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Expanding the application of a standardized questionnaire on recurrent wheezing in infancy

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Abstract

Objective: To verify the possibility of extending the application of an instrument to investigate the prevalence and clinical characteristics of wheezing in infants.

Methods: A cross-sectional study conducted as part of the International Study on Wheezing in Infants (EISL, Estudio Internacional de Sibilancias en Lactantes). A questionnaire was administered to parents of infants aged 12 to 15 months (group I) and 16 to 24 months (group II) infants.

Results: One thousand, three hundred and sixty-four infants (45.4%) in group I and 250 (46.7%) in group II had had at least one episode (p = 0.58). The numbers of patients on inhaled β_2-agonists, inhaled or oral steroids and/or leukotriene modifiers were similar in both groups (p = 0.52, 0.12, 0.06, and 0.75). There were no differences between the groups in terms of night-time symptoms, shortness of breath, emergency room visits, asthma hospitalization or asthma diagnosed by a doctor (p = 0.09, 0.28, 0.54, and 0.45).

Conclusion: The application of the questionnaire can be extended to include infants up to 24 months of age.

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Introduction

The epidemiology of asthma has been the subject of a large number of studies with samples covering a wide variety of age ranges. The International Study of Asthma and Allergies in Childhood (ISAAC) is the most wide-ranging epidemiological study that has been undertaken to determine the prevalence, severity and risk factors of asthma and allergic diseases in children.[1] The ISAAC group used a standardized method that was employed uniformly at hundreds of participating centers all over the planet. Its instruments, either a written or video questionnaire, have been widely publicized.[2] The validation study of the Portuguese language versions of the ISAAC instruments demonstrated good reproducibility and the power to differentiate asthmatic children from those without asthma.[3]

In common with the ISAAC, the International Study of Wheezing in Infants (EISL, *Estudio Internacional de Sibilancias en Lactantes*) also has a standardized method and the written questionnaire has been validated in Portuguese and Spanish. The written questionnaire was originally developed to be administered to the parents of infants aged 12 to 15 months, with the questions relating to wheezing during their first 12 months of life.[4,5]

In distinct validation studies for the Portuguese and Spanish versions, the written questionnaire provided evidence that the infants' parents were capable of identifying wheezing among their children with a high degree of agreement.[6,7] In a constructive validation of the Portuguese version, it was shown that the questionnaire could be administered to the parents of infants aged up to 36 months.[8]

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1) Has your baby had wheezing in the chest or bronchitis or whistling during his/her first 12 months of life?
( ) Yes ( ) No

2) How many episodes of wheezing in the chest (bronchitis or whistling) did your baby have during the first year?
( ) None ( ) Less than 3 episodes ( ) 3 to 6 episodes ( ) More than 6 episodes

3) At what age did your baby first have an episode of wheezing in the chest (first bronchitis)?
At _____ months

4) Has your baby been trated with inhaled medications to relieve chest wheezing (bronchodilators) via nebulizers or inhalers (sprays)? (For example: Salbutamol®, Aerolin®, Berotec®, Bricanyl®)
( ) Yes ( ) No ( ) Don't know

5) Has your baby been trated with corticosteroids (cortisones in spray form)? (For example: Symbicort®, Flixotide®, Seretide®, Clenil®, Beclosol®, Budesonide®, Busonid®, Pulmicort®, Beclometasone, Fluticasone, etc.)
( ) Yes ( ) No ( ) Don't know

6) Has your baby been trated with antileukotrienes (Singulair®)?
( ) Yes ( ) No ( ) Don't know

7) Has your baby been trated with oral corticosteroids (Predsim®, Predone®, Decadron®)?
( ) Yes ( ) No ( ) Don't know

8) During the last 12 months, how many times you woken up during the night because your baby was coughing or had a wheezing chest?
( ) Never
( ) Rarely (less than once a month)
( ) Sometimes (some weeks of some months)
( ) Frequently (2 or more nights per week, almost every month)

9) During the last 12 months, has the wheezing (whistling) in your baby's chest been so strong that you have had to seek emergency services (Hospital, Clinic or Health Center)?
( ) Yes ( ) No

10) During the last 12 months, has the wheezing (whistling) in your baby's chest been so intense that you have felt it caused great difficulty breathing (shortness of breath)?
( ) Yes ( ) No

11) Has your baby been admited to hospital for bronchitis?
( ) Yes ( ) No

12) Has a doctor ever told you your baby has asthma?
( ) Yes ( ) No

Figure 1 - Questions relating to the prevalence, treatment and clinical characteristics of wheezing

When this instrument was used in Curitiba, Brazil, it identified a 45.4% prevalence of infants with wheezing during the first 12 months of life, with 22.6% suffering three or more episodes.[9]

However, the age group for which the EISL project was designed is restricted, making it difficult to obtain adequate samples and precludes centers with small populations from taking part, which reduces the reliability of the results.

The objective of this study was to compare results in terms of prevalence and the clinical characteristics of recurrent wheezing during the first 12 months of life in order to extend the applicability of the EISL from infants aged 12 to 15 months to infants aged up to 24 months.

Methods

Data provided by parents of infants aged 12 to 15 months (group I) were compared with data from parents of infants aged 16 to 24 months (group II), in terms of epidemiology and the clinical characteristics and treatment of recurrent wheezing during the first year of life (Figure 1).

During the 17-month study period, the Municipal Health Department had 107 Health Centers and 35 of these were selected by lots, providing a proportional distribution of the population cared for at these Centers, within the municipal limits. This method results in a more homogenous population sample, since the area of the municipality is triangular and has an irregular demographic distribution.

The parents or legal guardians of infants aged 12 to 15 months presenting at the Health Centers consecutively for routine immunization during the period between August of 2005 and December 2006 were approached, given information about the study and invited to take part. Those who agreed signed a Free and Informed Consent Form and completed the written questionnaire. They received help and guidance from 16 medical students who worked on the data collection to reply to 95% of the questions, trying to avoid unanswered items. These interviewers attended the Health Centers once o week on varying days of the week.

The final sample of convenience comprised the parents of 3,003 infants aged 12 to 15 months, including both children

Table 1 - Comparison of replies related to the prevalence and clinical characteristics of wheezing and the medications given to wheezing children during the first year of life

	Group I,* n (%)	Group II,† n (%)	p
Males	1,522 (50.7)	264 (49.3)	0.57
Age in months at first crisis (mean ± SD)	5.5±3.1	5.9±3.7	0.50
Episodes of wheezing	1,364 (45.4)	250 (46.7)	0.58
≥ 3 episodes	678 (22.6)	125 (23.4)	0.87
Frequent night-time awaking	798 (26.6)	168 (31.4)	0.09
Visits to emergency	782 (26)	145 (27.1)	0.69
Breathing difficulties	628 (20.9)	105 (19.6)	0.28
Hospital admissions for asthma	172 (5.7)	35 (6.5)	0.54
Asthma diagnosed by a doctor	148 (4.9)	23 (4.3)	0.45
Inhaled β_2-agonists	1,149 (38.3)	205 (38.3)	0.52
Inhaled Corticosteroids	250 (8.3)	35 (6.5)	0.12
Oral Corticosteroids	329 (11)	47 (8.8)	0.06
Leukotriene modifiers	73 (2.4)	12 (2.2)	0.75

SD = standard deviation.
* Group I = 12-15 months (n = 3,003).
† Group II = 16-24 months (n = 535).

who had and who had not suffered from wheezing (group I), to meet the criteria for the project run in Curitiba, and, in parallel, 535 parents of infants aged 16 and 24 months, also with and without wheezing (group II). The same questionnaire was administered to all parents.

This study was approved by the Human Research Ethics Committee at the Hospital de Clínicas, Universidade Federal do Paraná, in Curitiba, Brazil.

For the statistical analysis, categorical variables are represented in terms of distribution of frequencies and proportions are compared using the chi-square test. Continuous variables are expressed as means and standard deviations and means are compared using Student's *t* test for paired samples. The significance level adopted was $\alpha = 0.05$. Statistical analysis of the data was carried out using MINITAB 14, MINITAB Brazil.

Results

The groups did not differ in terms of gender distribution. The prevalence rates of wheezing were 45.4 and 46.7% in groups I and II, respectively. The mean age at onset of wheezing episodes also did not differ between the groups.

When the wheezing infants were stratified by number of crises into greater than or equal to three crises and less than 3 crises, the proportion of infants suffering 3 or more crises was similar for the infants at 12 to 15 months and those at 16 to 24 months.

The parents' replies for night-time symptoms (sometimes and often), emergency room visits, breathing difficulties, hospital admissions for asthma and asthma disgnosed by a doctor were similar for both groups.

Both groups reported equal proportions inhaled β_2-agonists, inhaled corticosteroids, oral corticosteroids and leukotriene modifiers (Table 1).

Discussion

Standardized and validated written and video questionnaires have been used internationally to determine the prevalence of asthma in schoolchildren and adolescents in many different parts of the world.[1] In Brazil, the ISAAC initiative found evidence of an elevated prevalence of asthmatic children in the areas studied, putting the country in eighth position worldwide and with the highest rates found at centers close to the equator.[1,10]

Epidemiological studies with representative samples are necessary in order to determine the impact of recurrent wheezing in very young children. This Latin American and European project is beginning to release its results which will provide information on the rates of recurrent wheezing among infants, how this is being treated and the risk factors for the development of this condition.

During the validation of this instrument for the Brazilian population, the question "did your baby have wheezing or whistling in the chest or bronchitis during the first 12

months?", and confirmed by chest auscultation, exhibited high sensitivity, specificity, positive predictive value, negative predictive value and concordance.[6] However, questions on the clinical characteristics and treatment of recurrent wheezing were not included in that validation.

A constructive validation of this questionnaire was carried out with the parents of infants aged 12 to 15 months at 10 different centers in 6 Spanish and Portuguese speaking countries and found a high degree of concordance. The addition of questions about treatment for asthma did not improve accuracy. Notwithstanding, the authors suggest that it is suitable for use in large-scale international multicenter studies.[7]

The advantages that this instrument has over the ISAAC method is that the information is dependent on the memories of those responding to the questionnaire and in the EISL the time between the events is shorter, the child is more dependent on their parents at the time and the replies are confirmed by physical examination.

Notwithstanding, the age range proposed (12 to 15 months) for administration of the questionnaire is restrictive and makes it difficult to obtain samples of sufficient size to provide trustworthy results, particularly in towns with low population densities. It is for this reason that the study described here extended the maximum age of one study group up to 24 months.

We observed that the replies relating to the prevalence, clinical characteristics and treatment of wheezing in infants demonstrated that the frequency of night time symptoms, breathing difficulties, visits to emergency, hospital admissions due to wheezing and asthma diagnosed by a doctor were similar when the same questionnaire was applied to the parents of differently-aged infants. The same was observed with respect to the use of inhaled β_2-agonists, inhaled corticosteroids, oral corticosteroids and leukotriene modifiers.

It was not the objective of this study to carry out a constructive validation of this instrument, which presupposes the reproducibility and reliability of the information in different populations, but the comparison of the replies of parents of infants in different age ranges, who did or did not suffer wheezing during the first 12 months of their lives. Since the instrument had already been validated for the 12 to 15 months age group it was expected that if the observation range was extended the results would remain similar.

In conclusion, administration of the EISL questions on the prevalence, clinical characteristics and treatment of recurrent wheezing can be extended to parents of infants aged between 12 and 24 months without prejudice to the quality of information obtained, which facilitates their use by reducing barriers to obtaining samples of the necessary size.

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