

Brief Report

Risk Factors for Wheezing Disorders in Infants in the First Year of Life Living in São Paulo, Brazil

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Summary

The objective of this study was to identify risk factors for wheezing disorders in the first year of life in infants living in São Paulo (SP), Brazil, applying the standardized protocol of the *Estudio Internacional de sibilancias en lactentes*—Phase 1. A total of 1014 parents or caregivers of infants, who attended for routine evaluation and immunization in public health centers were interviewed in Southern SP city. Risk factors significantly associated with recurrent wheezing were: history of previous pneumonia, daycare attendance, consumption of processed food, presence of a cat at home, more than five upper respiratory infection (URI) episodes and the first URI before the age of sixth month. Most of these risk factors for wheezing can be avoided or controlled. Prospective studies on wheezing, especially in children with a severe presentation, are needed to analyze the impact of these risk factors and the effect of preventive actions.

Key words: infant, wheezing, risk factors, asthma.

Introduction

Wheezing disorders in childhood have high morbidity [1–3] worldwide and are responsible for overuse of health resources [4, 5]. The first year of life is the period when the majority of wheezing infants present their first episode of wheezing [6].

Recently, the *Estudio Internacional de Sibilancias en Lactentes* (EISL) or International Study of Wheezing in Infants was developed to study the impact of wheezing in infants in the first year of life and to identify its prevalence and associated risk factors [7].

The aim of this study was to identify risk factors for wheezing and recurrent wheezing (three or more episodes) in the first year of life in infants living in southern region of São Paulo (SP), using the standardized protocol of EISL.

Methods

Parents or caregivers of infants aged from 12 to 15 months, who attended nine selected health centers for routine immunization, between March 2005 and August 2006, were invited to participate and were interviewed by pediatricians or medical students.

The EISL—Phase 1 written questionnaire consists of 45 questions on demographic characteristics, use of medications, wheezing and its probable risk

factors [8]. The questions on wheezing included wheezing-like terms and had been previously validated in physician-diagnosed wheezing in the same health centres [9]. Non-parametric and logistic regression statistic analyses were performed. This study was approved by the Research Ethics Committee at the Federal University of SP—UNIFESP/EPM.

Results

Among 1014 infants enrolled, 467 (46.0%) had one or more episode of wheezing in the first 12 months of life and 270 (26.6%) wheezing infants had recurrent episodes.

Variables related to respiratory infections and family history of asthma were at least twice more common among wheezers, while updated immunization, and exclusive breastfeeding (minimum of 6 months), were identified as protective factors (Table 1).

History of previous pneumonia, daycare attendance, consumption of processed food, presence of a cat at home, the report of more than five upper respiratory infection (URI) episodes and a first URI before the age of 6 months were significantly associated with recurrent wheezing (Table 2).

TABLE 1
Factors significantly associated with wheezing in the first year of life in infants from southern region of SP (n = 467): logistic regression analysis

Variables	n (%)	OR (95% CI)	p
Male gender	259 (55.5)	1.53 (1.2–2.1)	0.004
Pneumonia	144 (30.8)	2.66 (1.6–4.4)	<0.001
Caucasian	286 (61.2)	0.72 (0.5–0.9)	0.03
Hospitalization due pneumonia	71 (15.2)	2.19 (1.1–4.7)	0.04
Exposure to tobacco smoke at home	100 (21.4)	2.19 (1.5–3.3)	<0.001
Asthmatic mother	41 (8.8)	3.22 (1.6–6.4)	<0.001
Daycare attendance	123 (26.3)	1.87 (1.3–2.7)	0.001
Dog at home at 12 months of life	128 (27.4)	1.82 (1.3–2.6)	0.001
Other pets at home at 12 months of life	18 (3.9)	0.46 (0.2–0.9)	0.02
Carpet at home	111 (23.8)	1.59 (1.2–2.3)	0.01
Skin allergy	239 (51.2)	1.53 (1.2–2.1)	0.004
Mould at home	182 (39.0)	1.51 (1.2–2.1)	0.008
More than 5 URI/year	186 (40.0)	2.70 (1.9–3.8)	<0.001
First URI before 6 months of life	334 (71.5)	1.86 (1.4–2.5)	<0.001

CI, confidence interval; OR, odds ratio.

TABLE 2
Factors significantly associated with recurrent wheezing in the first year of life (three or more episodes) in infants from the center to south region of SP (n = 270): logistic regression analysis

Variables	n (%)	OR (95% CI)	p
Pneumonia	104 (38.5)	3.10 (1.6–5.9)	0.001
Daily consumption of processed food	127 (47.0)	1.68 (1.1–2.5)	0.02
Cat at home at 12 months of life	18 (6.7)	5.71 (1.8–18.2)	0.003
First URI before 6 months of life	212 (78.5)	2.72 (1.8–4.2)	<0.001
More than 5 URI/year	140 (51.6)	1.89 (1.2–2.9)	0.006

CI, confidence interval; OR, odds ratio.

Discussion

In this study, male gender was a risk factor for wheezing (Table 1). This higher prevalence of childhood asthma and wheezing among boys have been attributed to the small diameter of their airways in relation to the size of their lungs at this stage of life [10].

The reporting of parents or siblings with atopic diseases was more common among wheezing infants. However, maternal history of asthma, considered a major risk factor for early and persistent wheezing [11], was related in <10% of the wheezing infants (Table 1).

We found a significant association with hospitalization for pneumonia and wheezing (Table 1) and having had pneumonia with recurrent wheezing (Table 2). As this is a cross-sectional study, we cannot characterize the wheezing as a trigger or as an outcome from pulmonary infections, but we can point to pneumonia as a predictor of wheezing and recurrent wheezing in infants. We also found a high frequency of early (before 6 months of life) URI among the wheezing infants (Table 1) and the

recurrent wheezing infants (Table 2). The study with all EISL centers showed that having a cold during the first 3 months of life and attending nursery school were the most important independent risk factor for wheezing [12]. The frequent association of wheezing and respiratory infections of upper and lower airways is well known [13, 14]. It is likely that early contact with other children increases the exposure to infectious agents, mainly viruses, leading to transient early wheezing in childhood. Our study has shown that daycare attendance was associated with wheezing, with a higher proportion of wheezing among those who started earlier in day care (Table 1).

Passive smoking and maternal smoking during pregnancy were also more frequently reported among sibilants (data not shown). The exposure to cigarette smoke at home was an independent and significant risk factor for wheezing in the first year of life (Table 1).

We did not observe a relationship between household exposure to pets after birth and wheezing, but

the presence at home of dogs at 12 months of life was significantly associated with wheezing (Table 1), and the exposure to cats at 12 months of life was associated with recurrent wheezing (Table 2). The available data regarding the risk of or protection from wheezing from exposure to domestic animals are discordant [15–17]. It is likely that there is a relationship between age of exposure to allergens and genetic predisposition to atopy and wheezing. The presence of carpets or mould in the house was also associated with recurrent wheezing in the first year of life (Table 1), and this finding has been confirmed by other authors [17–19].

Furthermore, we observed an inverse association between breastfeeding for ≥ 6 months and the occurrence of wheezing at least once (data not shown), while the daily consumption of processed food was independently associated with recurrent wheezing (Table 2). Systematic reviews of studies evaluating the influence of diet during pregnancy, lactation and the first year of life in the development of wheezing and atopy in childhood, indicate that there is controversy over the protective effect of exclusive breastfeeding and late introduction to solids for the development of wheezing, eczema or atopy in infants at risk for atopy [20–22]. However, breastfeeding seems to decrease the frequency of episodes of wheezing in infants, which are generally associated with respiratory infections [22].

We believe that the use of a questionnaire with questions that depend on parents' memory may have influence on data collection, but other studies have shown that, using written questionnaires, parents are able to remember diseases, such as asthma and perception of symptoms with high levels of accuracy [23, 24].

In conclusion, there are several factors associated with wheezing in the first year of life. Most of them are environmental factors and infections that can be prevented or controlled. Prospective studies on wheezing, especially in children with a severe presentation, are needed to analyze the impact of these risk factors and the effect of preventive actions.

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