



## The association of residential mold exposure and adenotonsillar hypertrophy in children living in damp environments



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### ABSTRACT

**Background:** There are many consequences of mold exposure related to respiratory system health of children. This retrospective cohort study aims to find the association between adenoid hypertrophy and mold exposure in children living in damp environments.

**Methods:** Children with history of recurrent respiratory tract infections were enrolled in the study between June 2012 and June 2013 and were followed up for adenoid hypertrophy from June 2013 to June 2016. One hundred and forty two children were residents of moldy houses and 242 were living in normal houses. Skin prick test results for 60 common allergens, vitamin D levels, IgE levels, age, presence of comorbidities such as urticaria, atopic dermatitis, allergic conjunctivitis, allergic rhinitis, asthma, frequency of upper respiratory tract infections and lower respiratory tract infections, were evaluated in both groups.

**Results:** A total of 384 children (mean age  $\pm$  standard deviation =  $53.37 \pm 36$  months; 198 males and 186 females) were included. The children were classified into 2 groups (1) Children living normal houses ( $n = 242$ ) (2); Children living in damp houses ( $n = 142$ ) according to mold exposure. Children with adenoid hypertrophy ( $p < 0,001$ ) and higher IgE levels ( $p < 0,001$ ) were more common in mold exposed group. Lower respiratory tract infections were more common in children with mold exposure ( $p < 0,05$ ). Bivariate correlation analysis showed no significant association between IgE levels and adenoid hypertrophy. Multiple linear regression analysis was performed to evaluate IgE levels, vitamin D levels, and presence of adenoid as independent variables; age as dependent variable among two groups and was found statistically significant ( $p < 0,001$ ). Dermatophagoid sensitive group living in damp houses had a significant increase in adenoid hypertrophy ( $p = 0,01$ ). Housedustmite sensitive children with recurrent lower respiratory tract infection and upper respiratory tract infection were mainly residents of damp houses ( $p < 0,001$ ). Allergic comorbidities were significantly more in damp environment group ( $p < 0,001$ ), but there was no significant increase in any of the subgroups.

**Conclusions:** Children with mold exposure had significantly increased adenoid hypertrophy regardless of their atopic nature, however, they may have become more sensitized due to other environmental triggers and genetic factors. In damp environments, sensitization to dermatophagoids, was significantly increased in children with adenoid hypertrophy. During the period of infancy, when children were mostly vitamin D supplemented, they were not sensitized and had normal adenoids. As children with recurrent respiratory tract infections grow, they tend to have lower vitamin D levels, become more atopic and tend to have adenoid hypertrophy.

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### 1. Introduction

Respiratory infections in children remain a major cause of morbidity and mortality in developing countries. Children are more vulnerable to indoor air pollution levels because they have a higher minute ventilation and are more physically active. Adenoid

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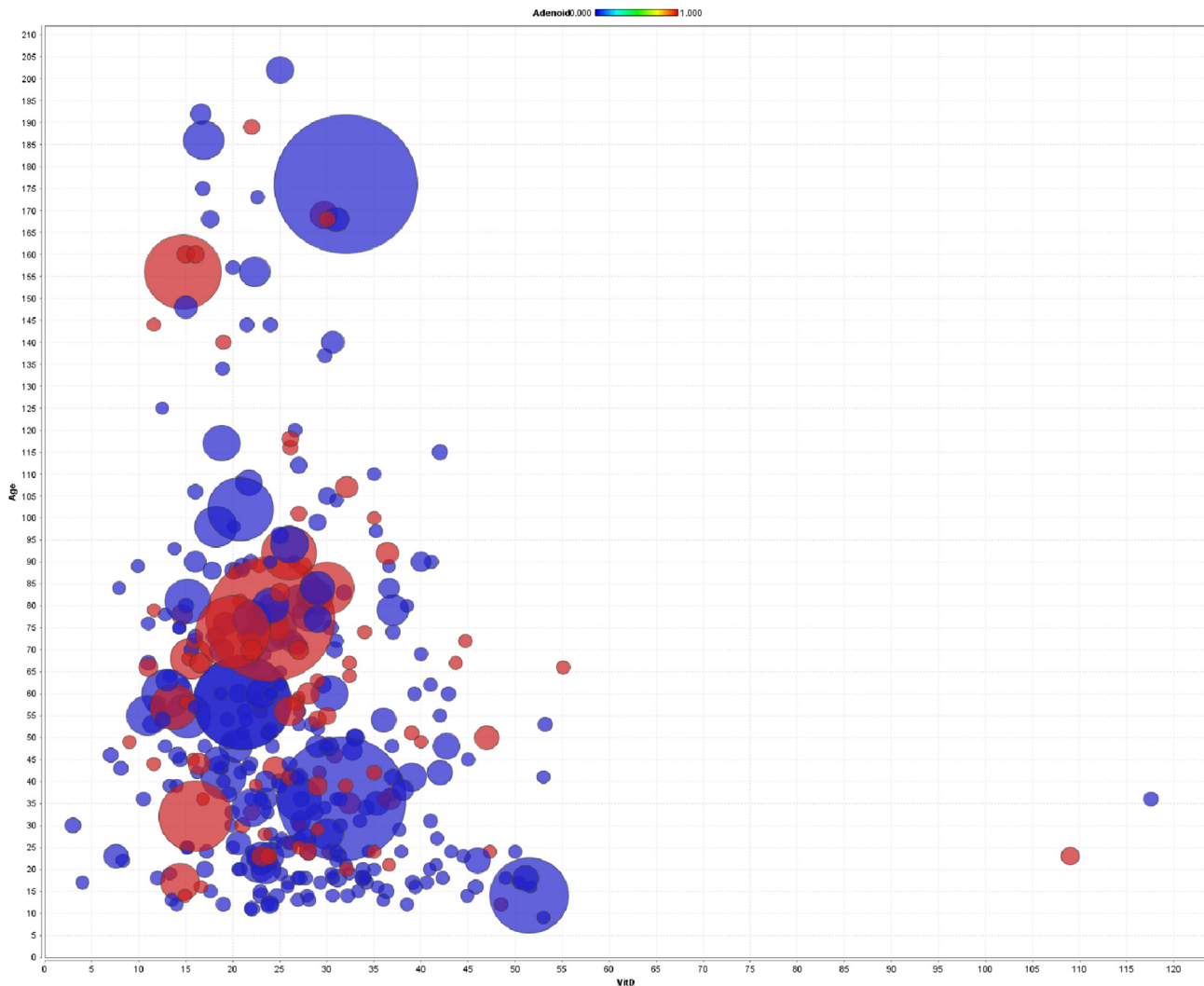
E-mail address: [ozlemnaciyeatansahin@yahoo.com](mailto:ozlemnaciyeatansahin@yahoo.com) (O. Atan Sahin).

hypertrophy (AH) is a common disorder with prevalence of 2–3%. Adenoids are very small in newborns but tend to grow during infancy through the first 4 years of life as immune system develops. Adenoid hypertrophy can occur with a wide spectrum of symptomatology such as nasal obstruction, nasal and post nasal discharge, snoring, ear ache, decreased hearing, sleep apnea and asthma attacks [1]. There is evidence that AH may be associated with respiratory and cardiovascular morbidity. It may have major effect on quality of life and healthcare costs [2]. Children with adenoids are more prone to oxidative stress [3]. Exposure to mold has been linked to frequent lower respiratory tract infection (LRTI) in atopic individuals, and emerging data suggest that mold might trigger the development of asthma [4,5]. Patients with adenoids experience frequent LRTI. Therefore, the objective of this retrospective study is to rule out the association of mold exposure, vitamin D levels, IgE levels with adenoid hypertrophy and to rule out if adenoids are an independent risk factor, like atopy for LRTI. All data and samples that belong to patients used for this study were collected during routine clinical care in an outpatient setting. (see Fig. 1).

## 2. Methods

### 2.1. Data extraction

Admissions to department of pediatrics between June 2012 and June 2013 were evaluated retrospectively. 384 children (198 male, 186 female, between 12 and 202 months, mean  $\pm$  SD,  $55.6 \pm 6$  months) with history of recurrent respiratory tract infections and available data including; skin prick test results, vitamin D levels, IgE levels, age, gender, routine clinical examination data that belong to the pediatrician and otorhinolaryngologist fulfilled the eligibility criteria. 384 children with previous laboratory data and without adenoid hypertrophy were selected from hospital records retrospectively. The past records of children beginning from June 2013, until January 2016 were evaluated for development of adenoid hypertrophy. Evaluation and diagnosis of adenoid hypertrophy was performed by ear nose and throat specialist based on history, endoscopic and radiological examination. The 142 children were living in damp terrace houses in subtropical climate and 242 were living in normal houses with dry climate. Damp house residents live in Bodrum, in southwest coast of Turkey while children with



**Fig. 1.** Correlations of age and vitamin D, IgE, presence of adenoids in damp and normal houses. x-axis: Vitamin D level. y-axis: Age. Blue colour: cases with adenoid hypertrophy. Red colour: cases without adenoid hypertrophy. Size of Bubbles: IgE level. Bivariate correlation analysis was used to determine IgE level, vitamin D level and adenoid hypertrophy relationship, and results indicated that it was not statistically significant. (For interpretation of the references to colour in this figure legend, the reader is referred to the web version of this article.)

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