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Allergic Rhinitis as a Risk Factor for Habitual Snoring in Children

To the Editor:

We read with interest the article “Risk Factors and Natural History of Habitual Snoring” by Urschitz et al (September 2004).¹ Urschitz et al claimed that their study was the first one to show differences in risk for habitual snoring between boys and girls. This is actually not true, as two studies conducted in our department^{2,3} and a recent study by Ersu et al⁴ demonstrated a male predominance of habitual snoring. In the adult population, the male predominance of habitual snoring was attributed to the influence of male sex hormones. In prepubertal children, this would not apply, and this male dominance in children is likely due to the presence of allergic rhinitis. Allergic rhinitis has long been recognized as a risk factor of sleep-disordered breathing in children,⁵ and the prevalence of allergic rhinitis was higher in boys in Hong Kong.⁶

Interestingly “respiratory allergies” and “frequent daytime mouth breathing” were assessed in the study by Urschitz et al, and both were found to be more common in boys. Both parameters are closely related to allergic rhinitis and corroborate previous findings of allergic rhinitis as a risk factor for snoring.

Even though respiratory allergies was not found to be a significant risk factor of habitual snoring in a univariate analysis (Table 3 of the study by Urschitz et al), respiratory allergies should be an important confounding factor that should be adjusted by logistic model. It is unclear why this important confounding factor was not adjusted in either model A or model B in the study by Urschitz et al (see Table 4 in the article). Nonetheless, “frequently daytime mouth breathing” emerged as an independent risk factor for childhood habitual snoring in all models (Table 4). The collinearity between mouth breathing and allergic rhinitis was not addressed. Hence, it is unfortunate that the possibility of allergic rhinitis as a risk factor was ignored by Urschitz et al as allergic rhinitis is readily treatable.

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rhinitis but not asthma among children in Hong Kong from 1995 to 2001 (phase 3 International Study of Asthma and Allergies in Childhood). *Pediatr Allergy Immunol* 2004; 15:72–78

To the Editor:

We thank Ng et al for their interest in our study. We assessed associations between known and suggested risk factors and habitual snoring in primary school children.¹ We did not find a gender difference in the prevalence of habitual snoring. Despite this, we found a higher prevalence of respiratory allergies in boys compared to girls, but were unable to identify a significant relationship between parentally reported respiratory allergies (which included allergic rhinitis) and habitual snoring. Thus, our data do not support the hypothesis of Ng et al that allergic rhinitis may be the underlying cause for a higher prevalence of snoring in male school children.²

In fact, another large European study² on snoring in children was also unable to find a gender difference in the prevalence of habitual snoring before the age of 15 years. Moreover, the Turkish study referenced by Ng et al also found significant gender differences only in children > 11 years old.³ In the light of all these population-based studies, we speculate that the studies of Ng et al^{4,5} may have been subject to referral bias as they included only children referred to a hospital. Thus, male sex may be a predictor for referral but not for habitual snoring in primary school children < 10 years of age.

One major limitation of our study is the fact that participating children were not objectively examined for the presence of respiratory allergies (including allergic rhinitis). Parental observations were used instead. This may have led to some misclassification and lowered associated risks. This limitation is explicitly stated.¹ In addition, some of the allergic children in our study were possibly receiving treatment for their allergy and were thus nonsymptomatic regarding their nocturnal breathing. As we did not obtain data on medication, this potential explanation cannot be fully ruled out.

However, we agree with Ng et al that some children presenting with daytime mouth breathing may have allergic rhinitis unrecognized by parents. As daytime mouth breathing was a significant and independent predictor for habitual snoring in our study, it cannot be ruled out that allergic rhinitis was in fact the underlying cause for snoring in some of these children. Our results, however, underscore the importance of nasal obstruction in children. We encourage physicians to search for the underlying clinical problem in snoring children.

We do not agree with Ng et al, however, that the variable “respiratory allergies” should have been introduced as a confounder into our logistic regression analysis. A confounder is strongly and significantly related to both exposure and outcome and accounts in some extent for the effect of exposure on outcome. In our study, the respiratory allergies variable was not significantly related to habitual snoring in univariate analysis and thus did not meet criteria for confounding.

In conclusion, Ng et al rightly point out that allergic rhinitis is most likely related to daytime mouth breathing and may lead to nighttime snoring. In our study, there was a steady and significant increase in the prevalence of respiratory allergies with increasing frequency of mouth breathing (ranging from 7.3% in children who “never” had mouth breathing to 20.3% in those who were reported to have this “always”; χ^2 test for trend, $p < 0.001$). Also, allergic rhinitis may be more prevalent in boys than girls, possibly leading to a higher prevalence of snoring in school children. However, we were unable to find a significantly higher prevalence of snoring in boys and/or in children with allergies. Thus, the hypotheses put forward by Ng et al are not supported by our data.

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Water Immersion Effects on Severe Diaphragm Weakness

To the Editor:

Schoenhofer et al (June 2004)¹ brought an important contribution to the understanding of water immersion effects on respiratory parameters in subjects with severe diaphragm weakness. Seven patients with neuromuscular diseases and seven healthy control subjects were studied out of the water (sitting erect) and in the water (standing up at neck level) by spirometry, maximal static inspiratory pressure (P_{imax}), and mouth occlusion pressure measurements. The patients and control subjects showed mean drops in vital capacity of 30% and 3%, respectively, while showing mouth occlusion pressure increases of 191% and 29%, respectively. There is evidence that some factors not mentioned by the authors could have influenced the changes observed between the groups. Water temperature and time of immersion are examples. Specifically, a time of immersion between 20 and 30 min can minimize the enlarged plasma volume, which is the most important factor for the decrease in vital capacity.² Thus, it would be important to know in the study of Schoenhofer et al¹ the length of time of immersion, and whether this time was the same for both groups.

In addition, water temperature ranging from 33 to 35°C (thermoneutral) is the most appropriate way to study immersion effects, since it prevents significant changes in the core temperature of the body.³ Moreover, water temperature induces different changes on pulmonary volumes.⁴ On the other hand, patients with amyotrophic lateral sclerosis (three of seven patients studied) usually present a different pattern of FVC change, compared to subjects with no disability, between the supine and erect seated positions.⁵ To avoid these potential biases, patients and control subjects in the research of Schoenhofer et al¹ should have been studied in the erect seated position, both out of the pool and in it.

Finally, we wonder about the low mean ($\pm$ SD) value of the P_{imax} ($60 \pm 26\%$ predicted) observed in the control group by Schoenhofer et al.¹ Besides the small number of subjects enrolled in the study (type II error), the low mean P_{imax} may also justify