천식질환이 있는 영유아가 환경요인 중 곰팡이 노출에 따른 영향

Effect of environmental relationship between fungal exposure and asthma in children

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ABSTRACT

Background: Asthma is one of the most common chronic diseases and can be affected by environmental factors. It has been reported that exposure to indoor environmental factors can cause infantile asthma during infancy and childhood, but the previous studies are not yet clear. Climate change has recently been shown to increase indoor mold. Exposure to fungi is known to be directly related to the development of aggravation.

Methods: This study was conducted from July 20, 2016 to September 30, 2016. The study was conducted on 90 household with children under the age of 7 who attend atopy school. The questionnaire surveyed allergic symptoms, social and demographic characteristics, and environmental characteristics. Environmentally hazardous substances were measured such as temperature, humidity, fine dust, volatile organic compounds, formaldehyde, bacteria, fungus, house dust mite, endotoxin.

Results: According to the survey results, 9 patients (10%) were treated with asthma, 6 (6.7%) were asthmatic patients during the past 12 months, and 4 patients (4.4%) were asthmatic patients during the past 12 months. There were statistically significant differences in the direct effect of smokers in the family (P=0.0328). High-filter vacuum cleaners collected 0.4222 CFU / m^3 in subjects without asthma, and 0.2222 CFU / m^3 in subjects with asthma. In addition, various results confirmed that asthma exacerbated by mold exposure.

Conclusions: The results of this study suggest that exposure to fungal by infants and toddlers may play an important role in the development of asthma. In this study, we investigated the relationship between asthma and fungal concentration.

1. Introduction

Due to recent climate change, there are abnormal symptoms such as weather change, deluge, and drought in Korea.(Jo et al., 2009) In Korea, indoor activities have been diversified to more than 80%, and it is being discussed that the importance of indoor is higher than anything else. There are many harmful substances in indoor air pollution sources including fine dusts, but some of them are biological factors. Fungi, which are a typical pollutant of biological factors, can cause infectious diseases (skin, nails, hair, mucous membranes) and irritable diseases (hypersensitivity pneumonia), and other toxins such as fungi, glucans and volatile organic compounds generated by microorganisms It is toxic.(Saijo et al., 2004) The environment of climate change not only causes the disease but also causes asthma and various diseases.(Lee et al., 2002) Of the environmental deterioration factors, mold is the main variable. The direct effects of mold are temperature and humidity.(Gent et al., 2012; Zock et al., 2002)

2. Materials and Methods

1.1 Site description

The questionnaire was developed according to indoor mold exposure and individual characteristics.(Dales et al., 1991; Dales et al., 1994; Fung and Hughson, 2003) Indoor environmental measurements and surveys were conducted on a one-time visit to the subject's consent. Household surveys measured environmentally harmful substances including fungi and secured basic data through questionnaires. Based on the questionnaires and data on environmentally harmful substances, we evaluated the factors affecting children's exposure to fungus on asthma.

1.2 Sampling

This study was recruited for children aged 3 to 7 years who were atopy·asthma friendly school in 2016. These children were children in kindergarten or daycare centers in atopy·asthma friendly school. The subjects were confirmed by telephone in advance considering the diagnosis of asthma in children. After passing through the clinical ethics committee of the Seoul Medical Center, the surveys were conducted by visiting the subject's home, explaining the research project, and then receiving consent. The surveys were selected by name, gender, age, contact information, current asthma diagnosis to the doctor, and asthma diagnosis to the doctor within the past 12 months. A total of 90 households were included. Questionnaire surveys were conducted across 90 households, while measurements were made on indoor air pollutants in 14 children with asthma and 16 without asthma.

1.3 Analytical method(Sampling method Sampling)

Household sampling was conducted on bedding and bed mattresses in residential areas.(Halken et al., 2003; Oluwole et al., 2017; Tsurikisawa et al., 2016) The sampling points were installed 1.2 ~ 1.5m above the ground to collect the samples. Collecting house dust was carried out by collecting dust on the surface of bedding 1x1m2 for 20 minutes by inserting a dust filter into a vacuum cleaner (electrolux,(Moraes et al., 2015) name: ZUSG4061) [Ministry of Environment Notice No. 2010-24 (March 3, 2010)(Lee et al., 2010; Sohn et al., 2006) applied indoor air quality process test standard]. The collected dusts were sieved with a sieve of 40 mesh, placed in a plastic bag, sealed and stored at -20 ℃. For sample collection, the flow controller of the single-stage impactor sampler (40 Hole, SKC, suction flow rate 28.3 L / min) was used (Bios International Corp. Defender 510-H). The sampling time of the subject facility was sampled with single stage impactor sampler (28.3 L / min) for 5 minutes and 10 minutes in order to examine the influence of the number of colonies and concentration (CFU/m3).(Patel et al., 2017) (Cywinska, 2015)At the upper part of 1.2 m from the bottom, 4 samples were collected in total for 5 minutes twice and 10 minutes for each item. Total airborne bacteria and airborne fungi were collected in accordance with the method of collision of total airborne bacteria among indoor air quality process test methods. NIOSH (National Institute for Occupational Safety and Health) of the United States carried out the recommendation of taking 10 minutes when collecting aspiration amount at 28.3L / min. (Johanning et al., 2014; Vance et al., 2016)

3. Results

Table 1. Characteristics of asthma disease

		total: N=90(%)
Prevalence of asthma diagnosis	No	84(93.3)
	Father	4(4.5)
	Mother	2(2.2)
Child's asthma diagnosis (born to date)	No	79(87.8)
	Yes	11(12.2)
Your child's asthma diagnosis (last 12 months)	No	63(70)
	Yes	27(30)
Your child's asthma treatment (last 12 months)	No	81(90)
	Yes	9(10)
Absence from child's asthma (last 12 months)	No	84(93.3)
	Yes	6(6.7)
Use of Emergency Room due to Child's Asthma (Last 12 Months)	No	86(95.6)
	Yes	4(4.4)

Table 2. Measuring concentration of indoor pollutants related to mold

		N(%)	Average	minimum	maximum	P-value
Temperature (°C)	*Asthma (-)	16(53.3)	28.4	25.3	30.4	0.1928
	*Asthma (+)	14(46.7)	27.8	26.3	28.9	
Humidity (%)	*Asthma (-)	16(53.3)	52.9	41	69	0.9784
	*Asthma (+)	14(46.7)	52.9	35.5	63.5	
Total floating bacteria (CFU/m³)	*Asthma (-)	16(53.3)	232.3	24.8	569.0	0.7815
	*Asthma (+)	14(46.7)	216.6	60.4	467.2	
Mold (fungus, CFU/m³)	*Asthma (-)	16(53.3)	57.0	14.5	270.1	**0.0241****
	*Asthma (+)	14(46.7)	122.4	28.5	290.5	
House dust mite (ng/g)	*Asthma (-)	16(53.3)	338.9	52.4	1686.6	**0.0189****
	*Asthma (+)	14(46.7)	79.5	10.6	255	
Endotoxin (EU/g)	*Asthma (-)	16(53.3)	2370.3	77.2	7582.5	0.2714
	*Asthma (+)	14(46.7)	3371.0	5.3	7730.2	

* Asthma: asthma diagnosis

4. Conclusion

The purpose of this study was to investigate the effects of atopic asthma on the severity of asthma. Among them, various interpretations of 30 environmental exposures were confirmed.

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