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Tobacco intervention teachable moments for pediatric otolaryngologists: atopy and second hand smoke exposure among children

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Abstract

Background—Pediatric otolaryngology clinics have tremendous access to children with allergic conditions, yet no research has evaluated in this setting environmental tobacco smoke and the occurrence of atopic diseases.

Methods—Caregivers or parents of 201 consecutive patients in a Hungarian pediatric otolaryngology clinic were queried on otolaryngologic conditions; self-reported diagnoses of atopic diseases; and tobacco smoke exposure.

Results—A history of asthma was reported in 10.3% of children; 38.7% had at least one parent who smoked. Fifteen out of the 20 children with asthma (75.0%) had at least one parent who smoked. Having a diagnosis of hay fever and having a parent who smoked greatly increased the odds of having a diagnosis of asthma.

Conclusions—Second hand smoke exposure among children in an otolaryngology clinic was common, and was associated with co-existing atopic conditions. Pediatric otolaryngologists have an important opportunity to address parental smoking as part their care of children.

MeSH key words

Second hand tobacco smoke; asthma; hay fever; atopy; pediatric otolaryngology; children

Asthma is a complex, recurring condition manifesting as airflow obstruction, small airways hyperresponsiveness and pulmonary inflammation.¹ The interaction between the host and the environment is critical in development of symptoms. Host factors in asthma pathogenesis include genetic predisposition, co-morbidities (e.g., hay fever and eczema),

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and age. Environmental factors include allergens, pollution, infections and stress.¹ One important environmental factor related to asthma development and symptomatology is exposure to second hand tobacco smoke.^{1–3} Indeed, the US Surgeon General has determined that there is sufficient evidence to infer a causal relationship between parental secondhand smoke exposure to children and adolescents; and asthma-related symptoms, lower respiratory tract infections, and middle ear disease.²

The central European nation, Hungary, has a relatively high prevalence of tobacco smoking. Based on a representative population sample in 2007, the prevalence of current, daily smoking is about 30%,⁴ which is nearly 25% higher than other European Union nations combined.⁵ This includes between 27% and 38% of 18 to 44 year old Hungarian adults, with the highest prevalence rates in the 35–44 year old age group. Because ages 18 to 44 span the reproductive years of most adults, a large percentage of Hungarian children are potentially exposed to secondhand tobacco smoke.

Pediatric otolaryngology clinics have tremendous access to children with allergic conditions, yet to our knowledge no research has addressed the relationship in this setting between environmental tobacco smoke and the prevalence of the most life-threatening atopic disease, namely, asthma. Such a relationship would uncover a teachable moment for otolaryngologists to urge parental smoking cessation. To evaluate the contribution of household secondhand tobacco smoke on asthma among children, we carried out this study in a population of pediatric patients visiting the otolaryngology clinic at Heim Pal, the national pediatric hospital in Budapest.

Methods

The study was performed at Heim Pal National Children's Hospital, Ear, Nose and Throat (ENT) Department, Budapest, Hungary from July to November, 2010. Otolaryngology patients are referred here by both general practice physicians (GPs) as well as other otolaryngologists from around the country. Besides its referral status, the clinic also provides primary ENT care for children, with many patients self-referring for diagnosis and treatment of primary otolaryngology problems.

A questionnaire was constructed for the parents or caregivers of all children between 6 months and 18 years old presenting for their first visit to the ENT clinic with or without middle ear diseases. The questionnaire ascertained ENT conditions; a self-reported diagnosis of asthma, eczema or hayfever; smoking habits of caregivers and household members; and socioeconomic status (size of home, maternal education, and parental employment). Standardized assessment of ETS exposure from the medical literature were also elicited.² The institutional review board of Heim Pal approved the protocol.

A non-random (convenience) sample was obtained during the time investigators (ZC, GK) worked in clinic. After obtaining adult informed consent, the questionnaire was administered to the parents or caregiver by trained research personnel. Seven out of 201 parents or caregivers of children refused to participate, yielding a response rate of 96.4%.

Statistical analyses were performed **using bivariate analysis and logistic regression. Logistic regression analyses were carried out in the whole sample as well as the subsample of patients whose parents smoked. All models controlled for patient age, gender, size of home, maternal education and parental employment. Significance was set at $p < 0.05$.**

Results

A history of asthma was reported in 20 out of 194 total patients (10.3%). Seventy five children out of the 194 patients had at least one parent who smoked (38.7%). Additionally, 15 out of the 20 children with asthma (75.0%) had at least one parent who smoked. In bivariate analysis (Table 1), parental smoking, smaller flat size, and having ENT operations planned for the future correlated with a diagnosis of asthma. Having a diagnosis of hay fever or eczema approached statistical significance ($p = 0.07$ and $p = 0.057$, respectively) in correlating with having a diagnosis of asthma.

Multivariable logistic regression (Table 2) showed that males were 64% less likely than females to have a diagnosis of asthma (Odds Ratio [OR] = 0.34, 95% confidence interval [CI] = 0.12–0.96). Having a diagnosis of hay fever (OR = 6.68, 95% CI = 1.30–34.2) and having a parent who smoked (OR = 7.82, 95% CI = 2.50–24.4) greatly increased the odds of having a diagnosis of asthma.

Discussion

We have found that 75% of children with a doctor's diagnosis of asthma in this pediatric otolaryngology clinic had parents who smoked. In bivariate analysis, having a smaller home or flat correlated with a diagnosis of asthma ($p < 0.002$), but this did not remain statistically significant in the multivariate model. Indeed, multivariate logistic regression showed that males were less likely to have a diagnosis of asthma, while having a diagnosis of hay fever or a parent who smoked increased the odds of having a diagnosis of asthma by around sevenfold.

Despite a higher rate of adult smoking in Hungary (30.3%)⁴ compared to the US (20.6%),⁶ the prevalence of asthma in this pediatric population (10.3%) was only slightly higher than asthma prevalence of children age 0–17 in the US (9.6%).⁷ This finding suggests that country-specific factors, such as racial demographics, might also play a role in the contrasting findings between the US and Hungary.

Males' lower prevalence of asthma (4%) compared to females (6%) also mirrors findings in the US (7.3% and 9.3% respectively).⁸ It has long been recognized that females have higher rates and more severe episodes of asthma,⁹ which is felt to be related to fluctuations in estrogen levels.¹⁰ While 45% of the sample were girls under the age of 12—making menarche less probable—sex hormone differences still likely had some influence. In data not shown, 12% of girls and 6% of boys under the age of 12 had a history of asthma.

A family history of atopy (either hayfever or eczema) was not associated with a diagnosis of asthma. Nonetheless, a child's history of hayfever did predict a diagnosis of asthma as

would be expected.^{11,12} Additionally, in this sample we did not find support for the effect of maternal smoking during pregnancy and a diagnosis of asthma, as has been found by others.¹³

While no child should be exposed to secondhand smoke, children with a chronic, potentially life-threatening illness such as asthma are at particular risk. These children—and their families—already face extreme disruptions in daily living and family life. The possible dire consequences of asthmatic children living in a home with smokers require clinicians to warn parents about these risks, even in a pediatric specialty clinic.¹⁴

Our study is subject to limitations. Misclassification of asthma may have arisen by reliance on parental or care giver's report of a doctor's diagnosis of asthma. However, unlike what has been found in other studies,¹³ since health care is universally available in Hungary, lack of access to medical care (and thus the inability to visit a doctor for the diagnosis to be made) is an unlikely source of error. Further, others have used parental report for their diagnosis of asthma,^{13, 15–17} including a metaanalysis of 50 studies,¹⁶ and have found an association between parental smoking and asthma in children. It should be noted, however, that the association we found (OR=7.82) was up to 6.5 times the risk of asthma associated with parental smoking found in those studies. Our smaller sample size might be the cause of this increased odds compared to these other studies, especially given the wide confidence interval. An additional limitation is that this study was conducted at one otolaryngology clinic at a large referral hospital and might not reflect what is seen in a general practice setting. Mitigating this limitation to some extent is the fact that a substantial number of patients seen at Heim Pal pediatric otolaryngology clinic self-refer, with many patients using this clinic as their primary care source for childhood ear, nose and throat problems. Finally, these data are cross sectional which limits the temporal ability to say which condition came first—e.g., did atopic diseases precede tobacco exposure or did tobacco exposure unmask subclinical atopic diseases. Regardless, this study is in agreement with major authorities of the association between childhood asthma and parental smoking.^{1–3}

Conclusion

The vast majority of children (75%) with a doctor's diagnosis of asthma in this pediatric otolaryngology clinic had parents who smoked. This study supports the continued need to educate parents about the effects of second hand tobacco smoke on their children. While second hand smoke is harmful for all children, those individuals with a history of atopy appear to be the most vulnerable to having asthma in relationship to parental smoking. This study underscores that pediatric otolaryngologist have access to numerous families in which children are exposed to secondhand smoke. Such access represents a clear teachable moment for clinicians to urge parental smoking cessation.

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Table 1

Characteristics of pediatric otolaryngology outpatients (n=194) with and without asthma at Heim Pal Hospital, Budapest, Hungary.

Variable	No Asthma n=174 (%)	Asthma n=20 (%)	p value *
Male sex	100 (57.5)	8 (40.0)	NS
Eczema	19 (10.9)	5 (25.0)	p = 0.07
Hay Fever	8 (4.6)	3 (15.0)	p = 0.057
Two or more ear infections	71 (40.8)	7 (35.0)	NS
Parental Smoking	60 (34.5)	15 (75.0)	p < 0.001
Mother Smoked During Pregnancy	23 (13.2)	5 (25.0)	NS
Mother's Education			NS
Primary School	17 (9.8)	3 (15.0)	
Secondary School	77 (44.2)	12 (60.0)	
High School	68 (39.1)	3 (15.0)	
Other	12 (6.9)	2 (10.0)	
Mother's Employment			NS
Not Employed	50 (28.7)	6 (30.0)	
Part Time	16 (9.2)	2 (10.0)	
Full Time	108 (62.1)	12 (60.0)	
Father's Employment			NS
Not Employed	27 (15.5)	5 (25.0)	
Part Time	5 (2.9)	1 (5.0)	
Full Time	142 (81.6)	14 (70.0)	
Residence			NS
Budapest	81 (46.6)	11 (55.0)	
Country-side	69 (39.6)	6 (30.0)	
Other city	24 (13.8)	3 (15.0)	
House or Flat Size			p < 0.002
> 70 m ³	99 (56.9)	9 (45.0)	
40–70 m ³	68 (39.1)	6 (30.0)	
< 40 m ³	7 (4.0)	5 (25.0)	
Planned ENT	20 (11.5)	6 (30.0)	p = 0.021
Operations			
Past ENT operations	59 (33.9)	9 (45.0)	NS
Age (months ± SD) **	73.7 ± 37.5	85.0 ± 47.1	NS

* Chi square

** Student's t-test

Table 2

Logistic regression predictors of having a diagnosis of asthma among pediatric otolaryngology outpatients (n=194) at Heim Pal Hospital, Budapest, Hungary.

Variable	Odds Ratio	95% Confidence Interval	p value
Male sex	0.34	0.12–0.96	0.041
Diagnosis of Hay Fever	6.68	1.30–34.2	0.023
Parental Smoking	7.82	2.50–24.4	< 0.001