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Risk Factors of Asthma in 2-8 Years Old Children Referred to Out-Patient Clinic of Tabriz University of Medical Sciences

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Abstract: Asthma is a chronic inflammatory disease of the small airways that results from a complex interaction between genetic and environmental factors. As mentioned in many reports from different parts of the world, the prevalence of asthma is increasing during recent years, therefore we planned this study to investigate its predisposing factors, clarifying its epidemiology in our ethnic and geographical territory. In a case-control study on 360 children in the age range from 2-8 years, we compared the presence of asthma risk factors between 2 groups including 120 asthmatic cases and 240 non-asthmatic controls. Some risk factors were significantly more prevalent in asthmatics than controls, these include: positive family history of asthma ($p = 0.003$, OR = 7.5), non-breastfed ($p = 0.001$, OR = 5.4), low birth weight ($p<0.001$, OR = 3.54), passive smoking ($p = 0.001$, OR = 2.36) and rhinitis ($p = 0.005$, OR = 2.05). The most important risk factors for development of asthma were found to be positive history of asthma in first degree family, being non-breastfed and low birth weight in order of decreasing significance.

Key words: Asthma, risk factors, childhood asthma

INTRODUCTION

Asthma is a chronic inflammatory disease of the small airways that results from a complex interaction between genetic and environmental factors (Kaugars *et al*., 2005). Asthma is one of the most common chronic diseases worldwide and its prevalence is known to be gradually increasing (Litonjua *et al*., 1998; Leung *et al*., 1997). About 10-15% of infants under 1 year of age and 25% of children under 5 years of age experience at least one attack of wheezing and more than one third of them will encounter with asthma in future (Alper *et al*., 2006). A study in Hong Kong showed that 2-4% of school-age children have experienced severe wheezing attacks and recurrent dyspneic sleep disorders (Leung *et al*., 1997). It has been cleared that most asthmatic children will recover as their age increases; reversely, some adults catch asthma while they had not childhood asthma (Del-Rio-Navarro *et al*., 2006).

International study of Asthma and Allergy in Childhood (ISAAC)" has evaluated many different factors of asthma prevalence and revealed that it is less prevalent in developing countries than rich communities with western life style. Although, heredity plays a major role in development of asthma but its prevalence is significantly different between populations with similar ethnic and genetic background who live in different areas of the world; this difference shows that environmental factors are the most important determinants of asthma prevalence in every population (Xuan *et al*., 2002).

To reduce the incidence and severity of asthma in children, preventive strategies have often focused on indoor environmental factors such as tobacco smoke, allergens from furred pets and house dust mites, indoor humidity, early exposure to cows' milk and other foreign food proteins and also on the possible protective effect of breast feeding (Kull *et al*., 2002).

Susceptibility to asthma may be increased by factors present early in life. These include being male, low birth weight, preterm birth, young maternal age, maternal smoking and, possibly, early cessation of exclusive breast feeding. Environmental allergens including grasses or pollens may also cause sensitization (Oddy *et al*., 1999).

Parental history of asthma and personal history of atopy are among the most important indicators of the development of asthma in infants (Fiocchi *et al*., 2006).

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Hence, prevalence of asthma and its associated risk factors are varying between different countries and nations with different ethnic background, therefore, we planned this study to investigate its predisposing factors in asthmatic children referred to out-patient clinic of "Tabriz University of Medical Sciences" and clarifying its epidemiology in our ethnic and geographical territory.

MATERIALS AND METHODS

In a case-control (cohort) study on 360 children from March 2005 to March 2006, we compared the presence of asthma risk factors between two groups including: 120 cases with persistent asthma in the age range from 2-8 years and 240 non-asthmatic controls in the same age group. Sampling was done with convenience method in case group by selecting all children under treatment and/or follow up for persistent asthma in out-patient clinic of "Tabriz University of Medical Sciences". Control group was formed by computerized random selection from file numbers of those children who have been referred to the same clinic due to reasons other than asthma, including: normal growth surveillance, transient viral infections and gastroenteritis.

Inclusion criteria were: physician-diagnosed persistent asthma and being 2-8 years old.

Exclusion criteria were intermittent asthma or any disorder mimicking signs and symptoms of asthma such as cystic fibrosis, retained foreign body in air ways and bronchiectasis.

Two studied groups were compared for presence of risk factors predisposing children to asthma; including: sex, average number of family members (home crowding), emotional stress, positive history of asthma or atopy in first-degree family members, being non-breastfed, low birth weight, passive exposure to smoking and rhinitis (diagnosed by chronic nasal stuffiness or discharge without catching cold).

Finally, all collected data were statistically analyzed by t-test and Chi-square test using SPSS software. The $p<0.05$ was considered as significance level.

RESULTS

Mean age was 4.5±2.1 years in case group and 4.8±1.8 years in control group which shows no significant difference ($p>0.05$).

Average number of family members was 3.6±0.8 persons in case group and 3.5±0.9 persons in control group showing no significant difference ($p>0.05$).

Sex distribution showed a significant male predilection in cases, as there were 40 (33.3%) females and 80 (66.6%) males in case group and 115 (47.9%) females and 125 (52.1%) males in control group ($p = 0.008$, OR = 1.84).

Thirty 5 asthmatic patients (29.1%) have had low birth weight but only 25 controls (10.4%) had such history, this difference was statistically significant ($p<0.001$, OR = 3.54).

Rhinitis was significantly more prevalent in case group than in controls, as 35 (29.1%) cases and 40 (10.4%) controls had positive history of chronic or recurrent rhinitis in form of chronic nasal stuffiness or prolonged nasal discharge without catching cold ($p = 0.005$, OR = 2.05).

Receiving breastfeeding was significantly less common in case group than in control group, as 50 (41.6%) cases and 180 (75%) controls had received breastfeeding ($p = 0.001$, OR = 5.4).

Positive history of asthma in first-degree family members was significantly more common in case group than in controls, as 40 (33.3%) cases and 15 (6.2%) controls had such a positive family history ($p = 0.003$, OR = 7.5). This was not the same about positive history of allergic disorders in first-degree family members, which showed no significant difference between 2 groups, as 15 (12.5%) cases and 18 (7.5%) controls had such a positive family history ($p>0.05$, OR = 1.6).

Household exposure to passive smoking was significantly more common in case group than in controls, as 25 (20.8%) cases and 24 (10%) controls had exposed ($p = 0.004$, OR = 2.36).

DISCUSSION

In this study, the correlation between some risk factors and development of asthma in children was evaluated and their predisposing role has been emphasized; these factors include: positive history of asthma in first-degree family members, being non-breastfed, low birth weight, passive exposure to smoking, rhinitis and male sex, in order of decreasing strength of correlation.

According to, the study of Klinnert *et al.* (2001) male gender was significantly associated with higher IgE levels when infants were 6 months of age. The study of Martinez *et al.* (1995) also showed a significant, direct relation between the risk of persistent wheezing and the serum IgE level at nine months of age. These findings may explain the higher prevalence of asthma in male gender.

A significant univariate association between early childhood wheezing and duration of breast-feeding has been shown in a number of studies. It is thought that

breast feeding might provide immunological protection against infections by transfer of immunoglobulin A and G through breast milk. However, it is also possible that the apparent protective effect of breast-feeding is due to a confounding effect of socioeconomic status (Lewis *et al*., 1995). The study of Burr *et al*. (1993) has also demonstrated that children who had ever been breast fed had a lower incidence of wheeze than those who had not. It has been also claimed by Wright *et al*. (1995) that recurrent wheeze at the age of 6 years is less common among non-atopic children who were breast-fed as infants; while non-atopic children who had not been breast-fed had three times the odds of wheezing recurrently, this odds was 5.4 times in our study.

It has been declared by Brooks *et al*. (2001) that The prevalence of asthma varies by birth weight category; as asthma develops in: 6.7% of children 2500 g or more at birth, 10.9% of children 1500-2499 g at birth and 21.9% of children less than 1500 g at birth, with the Odds Ratio (OR) of 1.9, 1.4 and 2.9, respectively ($p<0.001$); the same meaningful relation with OR = 3.5 was found in our study too.

Several studies have demonstrated that passive exposure to tobacco smoke influences the levels and development of lung function in early childhood, even to the extent that impairment in airway development is altered by in utero exposure (Tager, 1998). In our study, the odds ratio for development of asthma following household exposure to passive smoking was 2.36, it means that the risk of asthma development in children exposed to passive smoking is about two times as greater as those who did not. It has been also showed that passive smoking is significantly associated with current signs and symptoms of physician-diagnosed asthma, persistent cough and late-onset wheeze (Tager, 1998).

A personal history of atopy was independently associated with the presence of current symptoms, persistent symptoms, late-onset symptoms and a doctor diagnosis of asthma (Withers *et al*., 1998). It has been demonstrated that asthma is strongly associated with atopy in childhood and adulthood and even atopic children who has not presented any wheezing symptom until the age of 12 years, are yet at increased risk of future asthma. Primary prevention of asthma needs a strategic planning for diminishing the prevalence of atopy (Del-Rio-Navarro *et al*., 2006).

According to, the study of Prosbjerg *et al*. (2006) the presence of more than one risk factor simultaneously in the same subject should be recognized as markers of prognostic significance that predict a very high risk of future asthma.

Based on facts mentioned above, it seems that controlling the preventable risk factors such as household exposure to passive smoking, low birth weight and lack or early termination of breastfeeding, might be able to restrict progressive prevalence of asthma.

CONCLUSION

This study evaluated the predisposing risk factors of asthma, the most important of them are: positive history of asthma in first degree family, being non-breastfed and low birth weight in order of decreasing significance.

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