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## Prevalence of the Common Cold Symptoms and Associated Risk Factors in a Large Population Study

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### ABSTRACT

**Background:** Common cold is the most frequent illness managed in general practice. Data regarding prevalence of the common cold in communities is confounded by the close similarity between allergy and/or asthma related symptoms and common cold.

The purpose of this study was to elucidate possible correlations between self-reported common cold episodes and asthma/allergy related symptoms and some evident risk factors.

**Materials and Methods:** As a part of an ISSAC study in Isfahan, Iran, a randomly selected population of 11666 students aged 6 to 18 years (mean  $\pm$  SD = 12.96  $\pm$  2.99) were studied. The children or parents completed in a questionnaire with both ISSAC, and other supplementary questions regarding the common cold and allergy.

**Results:** 11666 pupils (88.9%) completed the study.

Those pupils reporting more than 3 to five episodes of the common cold exhibited a significantly more asthma and/or allergy related symptoms.

**Conclusion:** Persian people with more than 3 to 5 episodes of cold like symptoms per year should be evaluated for allergic conditions. (*Tanaffos* 2006; 5(3): 13-17)

**Key words:** Common cold, Allergy, Asthma, ISSAC (International Study of Asthma and Allergies in Childhood)

### INTRODUCTION

The common cold is the most commonly encountered infectious syndrome of human beings (1), and the most frequent illness managed in general practice (2). However, this illness is not well defined and most major textbooks do not provide a definition for the condition (3).

Despite a long search for a cure, only potential

treatments for the symptoms have been established (4). Colds afflict most adults two to three times a year and children five to seven times a year, and the resulting hours of absenteeism from work or school have enormous economic bearings (5). Of the several viruses that cause the disease, the role of rhinoviruses is most prominent (6). About a quarter of all colds are still without proven causes (7).

A confusing burden to epidemiologic studies concerning the common cold, is the great similarity between the common cold and allergic rhinitis

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symptoms, which makes questionnaire based studies to be of limited reliability (8).

The purpose of this study was to provide epidemiologic information concerning self reported common cold symptoms in a large pediatric population in Isfahan. The cold frequencies and symptom patterns were compared in subjects suffering from asthma and those without asthma symptoms to see if these differences can differentiate true colds from symptoms of allergy.

## MATERIALS AND METHODS

As a part of an international study of asthma and allergies in childhood (ISAAC) during a two-year period from Oct.1998 to Dec. 2000 a randomly selected population of 11666 students aged 6 to 18 years (mean  $\pm$  SD= 12.96 $\pm$ 2.99) including 6166 girls (52.9%) and 5500 boys (47.1%) were studied. Details of randomization, population selection, questionnaires and pulmonary evaluations, have been previously published (9-10). Briefly, 300 elementary, junior high school, and high school classes were randomly selected, and 10 interns of Isfahan Medical School completed a standard questionnaire supplemented by many questions concerning cold habits of the population, their household conditions, family history of asthma allergies, and similar conditions of frequent and/or prolonged colds. Post exercise spirometric measurements were conducted in subjects with any history of frequent and/or prolonged colds and also those with asthma related symptoms.

### Definitions:

The common cold is any benign and self limiting illness presenting with nasal stuffiness and discharge, combined with any of the following symptoms; sneezing, sore throat, and cough(4).

Rhinitis is chronic or recurrent sneezing and/or runny or congested nose (11).

Allergic rhinitis in this study is any history of physician-diagnosed allergic rhinitis.

Asthma in the studied children is any history of repeating dyspneal attacks associated with wheezy breathing.

Family history of asthma is a history of physician-diagnosed asthma.

Histories of pulmonary infection, allergy, etc. in subjects or family members are physician-diagnosed conditions.

### Data analysis:

The information recorded in a data base was analyzed using frequency tables to determine the frequency of yearly colds and cold or allergy-related symptoms. Student t-test was used to correlate various findings. Logistic regression analysis was used to evaluate correlation between cold-related symptoms and various risk factors.

## RESULTS

Of the initially invited 13127 subjects 11666 pupils (88.9%) were able to complete the study. Male to female ratio was 47.53%. Twenty-eight of the fathers were smokers, while less than 1% of mothers were smokers. Anthropometric characteristics of the population are summarized in table 1.

Table 1. Population database

	Male (%)	Female (%)	Total (%)
<b>Total population</b>	5500 (47.15)	6166(52.85)	11666(100)
<b>Smoking father</b>	1622 (29.5)	1682(27.3)	3304 (28.3)
<b>Smoking mother</b>	53 (1.0)	70 (1.1)	123 (1.1)
<b>Parental education</b>			
Less than high school	2956 (54.4)	3587 (58.5)	6543 (56.6)
High school or above	2480 (45.6)	2540 (41.5)	5020 (43.4)
<b>Family size</b>			
Small family (2 siblings or less)	2536 (46.3)	2411 (39.3)	4947 (42.6)
Large family (3 siblings or more)	2941 (53.7)	3725 (60.7)	6666 (57.4)

Overall, those pupils with frequently repeated colds especially if associated with prolonged course or complicated by persistent cough showed statistically significant correlation with asthma-related symptoms including dyspneal attacks and wheezy breathing. Frequency of cold episodes and/or allergy related symptoms in different genders of the studied population are reported in table 2.

Logistic regression analysis showed that the existence of some environmental or reported comorbidities significantly increases the chance of frequent colds. Associations between the reported common cold-like conditions with various risk factors are listed in table 3.

**Table 2.** Frequency of cold or allergy related symptoms in different genders of the studied population.

Cold or allergy related symptoms	Male (%)	Female (%)	Total (%)	p value
History of diagnosed asthma	80 (1.5)	49 (0.8)	129 ( 1.1)	0.000
History of diagnosed allergy	111 (2)	247 (4)	358 (3.1)	0.000
History of dyspnea associated with wheezy breathing	862 (15.7)	779 (12.6)	1641(14.1)	0.000
History of parent's asthma	1527 (27.8)	1675 ( 27.2)	3202 (27.5)	0.23
Frequent chest infections diagnosed by family physician	112 (2)	93 (1.5)	205 (1.8)	0.02
Prolonged cough in most colds	1025 (18.7)	1503 (24.4)	2528 (21.7)	0.000
More than 2 colds in last 6 months	1167 (21.2)	1586 (25.7)	2753 (23.6)	0.000
More than 4 colds in last 12 months	1060 (19.3)	1459 (23.7)	2519 (21.6)	0.000
Colds usually lasting more than 5 days	1438 (26.2)	2236 (36.3)	3674 (31.5)	0.000
Colds usually followed by persistent cough	785 (19.7)	798 (18.8)	1583 (19.2)	0.15

**Table 3.** Association of reported common cold like conditions with various risk factors

Respiratory conditions and associated risk factors	Results of logistic regression analysis	
	p value	OR(CI)
<b>More than two colds in last 6 months</b>		
Female gender	0.000	1.31(1.16-1.47)
Age more than 11 years	0.028	1.22(1.02-1.45)
History of physician diagnosed allergy	0.001	2.01(1.16-3.85)
History of dyspneal attacks with wheezy breathing	0.000	1.57(1.36-1.83)
More than two siblings	0.023	0.86(0.76-0.98)
Colds lasting more than 5 days	0.000	2.11 (1.88-2.37)
Colds with persistent cough	0.049	1.11( 1.01- 1.27)
Parental smoking	NS	
Pets in the household	0.02	1.60(1.03-2.78)
Cockroaches in the household	0.002	1.19(1.07-1.34)
Family history of frequent colds	0.05	1.21(1.08-2.01)
<b>More than three colds in last 12 months</b>		
Female gender	0.000	1.24(1.11-1.38)
Age more than 11 years	NS	
History of physician diagnosed allergy	NS	
History of dyspneal attacks with wheezy breathing	0.02	1.21(1.04-1.41)
More than two siblings	0.049	0.89(0.78-0.97)
Colds lasting more than 5 days	0.000	2.05 (1.83 -2.29)
Colds with persistent cough	0.008	1.12( 1.00- 1.41)
Parental smoking	NS	
Pets in the household	0.05	1.72(1.01-2.97)
Cockroaches in the household	0.002	1.18(1.07-1.31)
Family history of frequent colds	NS	
<b>More than five colds in last 12 months</b>		
Female gender	0.031	1.34(1.04-1.55)
Age more than 11 years	NS	
History of physician diagnosed allergy	NS	
History of dyspneal attacks with wheezy breathing	0.005	1.31(1.08-1.56)
More than two siblings	0.015	0.82(0.70-0.96)
Colds lasting more than 5 days	0.000	2.05(1.78-2.37)
Colds with persistent cough	0.020	1.23(1.04-1.46)
Parental smoking	NS	
Pets in the household	0.02	2.01(1.11-3.66)
Cockroaches in the household	0.051	1.23(1.10-1.42)
Family history of frequent colds	NS	

## DISCUSSION

In most instances, the clinical diagnosis of the common cold is simple and can be made reliably by adult patients, themselves (12). However, diagnosis is sometimes problematic in infants and young children who are not capable of expressing their symptoms, or in patients suffering from intermittent recurrences of allergic rhinitis (4). The symptoms of sneezing, nasal congestion and, running nose are common in both allergic rhinitis and the common cold, so misinterpretation of allergic symptoms, as a common cold is not uncommon.

In this study frequent colds, occurring in more than two occasions in the last 6 months or recurring more than 3 to five times a year were strongly associated with previous histories of dyspneal attacks associated with wheezy breathing, a finding which seriously points to the possibility of misinterpretation of asthma attacks by the subjects, parents and/or family physicians.

Further association of the frequent colds with cockroaches and/or pets in the house hold, might enforce the possible allergic origin for at least many of the recurring cold like episodes. Under-diagnosis of allergic conditions including asthma have been frequently stressed in many epidemiologic studies both in developing (9-10) and industrialized (13) countries. Interestingly, allergic conditions had been diagnosed more in boys while morbidity conditions due to wrong attribution to simple colds especially those reported in the last four rows of table 2 are more common in girls. This paradox can be attributed to the physician's belief, that asthma might be more common in boys (14).

Although, viral infections have been associated with asthma exacerbations, the role of respiratory viral infection in the development of asthma remains unclear (15, 16). A number of factors play crucial roles, including the type of virus, the severity of the disease, the time of the infection, and most

importantly, the host predisposition. On the other hand, there is little doubt that a strong association exists between viral respiratory infections and induction of wheezing illnesses and asthma exacerbations. The underlying mechanisms, although not fully clarified, are likely to be multifactorial, involving inflammation of the bronchial mucosa, which interacts under certain circumstances with allergic inflammation. In addition, repetitive infections play an important role in perpetuating inflammation and airway hyperresponsiveness, especially in the presence of atopy, leading from childhood asthma to a more persistent asthma phenotype. But asthma as a predisposing factor to catch more viral infections has not been reported, so the more frequent cold episodes will be hard to be explained by asthma/ viral infection interactions.

Furthermore, other symptoms including prolonged colds and colds going to the chest are strongly associated with frequent colds which further support the mentioned idea that more than three colds per year are highly suspicious for allergic conditions rather than viral infections.

Lack of association between colds and parental smoking, might be a result of the fact that Persian women seldom smoke and most of the smoking fathers stressed that they do not smoke indoors.

In conclusion, Persian people with more than three to four episodes of cold like symptoms per year have to be evaluated for possible allergic conditions.

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