

## Elementary School Teacher's Knowledge, Disease Management Ability and Educational Needs Regarding Asthma and Allergic Diseases

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**Abstract:** We evaluated the knowledge, management and education needs related to asthma and allergic diseases among elementary school teachers in South Korea. Participants were 191 elementary school teachers assessed using a structured questionnaire. Participants were initially divided into two groups according to whether they had experience asthma and allergic disease. The demographic characteristics and main variables were compared between the groups using independent t-tests and  $\chi^2$ -tests; IBM SPSS Statistics 22 was used for these analyses. Pearson's correlation coefficient (r) was calculated to identify the relationship among the variables in each group. About 40% of teachers had experience in asthma or allergic disease the remainder had no experience. The demographics, except years of education did not significantly differ between these two groups. Participant's scores for knowledge, disease management and educational needs did not differ between the groups. Notably, the knowledge score of the no-experience group was higher than that of the experience group whereas the opposite was true for disease management scores. Perceptions of the educational needs of both groups were similar. Disease management ability was significantly positively associated with knowledge and educational needs in the experience group. However, there were no relationships between knowledge, disease management and educational needs in the no-experience group.

**Key words:** Asthma, allergic disease, teacher, knowledge, management, educational needs

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### INTRODUCTION

The lifetime prevalence of physician-diagnosed allergic disease such as asthma, rhinitis and a topic dermatitis has shown a larger increase than any other condition according to the International Study of Asthma and Allergies in Childhood (ISAAC) (Hong *et al.*, 2008). Asthma and allergic disease are the first and third greatest contributors to the disease burden in children and adolescents and are believed to be caused by industrialization, global warming, a westernized diet, an increased intake of drugs such as antibiotics and antipyretics and so-called rapid environmental changes such as housing (Beasley *et al.*, 2015; Yang *et al.*, 2014).

Worsening asthma symptoms can result in activity limitations thus restricting these children physical, emotional and social skills. These problems can lead children to feeling left out, impair their relationships with friends and can make it difficult for them to adapt to the surrounding environment (MacLean *et al.*, 1992). Additionally, when allergic diseases in childhood and adolescence are not managed properly, it can lead to

economic burden and severe disease in adulthood these factors, coupled with the currently increasing elderly population can increase the burden on society (Yang *et al.*, 2014). Therefore, it is necessary to ensure proper management of asthma and allergic disease through appropriate diagnosis and conservative treatment including removal of the irritant causing the condition, regulation of inflammation, physical environmental regulation and emotional stress reduction.

In South Korea, the proportion of individuals who subjectively reported poorly controlled asthma symptoms is twice that in other Asian countries; despite this the proportion of children who did not go to school because of asthma symptoms was 7>53% in the Japan and the 49% in the US (Cho *et al.*, 2006; Seo and Lee, 2009). This indicates that despite exhibiting asthma symptoms, many children with asthma are still going to school, making the appropriate management of asthma in schools important. According to Kim and Kwon (2016) 44% of elementary school students received a diagnosis of asthma in the last 6 years while the case was appealed to the difficulties in 32% of school trained in asthma (Kim and Kwon, 2016;

Kim *et al.*, 2014). Furthermore, 20% of students received aid for asthma while 22% took medications consistently. Regarding their knowledge of asthma, participants had the lowest knowledge in the areas of asthma prevention and management.

To ensure the self-management of children with asthma and allergic disease, teachers should involve disease management program. However, according to existing research, many teachers lack sufficient knowledge of these conditions and how to manage them (Canitez *et al.*, 2016; Olson *et al.*, 2004). In particular, teachers lack sufficient awareness of the causes, symptoms and management of asthma. According to Seo and Lee (2009), the participation rates of general education teachers in childhood asthma management programs in school were lower than were those of health teachers. Their primary reason for the lack of participation was being too busy and because they believed the students with asthma themselves did not require anyone to oversee them. However, in a study of 1400 individuals, the percentage of students whose asthma was known to the school health teacher was a scant 0.6% which was an enormous difference from the 11-15% estimated by the allergy association. This is likely because in South Korea, there is little general awareness of asthma and allergic disease and mild symptoms are typically ignored furthermore, even among those with a diagnosis if their condition does not require regular management, the condition may be ignored by others. Importantly, individuals who have no experience of such diseases typically lack knowledge and understanding of how to manage dangerous situations. Thus, it would be necessary to perform active dissemination of such information.

Research has shown that the presence or absence of asthma education influenced student's self-management knowledge. Teacher's education on the management of asthma and allergic disease should be conducted prior to student's education. This would ensure that teachers are educated enough to conduct appropriate in school education of students to promote more effective symptom management. The self-management of asthma symptoms has been shown to differ according to individualism experience and history (Hong, 2010). In other words, teachers educational needs, knowledge and disease management ability appear to differ depending on whether they have prior experience of asthma or allergic disease. Therefore, it is necessary to consider it during training on asthma, allergic diseases of the teachers. Park (2015) noted that teachers without experience of atopic dermatitis had low levels of knowledge and management ability related to the disease. Sufficient

knowledge of disease management is needed to care for patients with asthma and allergic disease effectively.

This study was implemented to help promote the effective disease management of students with asthma and allergic disease. Understanding teacher's current knowledge, management ability and educational needs regarding asthma and allergic disease will be helpful in developing intervention programs.

## MATERIALS AND METHODS

**Study design:** This study used a descriptive correlation research design to identify the relationship among overall knowledge, disease management ability and education needs regarding asthma and allergic disease among elementary school teachers.

**Study subject:** The study subjects were 191 elementary school teachers in D city. The sample size was calculated using G\*Power 3.1.7 with an effect size of 0.3,  $\alpha = 0.05$  and a power of 0.80 for a t-test. This analysis yielded a required sample size of 135. Nevertheless, we obtained a larger number to increase the generalizability of the findings.

### Study variables

**Knowledge of asthma and allergic disease:** This scale was used to develop a Song (Yang *et al.*, 2014). It contained 20 items in total with a total score range of 0-20; higher scores indicated a higher degree of knowledge regarding asthma and allergic disease. In Song (2002), the Cronbach's alpha was 0.66. The Cronbach's alpha of this study was 0.64.

**Asthma and allergic disease management ability:** Participant's asthma and allergic disease management ability was assessed using Song (2002)'s scale. This scale comprises 30 items rated on a 4-point Likert scale with higher scores indicating a greater ability to perform appropriate disease management. In Song (2002)'s study, the Cronbach's alpha was 0.72 while that in this study was 0.75.

**Asthma and allergic disease education needs:** Participant's education needs regarding asthma and allergic disease was measured using Kwon and Lee (2002)'s scale which was developed specifically for elementary school teachers. It comprises 12 items in subscales of general information, administration, diet, exercise and treatment all items were rated on a 5-point Likert with higher scores indicating greater education needs. In this study, the Cronbach's alpha was 0.94.

**Data analysis:** We compared participant’s demographics and main variables between the groups using IBM SPSS statistics 22. The significance level was set at 0.05. We analyzed the demographic characteristic differences between the two groups using independent t-tests and chi-square tests. We compared the groups in terms of knowledge, management and educational needs scores using independent t-tests. Pearson’s correlation coefficient (r) was calculated to identify the relations among the variables in each group.

**RESULTS**

**Demographics between groups:** The majority of participants in both groups were women (Group 1 = 97.4%, Group 2 = 98.3%) while the most common age group was 39 years (50% [n = 38] in Group 1 and 40.9% [n = 47] in Group 2). Around 61.8 and 60% of the participants in Groups 1 and 2, respectively reported not having a religion. Most participants in both groups were married (73.7% of Group 1 and 80% of Group 2) and had <16 years of education (77.6% of

Group 1 and 66% of Group 2). The proportions of homeroom teachers were 51.3% in Group 1 and 48.7% in Group 2 while 43.4% and 43.5% of these groups had a teaching career of over 10 years, respectively. The proportion of participants who had experienced asthma or another allergic disease was 47.4% in Group 1 and 37.4% in Group 2. As shown in Table 1, the groups significantly differed only in their “years of education” (p<0.05).

**Comparison of knowledge, disease management and educational needs scores:** The mean knowledge scores for Groups 1 and 2 were 16.0 (±1.84) and 16.0 (±2.0), respectively while the mean disease management scores were 138.2 (±179.68) in Group 1 and 130.8 (±165.2) in Group 2. The mean educational needs scores were 39.8 (±5.75) in Group 1 and 39.9 (±5.89) in Group 2. As shown in Table 2, none of the mean scores significantly differed between the groups.

**Correlation among the variables in the two groups:** As shown in Table 3, knowledge of asthma and allergic diseases had a significant correlation with disease

Table 1: Participant demographic characteristics (N = 191)

Characteristics/Categories	n (%)		t-values	p-values
	Group 1 (n = 76)	Group 2 (n = 115)		
<b>Sex</b>				
Male	2 (2.6)	2 (1.7)		
Female	74 (97.4)	113 (98.3)	-0.42	0.675
<b>Age years</b>				
≥ 39	38 (50.0)	47 (40.9)		
40-49	26 (34.2)	35 (30.4)		
≤ 50	12 (15.8)	33 (28.7)	-1.71	0.088
<b>Religion</b>				
Have	47 (61.8)	69 (60.0)		
None	29 (38.2)	46 (40.0)	0.25	0.800
<b>Marital status</b>				
Married	56 (73.7)	92 (80.0)		
Single	20 (26.3)	23 (20.0)	-1.02	0.309
<b>Years of education (years)</b>				
≥ 16	62 (77.6)	76 (66.0)		
<17	14 (18.7)	39 (33.9)	-1.99	0.047
<b>Responsible subjects</b>				
Health teachers	37 (48.7)	59 (51.3)		
Homeroom teachers	39 (51.3)	56 (48.7)	0.35	0.725
<b>Teaching career (years)</b>				
≥ 10	33 (43.4)	50 (43.5)		
11-20	29 (38.2)	27 (23.5)		
≤ 21	14 (18.4)	38 (33.0)	-1.56	0.119
<b>Experience of asthma/allergic disease</b>				
Yes	36 (47.4)	43 (37.4)		
No	40 (52.6)	72 (62.6)	-1.37	0.172

Group 1: Asthma and allergic disease experienced; Group 2: No experience asthma and allergic disease

Table 2: Comparison of knowledge, disease management and educational needs scores (N = 191)

Variables	Ranges	Group 1M (±SD)	Group 2M (±SD)	t-values	p-values
Knowledge	10-20	16.0(±1.84)	20.0 (±2.0)	0.18	0.854
Management	25-812	138.2(±179.68)	130.8 (±165.2)	0.29	0.770
Education needs	16-48	39.8 (±5.75)	39.9 (±5.89)	-0.05	0.960
Characteristics	3-12	9.5 (±1.54)	9.5 (±1.72)	-0.15	0.875
Administration	3-12	9.7 (±1.73)	9.7 (±1.85)	0.21	0.832
Dietary	1-4	3.4 (±0.62)	3.4 (±0.56)	0.70	0.485
Exercise	1-4	3.2 (±0.65)	3.3 (±0.63)	-0.57	0.565
Treatment	4-16	13.7 (±2.2)	13.8 (±2.0)	-0.21	0.829

Table 3: Correlations among the variables

Group/Categories	r(p)	r(p)	r(p)	r(p)	r(p)	r(p)	r(p)
<b>Group 1</b>							
Knowledge	1						
Management	0.22 (0.047)	1					
Educational needs	0.23 (0.041)	-0.09 (0.408)	1				
General information	0.18 (0.118)	0.01 (0.871)	0.75 (<0.001)	1			
Administration	0.23 (0.038)	-0.08 (0.490)	0.87 (<0.001)	0.50 (<0.001)	1		
Dietary	0.16 (0.158)	-0.10 (0.391)	0.86 (<0.001)	0.52 (<0.001)	0.71 (<0.001)	1	
Exercise	0.17 (0.126)	-0.04 (0.719)	0.73 (<0.001)	0.53 (<0.001)	0.54 (<0.001)	0.66 (<0.001)	1
Treatment	0.20 (0.082)	-0.16 (0.167)	0.93 (<0.001)	0.55 (<0.001)	0.76 (<0.001)	0.85 (<0.001)	0.63 (<0.001)
<b>Group 2</b>							
Knowledge	1						
Management	0.13 (0.151)	1					
Educational needs	-0.05 (0.541)	0.01 (0.846)	1				
General information	-0.08 (0.377)	-0.01 (0.882)	0.87 (<0.001)	1			
Administration	-0.02 (0.764)	0.02 (0.784)	0.90 (<0.001)	0.73 (<0.001)	1		
Dietary	0.00 (0.952)	-0.01 (0.898)	0.80 (<0.001)	0.65 (<0.001)	0.66 (<0.001)	1	
Exercise	-0.07 (0.417)	-0.12 (0.193)	0.75 (<0.001)	0.61 (<0.001)	0.64 (<0.001)	0.60 (<0.001)	1
Treatment	-0.04 (0.606)	0.08 (0.380)	0.88 (<0.001)	0.64 (<0.001)	0.70 (<0.001)	0.72 (<0.001)	0.59 (<0.001)

Group 1: Asthma and allergic disease experienced, Group 2: No experience asthma and allergic disease

management ability ( $r = 0.22, p = 0.047$ ) and education needs ( $r = 0.23, p = 0.041$ ) in Group 1. Specifically, participants who had greater knowledge of asthma or allergic disease were more likely to have high disease management and educational needs. However, there were no significant correlations among knowledge, disease management and educational needs in Group 2.

### DISCUSSION

This study examined elementary school teacher’s knowledge, disease management ability and education needs concerning asthma and allergic diseases with the aim of benefiting the development of in school education programs for teachers. The results indicated a significant correlation between all three variables among teachers who had prior experiences with these diseases. Furthermore, teachers in this experience group tended to have more disease-related knowledge and educational needs. Generally, elementary school students spend a considerable amount of time in school under the guidance of individual teachers. If a student suffers an asthma attack, it may be necessary for his or her teacher to provide assistance and thus teachers who have the ability to manage the disease will be of greater help in rescuing students at risk for such attacks (Flores, 2009; Eiscnberg *et al.*, 1993). However, many teachers have little knowledge of asthma and allergic disease as they lack the opportunity to obtain even a general knowledge of this topic (Anderson *et al.*, 2005; Neuharth-Pritchett and Getch, 2001). Some teachers have expressed fears concerning whether they have received sufficient training for handling an emergency situation (Anderson *et al.*, 2005). Appropriately tailored education based on

teacher’s experience may enable better outcomes. In particular, teachers must be trained in disease management of students with asthma because asthma attacks and other severe allergic reactions (e.g., respiratory distress) can occur suddenly and often cannot wait for health teacher’s care. According to a previous survey, only 1% of teachers obtain relevant knowledge on allergic disease through experience of students with asthma/allergic symptoms whereas around 9.6% may obtain such knowledge through school records (Jaramillo and Reznik, 2015; Canitez *et al.*, 2016). For teachers to intervene in asthma attacks or allergic reactions appropriately, they must obtain sufficient knowledge and disease management ability.

Surprisingly, the disease-related knowledge of teachers without experience of asthma and allergic disease was higher than that of teachers with such experience but this knowledge was not correlated with disease management ability. Moreover, the educational needs scores of this group did not correlate with either the knowledge or the disease management scores. In other words, teachers without experience of asthma and allergic disease should be provided with education to enhance their awareness of the importance of asthma and allergic disease. In contrast, teachers who have experienced these diseases should be provided with a support program tailored to their level of knowledge. In a study by Woo and Park (2016), the effect of elementary school students was found to be influenced by the support of friends, family and teachers; this suggests that support from school teachers may help promote positive emotional changes among students with asthma and allergic diseases which in turn can aid in disease management. In summary, tailored education and training based on

teacher's educational needs and knowledge may help them support their students with asthma/allergic disease. This is likely to be especially beneficial to students at high risk of asthma attacks or allergic reactions (Kwon *et al.*, 2015).

Various programs aimed at elementary school teacher's knowledge and disease management ability related to asthma and allergic diseases and tailored to their individual needs are needed for effective symptom management.

### CONCLUSION

We concluded that school teachers with experience in asthma/allergic disease had better disease management ability than did the no-experience group. Systematic, continuous program aiming to educate school teachers on asthma/allergic disease should be provided according to their individual experiences and needs.

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