in AD and asthma patient. However, there was only one patient, presenting with asthma in unmet need group.

Table 2. Bivariate analysis on the subgroup analyses, based on problems with accessibility, finance, and others

Unmet need	Finance					Accessibility					Others							
	Presence		Absence		Total	p-value	Presence		Absence		Total	p-value	Presence		Absence		Total	p-value
	n	%	n	%			n	%	n	%			n	%	n	%		
Sex						0.029						0.024						0.004
male	10	3.2	301	96.8	311		34	10.1	301	89.9	335		21	6.5	301	93.5	322	
female	39	10.5	332	89.5	371		68	17.0	332	83.0	400		55	14.2	332	85.8	387	
Age group						<0.001						0.098						0.428
< 19	2	1.4	141	98.6	143		15	9.6	141	90.4	156		7	4.7	141	95.3	148	
19 - 64	36	7.5	443	92.5	479		83	15.8	443	84.2	526		59	11.8	443	88.2	502	
65 -	11	18.3	49	81.7	60		4	7.5	49	92.5	53		10	16.9	49	83.1	59	
Year						0.805						0.581						0.002
2007	1	2.1	47	97.9	48		4	7.8	47	92.2	51		9	16.1	47	83.9	56	
2008	21	11.4	163	88.6	184		24	12.8	163	87.2	187		26	13.8	163	86.2	189	
2009	10	6.1	153	93.9	163		31	16.8	153	83.2	184		23	13.1	153	86.9	176	
2010	10	6.7	139	93.3	149		24	14.7	139	85.3	163		6	4.1	139	95.9	145	
2011	7	5.1	131	94.9	138		19	12.7	131	87.3	150		12	8.4	131	91.6	143	
Region						0.540						0.540						0.488
urban area	41	7.1	538	92.9	579		84	13.5	538	86.5	622		61	10.2	538	89.8	599	
rural area	8	7.8	95	92.2	103		18	15.9	95	84.1	113		15	13.6	95	86.4	110	
Accommodation						<0.001						0.391						0.698
non-apartment	37	10.3	321	89.7	358		57	15.1	321	84.9	378		37	10.3	321	89.7	358	
apartment	12	3.7	312	96.3	324		45	12.6	312	87.4	357		39	11.1	312	88.9	351	
Income of household						<0.001						0.173						0.484
Lower than 25%	24	21.8	86	78.2	110		10	10.4	86	89.6	96		9	9.5	86	90.5	95	
25-50%	12	7.9	139	92.1	151		25	15.2	139	84.8	164		23	14.2	139	85.8	162	
50-75%	8	3.7	211	96.3	219		27	11.3	211	88.7	238		20	8.7	211	91.3	231	
75-100%	5	2.5	197	97.5	202		40	16.9	197	83.1	237		24	10.9	197	89.1	221	
Occupation						0.554						<0.001						0.872
employed	26	7.9	305	92.1	331		75	19.7	305	80.3	380		36	10.6	305	89.4	341	
unemployed	23	6.6	328	93.4	351		27	7.6	328	92.4	355		40	10.9	328	89.1	368	
Level of education						<0.001						0.298						0.105
below elementary school	21	19.8	85	80.2	106		9	9.6	85	90.4	94		9	9.6	85	90.4	94	
graduation from middle school	11	7.3	140	92.7	151		19	11.9	140	88.1	159		6	4.1	140	95.9	146	
graduation from high school	17	4.0	408	96.0	425		74	15.4	408	84.6	482		61	13.0	408	87.0	469	
Physical discomfort during last 2 weeks						<0.001						0.498						0.045
absence	14	2.8	483	97.2	497		74	13.3	483	86.7	557		48	9.0	483	91.0	531	
presence	35	18.9	150	81.1	185		28	15.7	150	84.3	178		28	15.7	150	84.3	178	
Depressive mood during last 2weeks						<0.001						0.121						0.467
absence	29	5.0	550	95.0	579		82	13.0	550	87.0	632		60	9.8	550	90.2	610	
presence	20	19.4	83	80.6	103		20	19.4	83	80.6	103		16	16.2	83	83.8	99	
Asthma						0.164						0.305						0.018
absence	42	6.6	598	93.4	640		96	13.8	598	86.2	694		75	11.1	598	88.9	673	
presence	7	16.7	35	83.3	42		6	14.6	35	85.4	41		1	2.8	35	97.2	36	
Breathesound on exercise						0.046						0.010						0.024
absence	40	6.4	589	93.6	629		88	13.0	589	87.0	677		66	10.1	589	89.9	655	
presence	9	17.0	44	83.0	53		14	24.1	44	75.9	58		10	18.5	44	81.5	54	
Level of stress on routine life						0.096						<0.001						0.285
low	26	5.8	422	94.2	448		46	9.8	422	90.2	468		46	9.8	422	90.2	468	
high	23	9.8	211	90.2	234		56	21.0	211	79.0	267		30	12.4	211	87.6	241	
Limitation of routine activities						<0.001						0.318						0.380
absence	24	4.1	561	95.9	585		89	13.7	561	86.3	650		65	10.4	561	89.6	626	
presence	25	25.8	72	74.2	97		13	15.3	72	84.7	85		11	13.3	72	86.7	83	
Sleep hours						<0.001						0.942						0.551
under 6 hours	18	16.1	94	83.9	112		14	13.0	94	87.0	108		8	7.8	94	92.2	102	
between 6 to 8 hours	28	5.6	476	94.4	504		76	13.8	476	86.2	552		62	11.5	476	88.5	538	
over 8 hours	3	4.5	63	95.5	66		12	16.0	63	84.0	75		6	8.7	63	91.3	69	
Days of intense physical activities a week						<0.001						0.129						0.160
none	32	7.6	387	92.4	419		59	13.2	387	86.8	446		55	12.4	387	87.6	442	
1- 3 days	7	3.8	177	96.2	184		24	11.9	177	88.1	201		18	9.2	177	90.8	195	
more than 4 days	10	12.7	69	87.3	79		19	21.6	69	78.4	88		3	4.2	69	95.8	72	
Total	49	7.2	633	92.8	682		102	13.9	633	86.1	735		76	10.7	633	89.3	709	

6. Multiple logistic regression analysis on all patients with unmet need

As bivariate analyses with chi-square test and Fisher's exact test can only calculate associations between dependent and independent variables, we attempted to analyze all groups including the previously mentioned three subgroups to the control.

In table 3, we described p-value and a 95% confidence index according to the groups and variables.

First, between the patients with and without unmet need, only sex showed the significant statistical difference among the dependent variables ($p < 0.001$). And there was also significant difference in employment ($p = 0.018$), the presence of abnormal breath sound during exercise ($p = 0.002$), and the extent of stress on routine life. ($p = 0.028$)

Second, in comparison between the patients with unmet need due to

economic problems and the patients without unmet need, there was statistical difference between the income of household ($p = 0.011$), physical discomfort ($p = 0.004$) and depressive mood ($p = 0.026$) during the last two weeks. Among the levels of house income, only the comparison between lowest and highest group showed a statistical difference. Also, patients with intensive physical activities for one to three days a week also complained more unmet need than the group without any intensive physical activity. ($p = 0.020$)

Third, we performed an analysis between the unmet need patients with problems in accessibility with the control group. In this analysis, sex ($p = 0.004$) and abnormal breath sound on exercise ($p = 0.012$) showed statistical difference. And there was significant statistical difference in employment and level of stress on routine life ($p < 0.001$)

Lastly, between the patients with unmet need without any association

with economic or accessibility factors for unmet need, we could observe statistical difference in sex ($p = 0.009$), year in 2010 ($p < 0.001$), education level above high school ($p = 0.010$), and abnormal breath sound on exercise ($p = 0.036$).

Table 3. Multivariate analysis among all patients with unmet need

	Table 4. Multivariate analysis among all, patients with and without economic problems															
	All unmet need (n=227)				Economic causes (n=49)				Accessibility (n=102)				Others (n=76)			
	OR	95% C.I.	p-value	OR	95% C.I.	p-value	OR	95% C.I.	p-value	OR	95% C.I.	p-value	OR	95% C.I.	p-value	
Sex																
male	1.00	1.00	1.00				1.00	1.00	1.00				1.00	1.00	1.00	
female	2.31	1.51	3.51	<0.001	2.24	0.80	6.26	0.123	2.26	1.29	3.95	0.004	2.45	1.25	4.80	0.009
Age group																
< 19	1.00	1.00	1.00				1.00	1.00	1.00				1.00	1.00	1.00	
19 - 64	0.96	0.44	2.09	0.923	5.71	0.76	42.78	0.090	0.67	0.24	1.90	0.453	0.43	0.14	1.34	0.145
65 -	1.12	0.40	3.13	0.830	4.19	0.51	34.76	0.184	0.48	0.09	2.62	0.399	1.20	0.29	4.92	0.797
Year																
2007	1.00	1.00	1.00				1.00	1.00	1.00				1.00	1.00	1.00	
2008	0.77	0.35	1.71	0.523	0.87	0.07	10.47	0.910	1.50	0.38	5.95	0.564	0.52	0.20	1.38	0.191
2009	1.12	0.50	2.51	0.775	1.15	0.09	14.74	0.917	2.87	0.80	10.32	0.108	0.62	0.23	1.65	0.340
2010	0.66	0.29	1.50	0.326	1.31	0.12	14.40	0.826	2.16	0.58	8.02	0.249	0.09	0.03	0.32	<0.001
2011	0.71	0.31	1.62	0.417	0.78	0.05	11.26	0.854	1.94	0.51	7.46	0.333	0.35	0.12	1.03	0.057
Region																
urban area	1.00	1.00	1.00				1.00	1.00	1.00				1.00	1.00	1.00	
rural area	1.03	0.57	1.85	0.921	0.42	0.15	1.17	0.097	1.28	0.54	3.06	0.577	1.71	0.77	3.77	0.188
Accommodation																
non-apartment	1.00	1.00	1.00				1.00	1.00	1.00				1.00	1.00	1.00	
apartment	0.87	0.56	1.33	0.506	0.43	0.16	1.15	0.092	0.88	0.49	1.58	0.673	1.12	0.57	2.20	0.733
Income of household																
Lower than 25%	1.00	1.00	1.00				1.00	1.00	1.00				1.00	1.00	1.00	
25-50%	1.21	0.64	2.28	0.564	0.40	0.14	1.11	0.078	1.98	0.70	5.57	0.195	2.00	0.66	6.61	0.222
50-75%	0.81	0.43	1.54	0.522	0.44	0.13	1.43	0.171	1.02	0.36	2.87	0.971	1.12	0.35	3.66	0.847
75-100%	0.95	0.49	1.84	0.869	0.15	0.03	0.64	0.011	1.67	0.60	4.67	0.327	1.51	0.45	5.09	0.505
Occupation																
unemployed	1.00	1.00	1.00				1.00	1.00	1.00				1.00	1.00	1.00	
employed	1.65	1.09	2.49	0.018	1.10	0.41	2.94	0.858	3.19	1.69	6.03	<0.001	0.97	0.55	1.71	0.921
Level of education																
below elementary school	1.00	1.00	1.00				1.00	1.00	1.00				1.00	1.00	1.00	
graduation from middle school	1.01	0.45	2.29	0.974	0.69	0.18	2.63	0.589	1.67	0.41	6.73	0.471	1.11	0.23	5.40	0.901
graduation from high school	1.42	0.67	3.01	0.361	0.46	0.14	1.54	0.209	1.85	0.45	7.61	0.396	5.23	1.49	18.37	0.010
Physical discomfort during last 2 weeks																
absence	1.00	1.00	1.00				1.00	1.00	1.00				1.00	1.00	1.00	
presence	1.55	0.97	2.49	0.068	3.88	1.55	9.70	0.004	0.93	0.46	1.91	0.846	1.82	0.85	3.89	0.122
Depressive mood during last 2 weeks																
absence	1.00	1.00	1.00				1.00	1.00	1.00				1.00	1.00	1.00	
presence	1.56	0.92	2.65	0.101	3.09	1.15	8.31	0.026	1.25	0.58	2.70	0.576	1.25	0.42	3.76	0.693
Asthma																
absence	1.00	1.00	1.00				1.00	1.00	1.00				1.00	1.00	1.00	
presence	0.43	0.18	1.00	0.050	2.20	0.51	9.54	0.291	0.33	0.10	1.04	0.059	0.11	0.01	1.00	0.050
Breathesound on exercise																
absence	1.00	1.00	1.00				1.00	1.00	1.00				1.00	1.00	1.00	
presence	2.87	1.47	5.60	0.002	1.74	0.56	5.41	0.336	3.08	1.28	7.43	0.012	2.79	1.07	7.25	0.036
Level of stress on routine life																
low	1.00	1.00	1.00				1.00	1.00	1.00				1.00	1.00	1.00	
high	1.64	1.07	2.51	0.025	0.80	0.30	2.11	0.654	2.84	1.61	4.98	<0.001	0.95	0.50	1.83	0.884
Limitation of routine activities																
absence	1.00	1.00	1.00				1.00	1.00	1.00				1.00	1.00	1.00	
presence	1.51	0.81	2.83	0.200	1.50	0.56	3.99	0.416	1.56	0.60	4.07	0.365	0.98	0.33	2.88	0.963
Sleep hours																
under 6 hours	1.17	0.63	2.17	0.615	1.70	0.68	4.21	0.254	0.90	0.38	2.18	0.822	0.96	0.28	3.25	0.944
between 6 to 8 hours	1.00	1.00	1.00				1.00	1.00	1.00				1.00	1.00	1.00	
over 8 hours	0.67	0.34	1.34	0.261	0.20	0.03	1.30	0.092	1.09	0.46	2.60	0.842	0.47	0.18	1.21	0.118
Days of intense physical activities a week																
none	1.00	1.00	1.00				1.00	1.00	1.00				1.00	1.00	1.00	
1- 3 days	0.85	0.51	1.40	0.517	0.25	0.08	0.81	0.022	1.05	0.55	2.01	0.891	0.81	0.38	1.71	0.574
more than 4 days	1.41	0.77	2.59	0.268	1.64	0.57	4.74	0.361	1.95	0.85	4.45	0.114	0.36	0.10	1.37	0.135

IV. DISCUSSION

Even though AD is one of the diseases receiving much attention by the Korean government and parents of the patients, we do not have specific data regarding the shortness of supply on health service to patients. Most epidemiologic studies on AD deal with the prevalence, incidence and associated biologic and nutritional factors and not with the socioeconomic and cultural factors.

According to the Korean National Survey for Health Behaviors in Adolescence, the prevalence of AD in adolescence has increased to 24.3 percent in 2012 compared to 18.9 percent in 2009. However, the percentage of regular check-ups in AD patients has decreased to 77.8 percent compared to 84.9 percent in 2009. This trend showed a gap between the increase in prevalence and the decrease in AD patients with regular visit to the clinic. This phenomenon showed that there is an

increase in the number of AD patients who are not able to visit the clinic at appropriate times.

Vachramon *et al* studied AD in African American children addressing unmet need of a common disease.⁶ By reviewing literatures, an attempt was made to figure out a difference of prevalence between Caucasians and African Americans. According to these studies, ceramide to cholesterol ratio and percutaneous absorption was lower in African American group.⁷ Serum IgE level and transepidermal water loss (TEWL) were higher, and mast cell granules were ~~are~~ also larger in African Americans.^{8, 9, 10, 11} The authors suggested that all of these laboratory findings might support the higher prevalence in African Americans. However, they could not consider the difference in socio-economic factors between the two races while it was observed that African Americans had more severe forms of AD than Caucasians. This

discovery could be attributed to a poorer access to medical care, a problem among African Americans in the United States. Such a delay in seeking medical care may be another explanation for a higher prevalence of severe disease forms in African American patients with AD.

A study done in London showed that London-born black Caribbean children appear to be at an increased risk of having atopic dermatitis.¹²

The prevalence of AD according to examination by dermatologist was 16.3% in black Caribbean children and 8.7% in white children. Other studies of migrant population on Hawaii¹³ and New Zealand¹⁴ have shown a large increase in atopic dermatitis prevalence in migrants compared with individuals of similar genetic groups in their own countries of origin. This evidence supports that the factors associated with urbanization are important in atopic dermatitis. Moreover, the

authors suggested that other physical or cultural factors such as increased susceptibility to irritant effects of repeated washing, increased sensitivity to antigens like house dust mites, early infant feeding practices, differences in staphylococcal colonization, and differences in access to medical care are possible explanation for the increased risk of atopic dermatitis in black Caribbean children.

Another study in the United Kingdom also showed that black children with AD are approximately six times more at risk of developing severe AD than white children.¹⁵ In this study, 50% of the black children's parents were unemployed, a rate much higher than that of white children.

Ben-Gashir *et al.* investigated that the quality of life and disease severity show a correlation in children with atopic dermatitis.¹⁶ In this study, the severity of eczema was evaluated using SCORAD (SCORing

Atopic Dermatitis) index and the Children's Dermatology Life Quality Index (CDLQI). The analysis showed a positive correlation between children's quality of life and disease severity, highlighting the impact of AD on children's life.

Upon putting all literatures together, it is possible to presume that there are some correlations between socioeconomic and cultural factors and the prevalence of AD.

In the general analysis between the patients with and without unmet need, several dependent variables such as sex, employment, presence of abnormal breath sound on exercise and level of stress on routine showed statistical difference confirmed by both bi- and multivariate analysis. However, age groups, physical discomfort and depressive moods, and limitation of routine activities failed to show significant difference on multivariate analysis while it was considered to be

statistically significant on bivariate. The presence of abnormal breath sound on exercise, which is a possible factor reflecting the severity in asthma, showed that the unmet need occurred more frequent in severe asthma group. Patients with a considerable amount of stress in routine life might have more severe symptoms of AD and can be presumed to have insufficient time to meet doctors.

Investigating the subgroup analyses, we clarified the influence of economy and accessibility to unmet need by dividing the patients with unmet need into the groups.

In the first subgroup analysis—the patients with unmet need due to economic problem—we recognized that the physical discomfort and depressive mood lasting during the recent two weeks showed statistical difference in both bi- and multi-variate analysis. Although there are other variables showing statistical difference in bivariate analysis such

as sex, age groups, employment, asthma history, abnormal breath sound on exercise and level of stress on routine life, the significance was not shown in multivariate analysis. On the contrast, multivariate analysis between the income of household and a group who performed intense physical activities at least 1 to 3 times a week showed a statistical difference.

It is assumed that the low income of household is able to induce more unmet need among the patients with economic problem. And the patients in this group are more sensitive to and more influenced by both physical discomfort and depressive mood than other subgroups. In this sense, we have to pay more attention to the patients with economic problems and cope with not only just the economic problems but also their mental and physical discomfort.

On the second subgroup, analyzing the patients with unmet need in terms of accessibility, it is described almost as the same in the general analysis between the patients with and without unmet need. It showed several associated independent variables with unmet need both in bi- and multivariate analysis such as sex, employment, and abnormal breath sound on exercise, and level of stress on routine life. We could assume that employed female AD patients with lots of stress on routine life are vulnerable to unmet need.

Lastly, we analyzed the association between the unmet need patients not associated with economic problems and accessibility, with control group. Interestingly in bivariate analysis, the presence of asthma was associated with unmet need. But since there was only one patient with unmet need with asthma, we have to be careful before applying this result to the general population. Also, lack of significance in the

multivariate analysis aids to this hesitancy. Moreover, another subgroup analysis showed that AD patients with high level of education having more prevalence of unmet need in multivariate analysis. Though we cannot interpret this phenomenon perfectly, it is possible that more-educated AD patients may neglect or underestimate their skin symptoms.

In Korea, the prevalence of unmet need in adult is 24.2 percent (males 18.0 percent and females 28.6 percent). Compared to the general unmet need, AD patients insisted slightly more unmet need. However it is almost same that females are more susceptible to unmet need.

Regardless of many efforts, the results of this study should be viewed in the context of its limitations and restricted data of the KNHNES. First, despite a thorough search and summing up of all patients during the last five years, the total number of AD patients with unmet need

were not many as our expectation. The scarcity of patient was most apparent in the first subgroup where the total number of patients with unmet need was only 49 patients. In this sense, we need to gather more patients in the next coming several years. The second shortcoming of this study involves the fact that the KHNES data does not provide data regarding the severity of AD. Since the questionnaires in the national survey are not specialized for AD, we cannot calculate and estimate the severity of AD, and also the number of visit to clinic in AD patients. Thus, if possible, we have to replenish the survey with some new questions able to figure out the severity and the symptom of AD. Third, there is a need to make an interpretation with laboratory tests regarding allergic diseases such as serum total IgE, vitamin D, and radioallergosorbent test (RAST) for house dust mites, dog's hair, and cockroach. Fourth, KHNES data are cross-sectional and do not cover

timing of event. Therefore, causal relationships cannot be established in these data. Fifth, perceived unmet need is not equivalent to objectively assessed unmet need. However, among individuals who seek treatment, perceived unmet need constitutes an important dimension of patients' perception of adequacy and quality of treatments; and among those who have not yet sought treatment, the data provides important information about demand for services.

Even though this study has several limitations, it carries a weight in being the first academic writing focused on the medical unmet need in AD up to our knowledge.

V. CONCLUSION

In this study, a total number of 860 patients were enrolled during the last 5 years of Korea National Health and Nutrition Examination Survey. Despite the several limitations on this study, the fact that finding in AD patients yielded a positive correlation of females, employment, abnormal breath sound on exercise, and high level of stress on routine life to the unmet need in health service. And in the subgroup analyses, it is able to figure out that the patients with economic problems are related to house income and more sensitive physical and mental discomfort, able to induce unmet need.

Therefore it is cautiously suggested that the need of tailored alternatives in the section of the health policy and management to reduce the number of unmet need.

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<Abstract (in Korean)>

아토피 피부염 환자에 있어서 미충족 의료 발생의 관련요인 분석

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신재용

아토피 피부염(atopic dermatitis)은 만성 습진 병변의 피부 질환으로 특징적으로 가려움증과 건조한 피부 병변을 갖는다. 지금까지 아토피 피부염의 인구학적 특성에 대한 많은 연구가 있었으나 이 질환을 가진 환자들을 대상으로 미충족 의료 여부와 그 원인을 분석한 연구는 찾을 수 없었다.

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으로 연구를 시행하였다. 총 860명의 아토피 피부염 환자가 이 연구에 등록되었다. 이중 227명의 환자가 조사시점 1년 전 동안 미충족 의료를 한번 이상 경험하였다. 미충족 수요의 유무에 따라 환자군을 나누고 이변량 분석을 시행한 결과, 성, 연령, 고용여부, 지난 2주간 신체적 불편감과 우울감, 운동 중 비정상적 숨소리, 일상 생활에 제한이 있는 경우 미충족 의료와 연관이 있음을 확인하였다.

다변량 분석 결과, 성별, 고용 여부, 2주간 신체 활동 제한 여부, 천식 유무, 운동 시 비정상적 숨소리 유무, 일상생활에서의 스트레스가 통계학적으로 유의한 인과관계가 있음을 확인할 수 있었다.

핵심되는 말: 아토피 피부염, 미충족 의료, 사회경제적 요인