

Disease Awareness and Management Behavior of Patients with Atopic Dermatitis: A Questionnaire Survey of 313 Patients

Jung Eun Kim, Young Bok Lee, Ji Hyun Lee, Hye Sung Kim, Kyung Ho Lee, Young Min Park, Sang Hyun Cho, Jun Young Lee

Department of Dermatology, College of Medicine, The Catholic University of Korea, Seoul, Korea

Background: Patients with atopic dermatitis (AD) should be relatively well informed about the disorder to control their condition and prevent flare-ups. Thus far, there is no accurate information about the disease awareness levels and therapeutic behavior of AD patients. **Objective:** To collect data on patients' knowledge about AD and their behavior in relation to seeking information about the disease and its treatment. **Methods:** We performed a questionnaire survey on the disease awareness and self-management behavior of AD patients. A total of 313 patients and parents of patients with AD who had visited the The Catholic University of Korea, Catholic Medical Center between November 2011 and October 2012 were recruited. We compared the percentage of correct answers from all collected questionnaires according to the demographic and disease characteristics of the patients. **Results:** Although dermatologists were the most frequent disease information sources and treatment providers for the AD patients, a significant proportion of participants obtained information from the Internet, which carries a huge amount of false medical information. A considerable number of participants perceived false online information as genuine, especially concerning complementary and alternative medicine treat-

ments of AD, and the adverse effects of steroids. Some questions on AD knowledge had significantly different answers according to sex, marriage status, educational level, type of residence and living area, disease duration, disease severity, and treatment history with dermatologists. **Conclusion:** Dermatologists should pay more attention to correcting the common misunderstandings about AD to reduce unnecessary social/economic losses and improve treatment compliance. **Ann Dermatol 27(1) 40~47, 2015)**

-Keywords-

Awareness, Complementary therapies, Dermatitis, atopic, Disease management, Information seeking behavior

INTRODUCTION

Atopic dermatitis (AD) is a chronic inflammatory skin disease characterized by periods of exacerbation and remission. As the treatment of AD is based on avoiding exposure to triggering factors and educating the patient about proper skin care, environmental control, and application of topical corticosteroids and emollient, disease control is highly dependent on patients' self-management¹.

To control their disease, many AD patients and the parents of patients attempt to seek information on the etiology and treatment of AD². These days, medical information can be easily accessed online, and false information about AD is prevalent on the Internet and in other media sources²⁻⁴. Thousands of AD-related sites exist on the Internet; however, 97% of these sites are advertisements for AD-related products, with some containing incorrect or exaggerated information^{2,5}. Moreover, most of the remaining 3% of these AD-related sites are advertise-

Received February 28, 2014, Revised April 21, 2014, Accepted for publication May 13, 2014

Corresponding author: Sang Hyun Cho, Department of Dermatology, Incheon St. Mary's Hospital, College of Medicine, The Catholic University of Korea, 56 Dongsu-ro, Bupyeong-gu, Incheon 403-720, Korea. Tel: 82-32-280-5100, Fax: 82-32-506-9514, E-mail: drchosh@hotmail.com

This is an Open Access article distributed under the terms of the Creative Commons Attribution Non-Commercial License (<http://creativecommons.org/licenses/by-nc/3.0>) which permits unrestricted non-commercial use, distribution, and reproduction in any medium, provided the original work is properly cited.

Table 1. Percentage of correct answers of all questionnaires according to demographic characteristics

No.	Question	Total	Gender		Marital status		Educational levels			living area	
			Female	Male	Married	Unmarried	Middle school graduates	High school graduates	College graduates	Urban	Rural
1	Atopy, atopic dermatitis, and infantile eczema have the same meaning.	32.6	29.1	36.5	32.8	32.7	38.0*	22.4* (<i>p</i> =0.046)	36.8*	33.2* (<i>p</i> =0.007)	23.8*
2	Atopic dermatitis is related to allergic rhinitis and allergic asthma.	70.9	68.5	73.6	80.2*	64.2* (<i>p</i> =0.010)	58.2*	69.4* (<i>p</i> =0.006)	78.5*	72.3* (<i>p</i> =0.041)	47.6*
3	Atopic dermatitis is a genetic disorder, not related to the environment.	87.9	90.9	84.5	88.5	89.5	84.8	87.1	89.6	87.2	95.2
4	Patients with atopic dermatitis should not have a high protein-diet such as a diet of meat, pork, and eggs.	41.2	42.4	39.9	52.7*	34* (<i>p</i> =0.007)	30.4	43.5	45.8	41.9	28.6
5	Patients with atopic dermatitis should consume olive oil instead of other types of cooking oil.	25.2	26.1	24.3	28.2	21.6	20.3	20.0	29.9	24.9	23.8
6	Food allergy usually disappears as children grow up.	39.0	38.2	39.9	47.3	32.1	30.4*	34.1* (<i>p</i> =0.034)	46.5*	39.1	33.3
7	Strengthening pulmonary function improves atopic dermatitis symptoms in patients with a family history of pulmonary dysfunction.	16.6	11.5*	22.3* (<i>p</i> =0.014)	13.7	18.5	24.1	14.1	14.6	17.0	14.3
8	Atopic dermatitis occurs in patients with a low level of immunity.	16.9	17.0	16.9	16.0	17.9	20.3	17.6	15.3	18.3	0.0
9	Exfoliation with rubbing using a flannel helps relieve atopic dermatitis symptoms.	91.1	90.9	91.2	95.4*	88.3* (<i>p</i> =0.027)	87.3	92.9	92.4	91.0	90.5
10	Patients with atopic dermatitis are more susceptible to bacterial and viral skin infections than non-atopic populations.	68.4	66.1	70.9	71.0	67.3	63.3	69.4	70.1	67.5	76.2
11	Atopic dermatitis shows seasonal variation in symptoms.	93.3	92.1	94.6	93.9	93.2	89.9	91.8	95.8	93.1	95.2
12	Diagnosis and cause of atopic dermatitis only relies on blood test results.	55.0	57.0	52.7	58.8	52.5	50.6	51.8	59	56.1	42.9
13	Atopic dermatitis can be cured by treatment.	25.6	24.8	26.4	32.1*	21.0* (<i>p</i> =0.022)	22.8	23.5	27.8	26.6	14.3
14	Systemic steroids aggravate symptoms in patients with atopic dermatitis.	25.9	27.9	23.6	32.8	19.8	19*	16.5* (<i>p</i> =0.002)	35.4*	26.3	23.8
15	Mild atopic dermatitis symptom can be treated with only emollients.	66.1	73.9*	57.4* (<i>p</i> =0.003)	76.3*	59.3* (<i>p</i> =0.013)	59.5	61.2	72.9	65.7	66.7
16	Topical steroid should be avoided due to its side effects even though symptoms worsen.	58.8	55.2	62.8	67.9*	53.7* (<i>p</i> =0.005)	43.0*	57.6* (<i>p</i> =0.001)	69.4*	59.2	52.4
17	Prolonged use of systemic and topical steroids can cause cancer.	13.7	15.8	11.5	13.0	14.8	13.9	8.2	16.7	11.8* (<i>p</i> =0.019)	33.3*
18	Using a water-softener has a good therapeutic effect on atopic dermatitis symptoms.	19.5	20.0	18.9	21.4	17.3	19.0	16.5	20.8	19.4	19.0
19	Getting placenta injections help control atopic dermatitis.	17.3	15.8	18.9	26.7*	11.7* (<i>p</i> =0.006)	8.9	16.5	22.2	17.3	14.3
20	Because cold and dry weather worsen pruritus, optimal indoor temperature and humidity for patients with atopic dermatitis is 25°C and 75%~80%, respectively.	16.6	15.8	17.6	22.9	12.3	13.9	17.6	17.4	17.3	4.8
21	Mild atopic dermatitis symptoms do not require treatment.	79.6	77.6	81.8	80.2	80.9	78.5	83.5	77.8	79.9	76.2
22	Breast milk feeding is effective to prevent occurrence of atopic dermatitis.	43.1	43.0	43.2	51.9	38.9	36.7	41.2	48.6	42.9	47.6
23	Patients with atopic dermatitis should restrict bathing, because it irritates the skin.	52.4	52.1	52.7	61.8	45.7	41.8	47.1	61.1	53.3	47.6
24	Exercise helps improve atopic dermatitis symptoms.	13.1	10.9	15.5	12.2	11.7	17.7	9.4	12.5	13.1	9.5
25	Atopic dermatitis disturbs bone growth.	37.7	40.6	34.5	36.6	38.9	40.5	36.5	37.5	36.7	52.4

*Chi-squared test, A *p*-value <0.05 was considered as statistically significant.

ments for oriental medicine clinics or contain information from unknown sources. For example, untested complementary and alternative medicine (CAM) therapies, such as pyroligneous liquor⁶ and lacquer⁷ for ingestion or topical application, as well as herbal medicines for improving AD symptoms, are being offered online^{2,8}.

Few studies have focused on the disease awareness and treatment behavior of AD patients worldwide. This study was performed to determine how much correct knowledge AD patients have on AD and to establish an important focus area for the development of educational resources for AD patients. In this study, we investigated the information- and treatment-seeking behavior of AD patients through a survey on their AD knowledge.

MATERIALS AND METHODS

This study was based on a questionnaire survey about AD knowledge. A total of seven university-affiliated hospitals (St. Paul's Hospital, St. Mary's Hospital, Uijeongbu St. Mary's Hospital, St. Vincent's Hospital, Bucheon St. Mary's Hospital, Incheon St. Mary's Hospital, and Seoul St. Mary's Hospital) participated. The study was approved by the institutional review board of each center (IRB No. XC11QIMI0119P), and all the participants gave informed consent. All patients whose AD was diagnosed based on the Hanifin-Rajka criteria⁹, by dermatologists in the The Catholic University of Korea, Catholic Medical Center between November 2011 and October 2012, were asked to complete the questionnaire. A total of 320 patients and parents of patients were enrolled. The response rate varied from 90% to 100% according to hospital. A total of 313 patients/parents completed the questionnaire without physician assistance. The average age of the patients was 28.5 years (range, 8~70 years).

The AD knowledge questionnaire consisted of 25 questions, including 1 question about AD definition, 5 questions about clinical manifestations, 4 about cause or triggering factor, 6 about treatment, 1 about diagnosis, and 8 about skin and environmental care (Table 1). The questionnaires consisted of polar questions about scientifically proven facts; common misunderstandings; and unproven, false, and exaggerated advertisements for commercial purposes.

We investigated the demographic information of patients, including sex, age, time of onset of AD, disease duration, and the three-item score (TIS) calculated on the day of the survey. All the participants were required to write down their personal information, including educational level, marital status, employment status, area of residence, and self-assessed disease severity at the beginning of the

questionnaire. Disease severity was categorized according to the TIS as follows: <3, mild; 3~6, moderate; and ≥6, severe. For the question about sources of AD information, the participants were asked to choose from among general physician, dermatology specialist, oriental medicine clinic, and personal acquaintance, with permission for duplication. For the question about the treatment methods they relied on, the options were treatment methods prescribed by a general physician, a dermatology specialist, or an oriental medicine clinic, or treatment with folk remedies. Treatment given in oriental medicine clinics and folk remedies were considered CAM.

The percentage of correct answers and the AD knowledge scores from all collected questionnaires were compared according to demographic characteristics and disease severity and duration, and whether treatment had been given by specialized dermatologists or not.

For analysis of intergroup comparisons, the chi-square test was used for categorical variables. Student's t-test and one-way analysis of variance were used to compare the mean AD knowledge scores. A $p < 0.05$ was considered as statistically significant.

RESULTS

Demographic characteristics

A total of 313 respondents (male, 148; female, 165) completed this questionnaire survey. One hundred thirty-nine adults and 174 children with AD were included in the study. Among the children, 77 patients completed the survey by themselves; for the remaining 97 children, their parents answered the survey. The demographic information of the patients is described in Table 2.

Information and treatment sources of AD patients

Fig. 1 shows the information and treatment sources of the participants. Dermatologists were the most frequent source (59.4%) of AD information. About 40% of the participants relied on information from the Internet. Dermatologists were also the most frequent treatment provider (71.6% of the AD patients). However, >30% of the participants had received treatment in oriental medicine clinics. About one-fifth of our patients had received CAM treatment.

Top 5 and bottom 5 questions

The top 5 questions that received the highest percentage of correct answers were as follows: question 11, "AD shows seasonal variation in symptoms" (93.3%); question 9, "exfoliation by rubbing with a flannel cloth helps in relieving AD symptoms" (91.1%); question 3, "AD is a genetic disorder, not related to the environment" (87.9%);

Table 2. Demographic information of respondents

Demographic information	Adults with AD (n=139)	Parents of a child with AD (n=97)	Children with AD (n=77)
Age (y)	30±10.5	37±9.4	14±3.7
Gender (female : male)	50.4 : 49.6	52.6 : 47.4	57.1 : 42.9
Marital status (married/unmarried)	29.5/70.5	94.8/5.2	
Education levels (middle school graduates/ high school graduates/college graduates)	4.4/34.3/61.3	7.5/28.7/63.8	
Occupation (employed/unemployed/students)	43.9/23.7/32.4	43.2/53.7/3.1	
Living area (urban/rural)	92.8/7.2	93.6/6.4	
Residency type (apartment/single house/multiplex house)	54/19/27	71.6/14.7/13.7	
Disease severity (mild/moderate/severe)	32.4/43.9/23.7	49.0/40.6/10.4*	32.9/50.0/17.1
TIS erythema/edema/excoriation	2±0.8/1±0.8/1±1.0	1±0.7/1±0.7/1±3.3*	2±0.9/1±0.7/1±0.8
Total TIS	4±2.0	3±1.8*	4±2.0
Disease duration (y)	16±11.0	3±2.7*	9±4.7
Age of onset (y)	13±10.8	3±3.2*	6±5.3

Values are presented as mean±standard deviation or percentage. AD: atopic dermatitis, TIS: three item score. *Information about a child with AD.

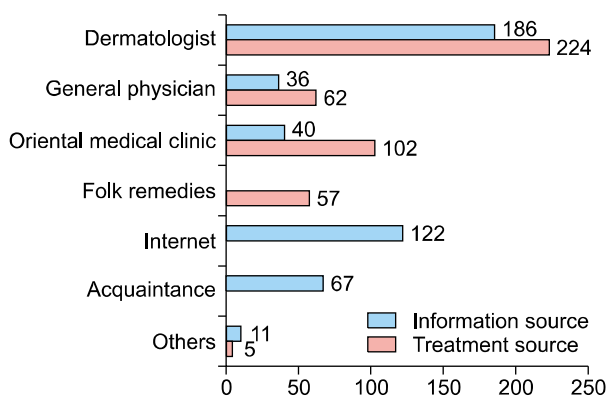


Fig. 1. The information and treatment sources of the patients and parents with atopic dermatitis.

question 21, "mild AD symptoms do not require treatment" (79.6%); and question 2, "AD is related to allergic rhinitis and allergic asthma" (70.9%).

The questions that received a low percentage of correct answers were as follows: "exercise helps AD symptoms" (13.1%); "prolonged use of systemic and topical steroids can cause cancer" (13.7%); "strengthening the pulmonary function improves AD symptoms in patients with a family history of pulmonary dysfunction" (16.6%); "because cold and dry weather worsens pruritus, the optimal indoor temperature and humidity for patients with AD is 25°C and 75%~80%, respectively" (16.6%); "AD occurs in patients with a low level of immunity" (16.9%); and "getting placenta injection helps control AD" (17.3%).

Comparison of the AD knowledge of participants according to demographic characteristics

Table 1 shows the percentage of correct answers in the AD knowledge questionnaire according to demographic characteristics. With regard to food restriction, natural course of food allergy, usefulness of emollient and usefulness of bath, the parents of patients showed significantly higher percentage of correct answers than the patients ($p=0.015$, 0.010 , 0.032 , and 0.002 , respectively).

More males (22.3%) than females (11.5%) ($p=0.014$) gave correct answers about the therapeutic effect of strengthening the pulmonary function. For the usefulness of emollients in treating mild AD, 73.9% of the females gave the correct answer, which is significantly higher than the proportion of males who answered correctly (57.4%; $p=0.003$). Married persons had a significantly higher percentage of correct answers to some questions than unmarried persons. Those questions included allergic march, food restriction, harmfulness of exfoliating the skin, potential for treating AD, usefulness of emollients and usefulness of topical steroids, and the effect of placenta injections ($p=0.010$, 0.007 , 0.027 , 0.022 , 0.013 , 0.005 , and 0.006 , respectively). Several questions had a high level of difficulty depending on education levels. Those questions included AD definition, allergic march, food allergy, beneficial effects of topical and systemic steroids, and adverse effects of topical and systemic steroids ($p=0.046$, 0.006 , 0.034 , 0.002 , and 0.001 , respectively).

A higher percentage of participants living in the city (33.2%) answered correctly about the definition of AD than those living in a rural area (23.8%; $p=0.007$). Also,

more urban residents (72.3%) than rural residents (47.6%; $p=0.041$) had the correct knowledge about allergic march. However, more urban residents (11.8%) than rural residents (33.3%; $p=0.019$) gave incorrect answers about the potential carcinogenic effects of systemic and topical steroids.

Apartment residents (37.9%) gave more correct answers than residents living in a single-detached house (28.3%) or a multiplex house (20.3%) concerning the definition of AD ($p=0.049$).

Several questions showed significant differences in the percentage of correct answers according to disease duration and severity. Patients/parents of patients with chronic AD had a significantly lower percentage of correct answers than patients/parents of patients with acute AD about the usefulness of emollients in treating mild AD (acute: 84.6% vs. chronic: 65.4%) and the lack of usefulness of placenta injections (acute: 34.6% vs. chronic: 15.8%). Similarly, fewer patients with moderate to severe symptoms than those with mild symptoms gave correct answers on the potential for treating AD (mild: 32.5%; moderate: 25%; severe: 11.1%) and the lack of usefulness of placenta injections (mild: 24.4%; moderate: 11.8%; severe: 14.8%). Participants with higher education levels showed significantly higher mean AD knowledge scores (middle school graduates: 10.13 ± 3.61 , high school graduates: 10.49 ± 3.47 , and college school graduates: 11.08 ± 3.28 ; $p=0.000$). Comparison of AD knowledge scores according to sex, marital status, living area, residency type, and disease severity and duration did not show significant differences.

Comparison of AD knowledge of the participants according to treatment history with a dermatologist

A total of 224 patients had received treatment from a dermatologist, whereas 89 had not. The baseline demographic characteristics did not differ between the two groups (Table 3).

Only one question showed a significant difference in the percentage of correct answers between the two groups. In question 3, "AD is a genetic disorder, not related to the environment," patients/parents with a treatment history with dermatology specialists gave the correct answer (91.1%) more often than those without a history of treatment from dermatology specialists (79.8%; $p=0.006$).

The mean AD knowledge scores were not significantly different between the two groups (treated by a dermatologist: 11.17 ± 3.45 ; not treated by a dermatologist: 10.83 ± 3.66).

DISCUSSION

The patients' knowledge about their disease could affect their behavior, which, in turn, could decide the outcome of the disease. This study addressed the level of awareness and treatment behavior of AD patients and parents of AD patients. Dermatologists ranked as the most frequent AD information source and the most frequent treatment provider; however, only one question showed a significant difference in the percentage of correct answers between patients who had a treatment history with dermatologists and those who do not. The results suggest that the current AD education being given in outpatient dermatology clinics might be insufficient to change the patients' behavior and that a more comprehensive education is needed. Almost 40% of the participants answered that they obtain

Table 3. Demographic information of patients with atopic dermatitis according to the treatment history by dermatology specialists

Demographic information	Patients treated by dermatologist (n=224)	Patients not treated by dermatologist (n=89)
Age (y)	28.4 ± 11.6	28.5 ± 12.7
Gender (female : male)	121 : 103	44 : 45
Disease severity (mild/moderate/severe)	35.3/44.0/20.6	47.6/31.7/20.7
TIS, erythema/edema/excoriation (mean)	1.7/0.5/1.4	1.7/0.5/1.2
Total TIS	3.6 ± 2.0	3.4 ± 2.0
Marital status (married/unmarried)	42.5/57.5	50/50
Education levels (middle school graduates/ high school graduates/college graduates)	26.0/25.6/48.4	24.8/32.6/43.7
Occupation (employed/unemployed/students)	28.0/25.0/40.4	30.7/34.1/35.2
Living area (urban/rural)	93.7/6.3	92.1/7.8
Disease duration (y)	1.9 ± 0.3	1.9 ± 0.3
Age of onset (y)	8.3 ± 8.8	8.6 ± 9.4

Values are presented as mean ± standard deviation or percentage. TIS: three item score.

information from the Internet. Many of the AD patients reported that they believe the unproven online information to be genuine. False information about CAM and steroid use was found to be widespread among the participants. Education about overall environmental care should be given in detail. Several questions showed a significantly different percentage of correct answers according to demographic characteristics, disease duration and severity, and whether the respondents are patients or parents of patients. Many of the participants expressed lack of knowledge about the standard treatment of AD. More than half of our participants have tried untested CAM to relieve their symptoms.

Nearly 70% of the participants in this study expressed confusion between AD and infantile eczema. Infantile eczema encompasses transient nonspecific skin rashes of infancy, AD, and seborrheic dermatitis, and it should be differentiated from AD. The lack of knowledge among the public about the definition of AD can be abused for commercial purposes, and this results in unnecessary expenditure on skin care, as well as unneeded food restriction and environmental control.

Most of the participants (87.9%) had the correct knowledge that AD results from the interaction between genetic susceptibility and the environment. AD patients are prone to environmental allergens and microbial infections because of decreased skin barrier function⁹, which was well known among 68.4% of the participants.

The relationship between AD, allergic rhinitis, and asthma was well known among the participants (70.9%). Because about 50%~80% of AD patients develop allergic rhinitis or asthma later in childhood, early management of AD is important⁹.

About 45% of AD patients/parents think that a diagnosis of AD can be confirmed by means of laboratory testing. For the diagnosis of AD, the presence of pruritus and chronic remitting eczematous dermatitis with a typical morphology and distribution is essential. Laboratory findings such as elevated immunoglobulin E are associated features⁹.

Many participants had awareness about the therapeutic effect of emollients (66.1%) and the necessity for persistent self-management (79.6%). AD patients need to use emollients appropriately to restore the defective skin barrier and to decrease the frequent use of topical corticosteroids even if they have no evident AD lesion on the skin¹⁰. Skin hydration with appropriate baths, which enhance the penetration and efficacy of topical treatment, helps control acute AD flare-ups as long as an emollient is applied after the bath¹¹. However, 47.6% of AD patients/parents think that baths should be restricted. The fact that rubbing irrita-

tes AD-affected skin¹¹ was well known to 91.1% of the participants. A recent study revealed that use of ion-exchange water softeners did not have additional benefits for AD patients because they cannot remove chlorine from tap water¹². Nevertheless, 81.5% of the respondents in this study believe that water softeners are beneficial.

Children with allergy to pork and chicken meat should consume vegetable protein. About 60% of the participants believe that an extensive elimination diet is needed, which might lead to nutritional deficiencies and growth retardation. A food allergy should be confirmed with a food challenge and an elimination diet¹³. Although there is no evidence that any particular kind of oil is associated with AD flare-ups, 74.8% of the participants believe that vegetable oil needs to be used. Common food allergies except those resulting from nut products and shellfish tend to disappear as children age¹³. These facts are poorly recognized only in 39.0% of AD patients/parents.

Seasonal variation of AD symptoms was well known in 93.3% of the participants. Pruritus of AD patients may worsen during winter and pollen seasons. Of the participants, 83.4% did not know the optimal indoor temperature range and humidity for their activities. House dust mites grow well at warm temperatures >25°C and a humidity of 75%~80%. To avoid exacerbation, the maintenance of an optimal indoor temperature and humidity is important. Although perspiration irritates AD skin, normal activities such as exercise is recommended for children⁹. Only 13.1% of participants had exact knowledge about exercise.

Steroid phobia could lead to poor compliance with treatment and has an impact on disease outcome. Unfortunately, 41.2% of the participants believe that they should not use topical steroids, although dermatologists consider topical steroids as a mainstay of treatment. Topical corticosteroid phobia was seen in 86.3% of our participants. Concordantly, Aubert-Wastiaux et al.¹⁴ reported that topical corticosteroid phobia was present in 80.7% of AD patients/parents regardless of disease severity and duration. Irrational fear of steroids was more frequently seen among urban residents (88.2%) than in others (66.7%). This might be because urban residents are exposed to much more advertisements about AD, some of which may be exaggerated and skewed.

The awareness that AD cannot be cured with occidental medicine and the presence of steroid phobia have led most AD patients to try CAM. More than half of our patients have tried CAM to relieve their symptoms. More than 30% of our participants answered that they had received oriental medicine treatment. A previous report stated that 84% of Korean AD patients have tried CAM, with

herbal remedies being the most frequent (73.8%)¹⁵. Many oriental medicine clinics insist that strengthening immunity or pulmonary function with herbal remedies, which do not contain steroids, can cure AD. Remarkably, >80% of the participants in this study believed that AD results from a low level of immunity and that strengthening the pulmonary function improves the symptoms. However, the therapeutic effects of herbal remedies prescribed in oriental clinics have been reported in only 25.3% of patients; others experienced no change or even an aggravation of their condition¹⁵. The annual per capita operation expense for AD is 2,646,372 won (US \$2,600) and a considerable portion of this expense is attributable to CAM. Supposing the gross national product of Korea was US \$20,000 in 2010, the estimated per capita nonoperation expense is US \$1,500. The annual per capita social loss for AD is an estimated US \$4,000, which was calculated by summing the operation and nonoperation expenses¹⁶. Untested CAM is sometimes not useful and incurs huge social costs. Patients with more severe symptoms and longer disease duration tend to have more doubts about the curability of AD, and to be more dependent on CAM. The lack of knowledge about these facts may be the cause of the severity and chronicity of their disorder. Education about AD should be started in patients with mild disease to reduce the severity and needless medical costs.

More than 60% of our participants think that AD disturbs bone growth. Although growth impairment may theoretically result from sleep disorders related to pruritus, AD itself or adequate topical corticosteroid use was not found to affect the overall height of children with AD¹⁷.

Persistent breastfeeding for at least 4 months decreased the development of AD in infants with a genetic background of atopy¹⁸. Surprisingly, less than half of the participants answered this question correctly.

In this study, 70% of the participants had received treatment from a dermatologist. Because all respondents were recruited from general hospitals, selection bias may be present. We tried to establish a validated AD knowledge questionnaire; however, there was some debate about what the right answers are. Because of the lack of questionnaire validation, the usability of the AD knowledge score in this study as a standard measure of AD knowledge is limited.

A well-structured education on AD treatment can help establish a good rapport between physicians and patients and encourage treatment adherence^{1,19-21}. Dermatologists should be at the forefront of public education about AD and of the quality control of information available on the Internet and in mass media, to attain better therapeutic results and reduce unnecessary social costs.

ACKNOWLEDGMENT

This study was supported in part by the Dermatology Alumni Fund of The Catholic University of Korea made in the 2011 program year.

REFERENCES

1. Cork MJ, Britton J, Butler L, Young S, Murphy R, Keohane SG. Comparison of parent knowledge, therapy utilization and severity of atopic eczema before and after explanation and demonstration of topical therapies by a specialist dermatology nurse. *Br J Dermatol* 2003;149:582-589.
2. Kwon HJ, Kim YJ, Park SB, Yu DS, Kim JW. Study of atopic dermatitis information on the internet in Korea. *Korean J Dermatol* 2006;44:137-140.
3. Yoo JH, Sohn AR. Evaluation of obesity health information internet sites in Korea. *Korea Sport Res* 2004;15:249-258.
4. Kim SY. Internet health information. *J Korean Acad Fam Med* 2002;23:281-290.
5. Kim DH, Li K, Seo SJ, Jo SJ, Yim HW, Kim CM, et al. A survey on understanding of atopic dermatitis among Korean patients. *Korean J Dermatol* 2012;50:201-211.
6. Keck CM, Anantaworasakul P, Patel M, Okonogi S, Singh KK, Roessner D, et al. A new concept for the treatment of atopic dermatitis: silver-nanolipid complex (sNLC). *Int J Pharm* 2014;462:44-51.
7. Elias PM. Lipid abnormalities and lipid-based repair strategies in atopic dermatitis. *Biochim Biophys Acta* 2014;1841:323-330.
8. Kim SY, Lee SD, Kim HO, Park YM. A survey of the awareness, knowledge, and behavior of topical steroid use in dermatologic outpatients of the university hospital. *Korean J Dermatol* 2008;46:473-479.
9. Donald L, Lawrence FE, Mark B. Fitzpatrick's dermatology in general medicine. New York: McGraw-Hill, 2007.
10. Ring J, Alomar A, Bieber T, Deleuran M, Fink-Wagner A, Gelmetti C, et al; European Dermatology Forum (EDF); European Academy of Dermatology and Venereology (EADV); European Federation of Allergy (EFA); European Task Force on Atopic Dermatitis (ETFAD); European Society of Pediatric Dermatology (ESPD); Global Allergy and Asthma European Network (GA2LEN). Guidelines for treatment of atopic eczema (atopic dermatitis) part I. *J Eur Acad Dermatol Venereol* 2012;26:1045-1060.
11. Katayama I, Kohno Y, Akiyama K, Ikezawa Z, Kondo N, Tamaki K, et al; Japanese Society of Allergology. Japanese guideline for atopic dermatitis. *Allergol Int* 2011;60:205-220.
12. Thomas KS, Dean T, O'Leary C, Sach TH, Koller K, Frost A, et al; SWET Trial Team. A randomised controlled trial of ion-exchange water softeners for the treatment of eczema in children. *PLoS Med* 2011;8:e1000395.
13. Forbes LR, Saltzman RW, Spergel JM. Food allergies and atopic dermatitis: differentiating myth from reality. *Pediatr Ann* 2009;38:84-90.
14. Aubert-Wastiaux H, Moret L, Le Rhun A, Fontenoy AM,

- Nguyen JM, Leux C, et al. Topical corticosteroid phobia in atopic dermatitis: a study of its nature, origins and frequency. *Br J Dermatol* 2011;165:808-814.
15. Chin HW, Jang HS, Jang BS, Jo JH, Kim MB, Oh CK, et al. A study on utilization of alternative medicine for patients with atopic dermatitis. *Korean J Dermatol* 2005;43:903-911.
 16. Seo SJ. Research of understanding and social loss of atopic dermatitis in Korea. Seoul: Chung-Ang University, 2011.
 17. Thomas MW, Panter AT, Morrell DS. Corticosteroids' effect on the height of atopic dermatitis patients: a controlled questionnaire study. *Pediatr Dermatol* 2009;26:524-528.
 18. Ip S, Chung M, Raman G, Chew P, Magula N, DeVine D, et al. Breastfeeding and maternal and infant health outcomes in developed countries. *Evid Rep Technol Assess (Full Rep)* 2007;(153):1-186.
 19. Ricci G, Bendandi B, Aiazzi R, Patrizi A, Masi M. Three years of Italian experience of an educational program for parents of young children affected by atopic dermatitis: improving knowledge produces lower anxiety levels in parents of children with atopic dermatitis. *Pediatr Dermatol* 2009;26:1-5.
 20. Armstrong AW, Kim RH, Idriss NZ, Larsen LN, Lio PA. Online video improves clinical outcomes in adults with atopic dermatitis: a randomized controlled trial. *J Am Acad Dermatol* 2011;64:502-507.
 21. Kupfer J, Gieler U, Diepgen TL, Fartasch M, Lob-Corzilius T, Ring J, et al. Structured education program improves the coping with atopic dermatitis in children and their parents-a multicenter, randomized controlled trial. *J Psychosom Res* 2010;68:353-358.