



The association between the parenting stress of the mother and the incidence of allergic rhinitis in their children



Min Bum Kim^{a,1}, Jeong Hong Kim^{a,b,1}, Keun-Hwa Lee^b, Seong-Chul Hong^b,
Hye-Sook Lee^b, Ju Wan Kang^{a,c,*}

^a Department of Otorhinolaryngology, Jeju National University School of Medicine, Jeju, South Korea

^b The Environmental Health Center (Atopic Dermatitis and Allergic Rhinitis), Jeju National University School of Medicine, Jeju, South Korea

^c Department of Medicine, Yonsei University Graduate School, Seoul, Republic of Korea

ARTICLE INFO

Article history:

Received 18 January 2017

Received in revised form

19 June 2017

Accepted 19 July 2017

Available online 21 July 2017

Keywords:

Parenting

Allergy

Stress

Children

Allergic rhinitis

ABSTRACT

Objectives: The prevalence of allergic rhinitis and the social burden related to the management of allergic rhinitis have persistently increased. There are many studies investigating the association between the allergic diseases of children and the stress of their parent. However, the relationship between parenting stress and the incidence of allergic rhinitis among children requires further investigation. We aimed to investigate the significance of parenting stress for mothers with children treated for allergic rhinitis.

Methods: The mothers of 250 children in the second and third grade of elementary school were involved in this study. The Parenting Stress Index-Short Form (PSI-SF) was used to measure parenting stress. Additionally, the monthly household income, treatment history for allergic diseases (atopic dermatitis, asthma, and allergic rhinitis) during the past 12 months, and maternal education status were investigated using the questionnaire.

Results: Parenting stress index score was significantly higher among the mothers of children treated for allergic rhinitis (76.41 ± 9.35) compared with the parents of children without treatment history for allergic rhinitis (70.06 ± 13.74). Nonetheless, there were no significant differences between the cases of children with atopic dermatitis and those with asthma. We analyzed the association between allergic rhinitis and parenting stress adjusted for the monthly household income, and maternal education status, and showed that a treatment history of allergic rhinitis was significantly associated with parenting stress (coefficient 7.477, 95% interval 1.703–13.252; $p = 0.011$).

Conclusion: Treatment of the children for allergic rhinitis significantly affects the parenting stress of their mother. We recommend that mothers with children with allergic rhinitis should receive appropriate counseling about parenting stress.

© 2017 Published by Elsevier Ireland Ltd.

1. Introduction

Allergic rhinitis (AR) is one of the most common chronic disorders among the pediatric and adult populations. The overall prevalence of AR is reported to be 12% in the adult population [1], and among children, the prevalence is much higher. Some studies suggest figures as high as 40% [2]. Similar to the incidence of other allergic disorders, such as asthma and atopic dermatitis (AD), AR is become more prevalent in the pediatric population [3]. Patients with AR usually suffer from a runny nose, sneezing, and nasal

obstruction. Additionally, AR disturbs the patient's sleep cycle, growth, and school performance [3]. It can eventually lead to the onset of mental disorders such as depression, anxiety, or sleep disorders [4,5]. Moreover, the disease is a potential etiological factor for comorbidities such as asthma, sinusitis, or otitis media [6]. In addition to affecting the physical and social functioning of the individual, the disease can also increase financial burden, both directly and indirectly [7].

There are many studies investigating the association between the incidence of allergic diseases among children and the stress of the parent. Asthma and AD are etiological agents that increase parenting stress [8,9]. Conversely, the role of maternal stress during pregnancy is associated with the development of allergic diseases affecting their offspring [10]. The incidence of AR among children

* Corresponding author. Department of Otorhinolaryngology, Jeju National University Hospital, 102 Jejudaehakno, Jeju 63243, South Korea.

E-mail address: juwankangmd@gmail.com (J.W. Kang).

¹ Both authors contributed equally to this work.

can also contribute towards the parent's level of stress. This is similarly observed in other studies on the incidence of other chronic, allergic conditions. The stress of the parent can also become a source of stress for the child; reciprocally, this affects the clinical course of the child's condition [11]. However, the relationship between parenting stress and the incidence of allergic rhinitis among children requires further investigation.

In this study, we aimed to investigate the significance of parenting stress in the parents of children with AR, compared with the parents of children without AR. We aimed to determine the relationship between the incidence of AR among their children and the prevalence of parenting stress.

2. Materials and methods

2.1. Study population

On November 2009, we administered questionnaires to the mothers of second and third grade students from two elementary schools in the Jeju province, Korea. Children with incomplete patient information, and responses provided from caregivers other than those of the mothers, were excluded. Among the 363 children whose caregiver had answered the questionnaires, 113 children were excluded because answered information was incomplete or other caregiver than mother had answered. Therefore, the data of 250 children were included in this analysis. This study was approved by the institutional review board of the Jeju National Hospital University in accordance with the Declaration of Helsinki. Patient confidentiality was maintained throughout the process.

2.2. Measures

The height and weight of the children were recorded, and the medical history of children was collected using questionnaires. For the three allergic diseases (AR, AD, and asthma), we inquired about the 'symptoms in the past 12 months' using the International Studies of Asthma and Allergies in Childhood (ISAAC) questionnaire, in addition to the 'treatment history in the past 12 months' of each disease. The Parenting Stress Index-Short Form (PSI-SF), which is an abridged version of the Parenting Stress Index developed by Adidin [12], was translated in Korean [13]. It was used to measure the parenting stress of the mothers. The PSI-SF shows good reliability and validity [12,14]. Additionally, the monthly household income, family type, and maternal education status were investigated using the questionnaire. The monthly household income was divided into units of 1000 US dollars, ranging from below 1000 US dollars to over 4000 US dollars. Maternal education status was divided into three categories: graduated from middle school or lower, graduated from high school, or graduated from college or higher.

2.3. Statistical analysis

The differences in PSI-SF were compared using the Student's *t*-test and analysis of variance (ANOVA) test. A linear regression analysis was used to show the independent variables after adjusting for the confounding variables. SPSS 17.0 was used for the analyses. A *p*-value of <0.05 (two-tailed) was considered statistically significant.

3. Results

Among the 250 children, 110 children were males and the remainders were females. Table 1 showed the demographic data of study population. The mean value of the parenting stress index

score was slightly lower in the female group, but no significant difference was evident (71.89 ± 13.66 for males and 69.86 ± 13.29 for females, $p = 0.239$). The monthly household income had a significant association with parenting stress according to the ANOVA test ($p = 0.036$). Families that earned 2000 to 3000 US dollars, monthly, had the lowest parenting stress index score (68.16 ± 13.75). The maternal education status showed that there were no significant differences in the parenting stress index scores of the participants (Table 1).

The numbers of children with symptoms of AR, AD, and asthma were 64, 44, and 12, respectively. Fig. 1A showed the number of children with symptoms of each allergic disease. Three children showed symptoms of AR, AD, and asthma. Fig. 1B showed the number of children with treatment history for allergic disease. And, there were no children were treated for AR, AD, and asthma.

The relationship between the incidence of allergic diseases and parenting stress was analyzed. The asthmatic symptoms within the past 12 months showed no significant correlation with the parenting stress index score. The treatment history of asthmatic children within the past 12 months also had no effect on parenting stress. Similarly, the signs and symptoms, and the treatment of AD had no effect on parenting stress. Symptomatic children with AR also showed no significant association to parenting stress. Interestingly, parenting stress was significantly higher among the mothers with children treated for allergic rhinitis than the mothers of children without treatment history (76.41 ± 9.35 for treated children vs. 70.06 ± 13.74 for untreated children, $p = 0.020$) (Table 1).

Finally, we performed a multivariate linear regression analysis on the variables to reveal the independent factors following adjustment for the confounding variables. We analyzed the association between the presentation of the signs and symptoms of AR and parenting stress. Mothers who had children who had been treated for AR were at a significantly greater risk of parenting stress. In this scenario, we adjusted for the sex of the child, the monthly household income, and the maternal education status. Additionally, monthly household income was also related to parenting stress (Table 2).

4. Discussion

Allergic rhinitis is a common chronic disorder observed in both the pediatric and adult populations. The condition is an IgE-mediated inflammatory disorder of the sinonasal mucosa induced by an allergen. Patients with AR present the following three signs: sneezing, nasal congestion, and rhinorrhea. Allergic rhinitis not only affects the patients' physical condition, but also adversely affects their social life, sleep cycle, school performance, and work productiveness [15]. It can lead to the onset of psychiatric disorders such as depression, anxiety, sleep disorders, or contribute towards diagnoses of attention deficit hyperactivity disorders [4,5,16]. Moreover, the incidence of AR increases the individual's spending on health-related expenses, such as on the management of symptoms, and decreases the patients' productivity. Consequently, the disease increases the financial burden for those affected [7], and may contribute towards the stress of the parents of children with AR.

Previous studies showed that the incidence of allergic diseases, such as AD and asthma, were associated with increased parenting stress. However, studies regarding the association between AR and parenting stress are lacking despite the increasing prevalence of the condition. To our knowledge, there is limited research assessing the association between AR and parenting stress. Warschburger et al. suggested that the onset of childhood AD had a profound impact on the emotional and social well-being of many of the parents [8].

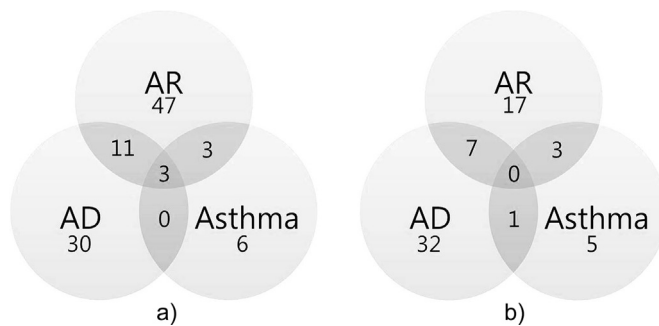
Table 1
Demographic data of study population.

Variables		PSI-SF score	p-value
Sex of children	Male (n = 110)	71.89 ± 13.66	0.239
	Female (n = 140)	69.86 ± 13.29	
Monthly household income (Unit: US dollar)	<1000 (n = 24)	76.25 ± 12.18	0.035
	1000–1999 (n = 73)	71.34 ± 12.79	
	2000–2999 (n = 106)	68.16 ± 13.75	
	3000–3999 (n = 36)	71.78 ± 14.25	
	4000 ≤ (n = 11)	76.36 ± 10.59	
Maternal education status	Middle school or less (n = 134)	71.28 ± 13.20	0.091
	High school (n = 66)	67.86 ± 14.25	
	College or more (n = 50)	73.12 ± 12.68	
Symptoms of allergic diseases			
Asthma	Present (n = 12)	70.25 ± 11.71	0.896
	Absent (n = 238)	70.77 ± 13.56	
AD	Present (n = 44)	71.88 ± 14.81	0.538
	Absent (n = 206)	70.51 ± 13.18	
AR	Present (n = 64)	71.75 ± 13.45	0.491
	Absent (n = 186)	70.40 ± 13.49	
Treatment history of allergic diseases			
Asthma	Treated (n = 9)	68.22 ± 15.16	0.622
	Untreated (n = 241)	70.84 ± 13.42	
AD	Treated (n = 40)	70.40 ± 15.56	0.875
	Untreated (n = 210)	70.81 ± 13.07	
AR	Treated (n = 27)	76.41 ± 9.35	0.020
	Untreated (n = 223)	70.06 ± 13.74	

p-value was calculated with *t*-test or ANOVA test as appropriate.

PSI-SF: Parenting Stress Index-Short Form (PSI-SF).

p-value < 0.05: presented in bold.

**Fig. 1.** A) number of children with symptoms of allergic disease in the past 12 months, B) number of children with treatment history for allergic disease in the past 12 months. AR: allergic rhinitis, AD: Atopic dermatitis.

Additionally, according to Shalowitz et al., the mothers of the children with either diagnosed or suspected asthma also experienced more stress compared to the mothers of children without asthma [9].

In the present study, parenting stress in mothers of children with allergic disease was not higher than that of mother of children without allergic disease, regardless of kind of allergic disease. Also, we considered the cases of children with multiple allergic diseases and analyzed the difference of parenting stress between children without allergic disease, children with single allergic disease, and multiple allergic diseases. However, there was no significant difference of parenting stress among the groups (data not shown).

However, parenting stress was significantly higher for the parents of children treated for AR compared to the parents of the children without treatment history of AR. We speculated on the possible causes for the increased levels of stress among the mothers of children treated for AR. First, we assumed that there was an

Table 2
Results of multivariate linear regression analysis.

Variables		B	95% CI	p-value
Sex of children	Male	—	—	—
	Female	−1.348	−4.947–2.251	0.461
Height		−0.353	−0.773–0.068	0.100
Weight		0.269	−0.089–0.627	0.140
Treatment history of AD	Untreated	—	—	—
	Treated	0.049	−4.813–4.911	0.984
Treatment history of AR	Untreated	—	—	—
	Treated	7.477	1.703–13.252	0.011
Treatment history of asthma	Untreated	—	—	—
	Treated	−4.651	−13.894–4.592	0.322
Monthly household income (Unit: US dollar)	<1000	8.633	2.352–14.913	0.007
	1000–1999	4.261	−0.012–8.535	0.051
	2000–2999	—	—	—
	3000–3999	5.662	0.424–10.900	0.034
	>4000	11.508	1.119–21.898	0.030
Maternal education status	Middle school or less	4.077	−0.270–8.423	0.066
	High school	—	—	—
	College of more	5.241	−0.062–10.545	0.053

p-value < 0.05: presented in bold.

economic factor to parenting stress; money spent on managing a child affected with this condition would also affect the stress score, even if parenting stress was independently associated with the monthly household income. Second, a previous study reported that there were more predisposed toward attention deficit hyperactivity disorders among children with AR than among those without AR [16]. Additionally, it was also shown that this would increase parenting stress. Interestingly, there was no significant difference in the parenting stress index score between the symptomatic children with AR and children without symptom of AR. We considered the possibility that treated children may have more severe symptoms, and that the enforcement of a medication regimen, or the use of nasal sprays, may be stressful for the mothers. Also, relatively small numbers of children treated with AR compared with the numbers of children with AR could affect the different results. Contrary to the results of previous studies [8,9], the incidence of asthma and AD among children had no effect on parenting stress. According to “the allergic march” theory, the signs and symptoms of AD and asthma tended to stabilize in children of school age, whereas the signs and symptoms of AR become more severe in children of the same cohort [17]. As such, the participants enrolled in this study were children who were of school age; the results are described as above.

Our study had several limitations. First, despite the larger cohort size of the present study compared to that of the previous studies, the size of the study population was still too small to derive a definitive conclusion. Second, we should include more variables, such as parent occupation, severity of allergic diseases, and the consideration of the comorbidities of allergic conditions within children that could affect parenting stress. Nonetheless, the consideration of all possible factors might not be feasible. Third, the demographic of children enrolled in the present study was limited to rural areas; therefore, regional factors may affect the results. Fourth, the information about symptoms and treatment history related with allergic disease fully depended on parental reports. We admitted that these might lead biased results. Finally, we did not consider the types of treatment despite there might be various spectrum of treatment.

Nevertheless, the inclusion criteria of our study population focused on children within a narrow age range. Parenting stress could be influenced by the child's age; therefore, a narrow age range is conducive towards achieving the study's objective. There have been previous studies on the relationship between the incidence of pediatric AR and parenting stress. Nonetheless, the present study provides a more comprehensive consideration of the variables that may influence parenting stress [16]; additionally, the present study population was also relatively larger than those of the previous studies [11].

In conclusion, the mothers of children treated for AR have increased parenting stress compared with the mothers of children without treatment history for AR. Therefore, the assessment of parenting stress in the mothers of children with AR is required, and the emotional and medical support provided to these mothers is essential to childcare.

Author contributions

J.W.K. and J.H.K. designed the research; K.W.L., S.C.H., H.S.L., and

J.H.K. analyzed the data; J.W.K. and M.B.K. wrote the paper. J.W.K., J.H.K., and M.B.K. revised the manuscript. J.W.K. had primary responsibility for final content. All authors read and approved the final manuscript.

Source of funding

This study was supported by grants from the Environmental Health Center funded by the Ministry of Environment, Republic of Korea. The funders had no role in study design, data collection and analysis, decision to publish, or preparation of the manuscript.

Acknowledgment

This study was supported by grants from the Environmental Health Center funded by the Ministry of Environment, Republic of Korea.

References

- [1] K. Radon, U. Gerhardinger, A. Schulze, J.P. Zock, D. Norback, K. Toren, et al., Occupation and adult onset of rhinitis in the general population, *Occup. Environ. Med.* 65 (2008) 38–43.
- [2] R.M. Sly, Changing prevalence of allergic rhinitis and asthma, *Ann. Allergy Asthma Immunol.* 82 (233–48 quiz) (1999) 248–252.
- [3] S. Hong, D.K. Son, W.R. Lim, S.H. Kim, H. Kim, H.Y. Yum, et al., The prevalence of atopic dermatitis, asthma, and allergic rhinitis and the comorbidity of allergic diseases in children, *Environ. Health Toxicol.* 27 (2012) e2012006.
- [4] B. Leynaert, C. Neukirch, R. Liard, J. Bousquet, F. Neukirch, Quality of life in allergic rhinitis and asthma. A population-based study of young adults, *Am. J. Respir. Crit. Care Med.* 162 (2000) 1391–1396.
- [5] R.A. Sansone, L.A. Sansone, Allergic rhinitis: relationships with anxiety and mood syndromes, *Innov. Clin. Neurosci.* 8 (2011) 12–17.
- [6] M.S. Blaiss, Pediatric allergic rhinitis: physical and mental complications, *Allergy Asthma Proc.* 29 (2008) 1–6.
- [7] M.S. Blaiss, Allergic rhinitis: direct and indirect costs, *Allergy Asthma Proc.* 31 (2010) 375–380.
- [8] P. Warschburger, H.T. Buchholz, F. Petermann, Psychological adjustment in parents of young children with atopic dermatitis: which factors predict parental quality of life? *Br. J. Dermatol.* 150 (2004) 304–311.
- [9] M.U. Shalowitz, T. Mijanovich, C.A. Berry, E. Clark-Kauffman, K.A. Quinn, E.L. Perez, Context matters: a community-based study of maternal mental health, life stressors, social support, and children's asthma, *Pediatrics* 117 (2006) e940–e948.
- [10] N.W. Andersson, M.V. Hansen, A.D. Larsen, K.S. Hougaard, H.A. Kolstad, V. Schlünssen, Prenatal maternal stress and atopic diseases in the child: a systematic review of observational human studies, *Allergy* 71 (2016) 15–26.
- [11] O. Emin, S. Mustafa, S. Nedim, Psychological stress and family functioning in mothers of children with allergic rhinitis, *Int. J. Pediatr. Otorhinolaryngol.* 73 (2009) 1795–1798.
- [12] D. Reitman, R.O. Currier, T.R. Stickle, A critical evaluation of the Parenting Stress Index-Short Form (PSI-SF) in a head start population, *J. Clin. Child. Adolesc. Psychol.* 31 (2002) 384–392.
- [13] S.J. Shin, M.J. Chung, Effects of stress, social support and efficacy on mothers' parenting behaviors, *Korean J. Child. Stud.* 19 (1998) 27–42.
- [14] M.E. Haskett, L.S. Ahern, C.S. Ward, J.C. Allaire, Factor structure and validity of the parenting stress index-short form, *J. Clin. Child. Adolesc. Psychol.* 35 (2006) 302–312.
- [15] R. Pawankar, C. Bunnag, N. Khaltayev, J. Bousquet, Allergic rhinitis and its impact on asthma in Asia Pacific and the ARIA update 2008, *World Allergy Organ. J.* 5 (2012) S212–S217.
- [16] Y.S. Lee, S.H. Kim, J.H. You, H.T. Baek, C. Na, B.N. Kim, et al., Attention deficit hyperactivity disorder like behavioral problems and parenting stress in pediatric allergic rhinitis, *Psychiatry Investig.* 11 (2014) 266–271.
- [17] J.M. Spergel, A.S. Paller, Atopic dermatitis and the atopic march, *J. Allergy Clin. Immunol.* 112 (2003) S118–S127.