

PREVALENCE OF RECURRENT WHEEZING AND ITS RISK FACTORS

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Abstract

Objective: analyze the prevalence of recurrent wheezing and its risk factors. **Method:** systematic literature review, guided by the research question "what is the prevalence of recurrent wheezing and its risk factors?". The search was performed in the databases MedLine and LILACS, in April and May 2013. The inclusion criteria were: scientific study, fully available, published between 2002 and 2013, with free access. **Results:** wheezing presents a higher prevalence in developing countries, possibly due to poor socioeconomic conditions. Among its risk factors, we find heredity, mother's education level, attendance of day nursery, smoking during pregnancy, breastfeeding for < 3 months, animals in the household of children, among others. **Conclusion:** in Latin America, the prevalence of wheezing shows to be high and the use of non-standardized instruments hampers its treatment.

Key words: wheezing, recurrent wheezing, childhood wheezing.

INTRODUCTION

The recurrent wheezing which emerges during the first year of life is a major cause of respiratory morbidity worldwide. Its prevalence is lower and less severe in the European countries than in Latin America.¹ Wheezing poses a great burden of care to parents, as well as to the health care system.²

In the first year of life, most consultations and hospitalizations in pediatrics is due to wheezing³, and recurrent wheezing results in an important increase in the use of health resources and a high economic cost, besides a compromised quality of life of patients and relatives.⁴

The presence of recurrent wheezing in the first year of life may indicate the emergence of bronchial asthma in children.⁵ The increasing prevalence of asthma and other allergic diseases has been associated to potential etiologic factors that can influence the development of the immune system.⁶

Asthma and bronchiolitis are responsible, in most cases, to wheezing in children and nurslings, respectively. Most cases of asthma in children, an average of 70% of cases, occur < 3 years of age. One-third of these cases emerge < 1 year of age.⁷

The risk factors for wheezing < 18 months of life are related to infections, air pollution, and

overweight, while its severity is mainly related to the children's atopic status.⁸

The occurrence of recurrent wheezing, e" 3 episodes, characterizes the epidemiological diagnosis of asthma. Wheezing is multifactorial, it may be associated to demographic, socioeconomic, genetic, gestational, nutritional, and environmental causes, among others, reflecting on society, on children, and on their relatives.⁹

Despite all studies and discoveries on the risk factors for wheezing, its incidence and prevalence do not decrease; besides, this symptom is a possible indicator of asthma at a later stage of the child's life, and it can cause significant problems with regard to the individual's personal and social aspects. Asthma, in addition to the repercussions on the life of patients, also has a high financial cost to be treated, making it a disease requiring special attention on the part of public health. Given the above, this paper aims to conduct a systematic review on the prevalence of recurrent wheezing and describe its risk factors.

METHODS

Integrative review, a methodology providing the synthesis of knowledge and incorporation of results from significant studies into practice. It

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involves, thus, defining the clinical problem, identifying the information needed, searching for studies and their critical evaluation in the literature, identifying the applicability of data from publications, and determining their applicability to the patient.¹⁰

The integrative literature review must follow six steps: identifying the theme and selecting the research question, establishing inclusion and exclusion criteria, identifying pre-selected and selected studies, categorizing the selected studies, analyzing and interpreting results, and presenting the review/synthesis of knowledge, which consists in presenting the key results obtained.¹¹

The survey was conducted in April and May 2013. It began with the theme choice, then, there was a search based on terms included in the *Descriptors in Health Sciences* (DeCS), in English: wheezing, recurrent wheezing, and childhood wheezing; in Portuguese: *sibilância*, *sibilância recorrente*, *sibilância na infância*; and in Spanish: *sibilancia*, *sibilancia recorrente*, and *sibilancia en la infancia*. Subsequently, we performed a search for reference literature in the databases Latin American and Caribbean Literature on Health Sciences (LILACS) and National Library of Medicine (MedLine).

The full set of results for the descriptor wheezing in all indices was 2,534 full texts, where 2,511 were articles, 22 theses, 21 project documents, 8 conference papers, and 1 monograph; in turn, in title, there were 258 full texts, with 248 articles, 10 theses, and 3 project documents.

Regarding recurrent wheezing in all indices, there were 52,196 full texts, where 47,875 were articles, 1,870 monographs, 1,842 theses, 889 conference papers, 934 project documents, 38 unconventional papers, and 33 audio transcripts; in turn, in title there were 2,484 full texts, with 2,174 articles, 207 theses, 93 monographs, 61 project documents, 39 conference papers, 10 unconventional papers, and 6 audio transcripts.

With wheezing in childhood in all indices, there were 10,549 full texts, where 9,495 were articles, 852 monographs, 186 conference papers, 23 project documents, 3 unconventional papers, and 3 audio transcripts; in turn, in title, there were 195 full texts, with 171 articles, 2 monographs, 21 theses, 10 project documents, and 1 unconventional paper.

Most articles found were observational (7 from MedLine and 9 from SciELO). The inclusion criteria were: scientific study, fully available, published between 2002 and 2013, with free access, with the presence of at least one of the selected descriptors in the title. In turn, the exclusion criteria were: repeated publications and papers available only in abstract format. Thus, we obtained 16 studies that met the criteria outlined.

RESULTS

The prevalence distribution is displayed in Table 1 and the risk factors in Table 2.

Table 1: Prevalence of recurrent wheezing in nurslings between 12 and 15 months of life

| Authors | Results |
|--|---|
| Pellegrini-Belinchón J, Miguel-Miguel G, De Dios-Martín B, Vicente-Galindo E, Lorente-Toledano F, García-Marcos L ⁴ | The prevalence of recurrent wheezing of 11.9% after the evaluation of 750 children. |
| Chong Neto HJ, Rosário NA, Grasselli EA, Silva FC, Bojarski LFM, Rosário CS, et al. ¹² | 3,003 parents of nurslings answered to the questionnaire: 45.4% of nurslings had at least 1 episode of wheezing and 22.6% had recurrent wheezing. |
| Alvim CG, Nunes S, Fernandes S, Camargos P, Fontes MJ ¹³ | 1,261 children were evaluated, out of which 656 (52%) expressed wheezing in the first year of life; 357 (54.6%) of these showed recurrent wheezing. |
| Medeiros D, Silva AR, Rizzo JA, Sarinho E, Mallol J, Solé D ¹⁴ | 1,071 parents and/or guardians participated in the research: 42.9% of nurslings exhibit wheezing < 3 times, 200 out of 466 infants; 57.1% had > 3 episodes of wheezing, 266 out of 466 infants. |
| Bianca ACCD, Wandalsen GF, Mallol J, Solé D ¹⁵ | Sample consisting of 1,014 respondents: 467 nurslings (46%) had > 1 episodes of wheezing; 270 infants (26.6%) had > 3 episodes of wheezing, while 100 had > 6 episodes. |
| Belyhun Y, Amberbir A, Medhin G, Erko B, Hanlon C, Venn A, et al. ⁶ | The prevalence of wheezing was 11.5% (103/899) and that of eczema was 8.6% (77/899). |
| Lima JAB, Fischer GB, Sarria EE, Mattiello R, Solé D ¹⁶ | 1,013 nurslings were evaluated: 61% had at least 1 episode of wheezing and, out of these, 1/3 repeated the symptom at least 3 times. |
| Visser CA, Garcia-Marcos L, Eggink J, Brand PL ² | The prevalence of recurrent wheezing was 14.5% after the evaluation of 1,115 questionnaires. |
| OMallol J, García-Marcos L, Solé D, Brand P ¹ | Among 30,093 children surveyed, 45.2% had at least 1 episode of wheezing. The average prevalence of wheezing in Latin America and European countries was 21.4% and 15%, respectively. |
| Chong Neto HJ, Rosário NA, Solé D, Mallol J ¹⁷ | 3,003 individuals were included, out of these, 1,364 nurslings (45.4%) had episodes of wheezing in the first 12 months of life; out of these, 678 (22.6%) had > 3 episodes. |

Table 2: Risk factors for recurrent wheezing in nurslings between 12 and 15 months of life

| Authors | Results |
|--|---|
| Soto-Ramírez N, Karmaus W, Zhang H, Davis S, Agarwal S, Albergottie A ¹⁹ | Any feeding way which includes formulae or bottled mothers' milk seems to be a moderate risk for coughing or wheezing in the first 12 months of life. |
| Midulla F, Pierangeli A, Cangiano G, Bonci E, Salvadei S, Scagnolari C, et al | Rhinovirus infection and positive family history of asthma are independent risk factors for recurrent wheezing |
| Pellegrini-Belinchón J, Miguel-Miguel G, De Dios-Martín B, Vicente-Galindo E, Lorente-Toledano F, García-Marcos L ⁴ | Attendance of day nursery, birth weight > 3,500 g, presence of eczema, exclusive breastfeeding for < 3 months, maternal smoking during the last 3 months of pregnancy. |
| Medeiros D, Silva AR, Rizzo JA, Sarinho E, Mallol J, Solé D ¹⁴ | Low education level; having attended day nursery; having pollution where she/he lives; being exposed to smoking at home or during pregnancy; having had pneumonia; having relatives with asthma, allergy or allergic rhinitis, or skin allergy; having had > 5 episodes of upper respiratory tract infections; having had the first episode < 6 months of life. |
| Bianca ACCD, Wandalsen GF, Mallol J, Solé D ¹⁵ | Use of inhaled corticosteroids; frequent nocturnal symptoms; need for care in first aid; diagnosed pneumonia. |
| Belyhun Y, Amberbir A, Medhin G, Erko B, Hanlon C, Venn A, et al. ⁶ | Independent predictors for wheezing: a history of maternal and paternal allergy, increasing number of family members, and use of paracetamol by the child. |
| Lima JAB, Fischer GB, Sarria EE, Mattiello R, Solé D ¹⁶ | Men; history of pneumonia; smoking during pregnancy; attendance of day nursery; low maternal educational level; high number of colds; first viral condition < 3 months; presence of siblings; presence of family members with asthma (both parents and siblings). |
| Visser CA, Garcia-Marcos L, Eggink J, Brand PL ² | Men, eczema, siblings with asthma, any allergic disease in the family, day nursery, humid housing, and asphyxia. |
| Garcia-Marcos L, Mallol J, Solé D, Brand PL ²¹ | Exposure to cold during the first 3 months of life, attending day nursery, being male, smoking during pregnancy, family history of asthma/rhinitis, and children's eczema. |
| Chong Neto HJ, Rosário NA ²² | History of asthma in both parents; bronchopneumonia; presence of dog in the household; attendance of day nursery; maternal smoking during pregnancy. |
| Chong Neto HJ, Rosário NA ²³ | Men; family history of asthma; attendance of day care; presence of other pets during pregnancy; > 6 episodes; and mildew stains at home. |

DISCUSSION

The prevalence of asthma is quite variable around the world. Brazil is among the countries with the largest number of asthma cases, whose prevalence varies, on average, from 19 to 24.3%.²³ In a study conducted in Latin America with families having a low socioeconomic status, in the first year of life, 80.3% of all children had suffered e" 1 episodes of wheezing and 43.1% had recurrent wheezing.⁴ This may be defined as e" 3 episodes of wheezing in the first year of life.¹³

The prevalence of recurrent wheezing greatly varies, where 10% and 80.3% of nurslings had at least 1 episode of wheezing in the first 12 months of life, while 8% to 43.1% had e" 3 episodes, and the prevalence is lower in the developed countries.²¹ The prevalence in developing countries shows to be higher than in developed countries. Its causes are not known, but environmental risk factors, such as poor socioeconomic status may contribute to this reality.¹⁵

Wheezing in the nursling is regarded as an important point for determining asthma in childhood and adolescence. Although some risk factors are already identified before birth, we do not know much about them among the Brazilian population.²¹

A study found a prevalence of 61% of cases of wheezing in Porto Alegre-RS, a result consistent with those found in developing countries.¹⁶ Another study identified a prevalence of 43% of episodes of wheezing in the first year of life in Recife-PE.¹² In Salamanca, Spain, a study identified the prevalence of 32.3% of wheezing; out of the 242 children who had wheezing in the first year of life, 89 had e" 3 episodes and the prevalence of recurrent wheezing was 11.9%.⁴

Recurrent wheezing has risk factors associated to the relation between the gene and the environment. A study found out that parents with asthma represent 4 times more risk of having children with wheezing in the first year of life.²¹ In another study, it was found out that almost half of children with wheezing in the first year of life have relatives with asthma.¹⁴

It was shown that parents and siblings with asthma represent a 20% higher nursling's risk for asthma in the first year of life.¹⁶ This increased risk was also found when comparing males to females, where this fact may be attributed to the smaller diameter of airways in boys during the first years of life. This has been observed in other studies, however, as the child grows and reaches adolescence, something which has not been well explained.²²

The risk factors for wheezing, such as maternal education level, attendance of day nursery, pollution at home, smoking during pregnancy and after birth are usually associated to poor socioeconomic status, something which results in environmental exposures, such as increased number of respiratory infections, as well as increased exposure to environmental allergens.¹⁴

In a study, it was observed in the group of wheezing patients that 15% of mothers smoked during pregnancy and that 47% of them smoked after birth, offering a nearly 2 times higher risk for a child with wheezing in an environment with smokers.¹⁴ Another study, carried out in Recife-PE, indicates that the risk of onset of wheezing was observed only in the multifactorial analysis when associated to intrauterine smoking.¹⁶ It has already been shown that nurslings with smoking mothers are twice as likely to have wheezing in the first year of life.²¹ The smoking mother contributes to a child who is born with decreased lung function.

It was found out in a study that nurslings with higher frequency of nocturnal symptoms, visits to the emergency room, use of β_2 -agonist agents, severe symptoms, hospitalizations due to asthma, and medical diagnosis of asthma had e" 3 episodes of wheezing in the first 12 months of life.¹⁷

It was found out in a study that 80% of children with wheezing showed compromised sleep; however, frequent awakening was only observed in 6.2% of cases.⁴ Out of the 242 children who wheezed, 112 required emergency care and 21 children had to be hospitalized. Children weighing < 1,500 g and > 3,500 g had more wheezing episodes, but not recurrent. The literature has already reported that the child with low birth weight has a higher risk for respiratory infections and wheezing, which may imply damage in adulthood.

Regarding breastfeeding, in a study, 40.3% of children < 3 months of life received exclusive breastfeeding and 51.1% of these for a period > 3 months.⁴ The prevalence of recurrent wheezing in the first group was 14.5% and 10% in the latter. Some researchers found a significant association between wheezes and recurrent wheezing when breastfeeding was exclusive up to 3 months. It was not fully explained, yet, the reason why exclusive breastfeeding constitutes a factor against infections, however, other studies point out that breastfeeding may be a protective factor, but it can cause increased allergies and asthma at older ages. Recurrent wheezing was also identified in 22.8% of children with eczema and in 10% of those who did not have it. Humid housing was not significantly associated to wheezing.

A study identified high consumption of oral corticosteroids among the children under analysis. In another study, 48.7% of parents confirmed to have used oral corticosteroids to treat wheezing, however, by relating this fact to the frequency and severity of episodes of wheezing, no significant association was identified.¹⁴

The presence of pets before or during pregnancy may be a protective factor against wheezing in early life, but this statement is only valid for children whose parents do not have a history of asthma.²¹ In a study, the presence of birds after birth showed to be significant with regard to the onset of episodes of recurrent wheezing ($p < 0.03$).³ In another study, there was no association between wheezing in the first year of life and history of rhinitis and dermatitis in the family, smoking by other family members, intake of processed foods by the nursling, maternal education level, number of siblings, etc.²²

Recurrent wheezing is a public health problem. In Brazil the morbidity and mortality due to respiratory infections are high, however, the prevalence of wheezing in the early years of life is still unknown. Improved diagnosis and treatment in the early symptoms of asthma and wheezing are extremely important and needed, since, this way, we can reduce the rates of morbidity and mortality in the first year of life due to these causes.¹⁵

CONCLUSION

We may conclude that the prevalence of recurrent wheezing shows to be high in Latin America and that it, perhaps, presents different values due to the application of non-standardized instruments. The socioeconomic factor, most of the times, shows up as a risk factor, but it is worth highlighting that most studies were conducted in low-income regions, implying other risk factors, such as low maternal education level and exposure to environmental factors. Some measures, such as encouraging breastfeeding and smoking cessation during pregnancy could result in an important impact on the decrease in the prevalence of recurrent wheezing in the first year of life; besides, identifying the risk factors for recurrent wheezing may contribute to the diagnosis of asthma in children in the first years of life, as well as its clinical management.

Conflict of Interests

The authors declare that there is no conflict of interests regarding the publication of this article.

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