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ORIGINAL ARTICLE

Factors associated to recurrent wheezing in infants under one year of age in the province of Salamanca, Spain: Is intervention possible? A predictive model



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KEYWORDS

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Abstract

Objectives: Wheezing is a very common problem in infants in the first months of life. The objective of this study is to identify risk factors that may be acted upon in order to modify the evolution of recurrent wheezing in the first months of life, and to develop a model based on certain factors associated to recurrent wheezing in nursing infants capable of predicting the probability of developing recurrent wheezing in the first year of life.

Methods: The sample was drawn from a cross-sectional, multicentre, descriptive epidemiological study based on the general population. A total of 1164 children were studied, corresponding to a questionnaire response rate of 71%. The questionnaire of the *Estudio Internacional de Sibilancias en Lactantes* (EISL) was used. Multiple logistic regression analysis was used to estimate the probability of developing recurrent wheezing and to quantify the contribution of each individual variable in the presence of the rest.

Results: Infants presenting eczema and attending nursery school, with a mother who has asthma, smoked during the third trimester of pregnancy, and did not consume a Mediterranean diet during pregnancy were found to have a probability of 79.7% of developing recurrent wheezing in the first year of life. In contrast, infants with none of these factors were seen to have a probability of only 4.1% of developing recurrent wheezing in the first year of life. These results in turn varied according to modifications in the risk or protective factors.

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Conclusions: The mathematical model estimated the probability of developing recurrent wheezing in infants under one year of age in the province of Salamanca (Spain), according to the risk or protective factors associated to recurrent wheezing to which the infants are or have been exposed.

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Introduction

Wheezing, because of its tendency to recur, is one of the most common problems in the first months of life.¹ The lack of specificity of the clinical manifestations, the variability of patient response to the existing treatments, and the association between wheezing and viral infections in this age group² can have a significant impact upon the quality of life of both the infant and the family,³ with an increase in the use of healthcare resources,⁴ and an important economic impact.⁵

Many studies have addressed wheezing in infants, although most have focused on viral causes^{6–8} or on the influence of allergies.^{9,10} In turn, some authors have related wheezing to obstetric antecedents,¹¹ early exposure to certain allergens,¹² immune alterations caused by certain environmental exposures^{13,14} or the administration of certain medications during pregnancy.¹⁵

A group of Spanish coordinators of the International Study of Asthma and Allergies in Childhood (ISAAC)¹⁶ developed the International Study on Wheezing in Nursing Infants (*Estudio Internacional de Sibilancias en Lactantes* (EISL)) to determine the prevalence of wheezing, its severity and risk factors in the first 12 months of life.¹⁷ These and other previous as well as subsequent studies have indicated that there are other factors apart from viral infections that might interact and condition the presence of recurrent wheezing (RW) in the first months of life, such as infant gender, attending nursery school, diet, characteristics of the home, pets, maternal diet during pregnancy, smoking, the presence of siblings, pneumonia, etc.^{1,18–21} The objective of the present study was to identify risk factors that may be acted upon in order to modify the evolution of recurrent wheezing in the first months of life. In this respect, a predictive model was developed, based on certain risk or protective factors, capable of predicting the probability of developing recurrent wheezing in the first year of life – with the evaluation of variations in probability according to changes in one or more factors.

Material and methods

Study design

A sample corresponding to one-year-old infants born in the province of Salamanca, Spain between 1 June 2008 and 31 May 2010 was drawn from a cross-sectional, multicentre,

descriptive epidemiological study based on the general population.

Study subjects

The EISL questionnaire has been validated in Spain and Latin America,²² and the results were found to be equivalent to those reported for other questionnaires developed for use in large studies.²³ The questionnaire comprises 118 items with questions referring to demographic characteristics, the home and surroundings of the infant, the eating habits of the mother during pregnancy, disease and medications used, complications at delivery, family antecedents of atopic disorders, a history of eczema in the infant, wheezing and its characteristics and severity, and the treatments provided. The questionnaire was distributed among the parents of infants visiting all the primary care centres (urban and rural) in the province of Salamanca for the regular scheduled visit at 12 months of age and for triple viral vaccination at 15 months of age. However, in the case of 15-month-old infants, the parents were informed that the questions all referred to the first year of life only.

Infants with incomplete or incorrectly completed questionnaires were excluded, as were those in which the number of wheezing episodes was not known, and those cases in which the parents failed to give consent. A total of 1164 children were studied, corresponding to a questionnaire response rate of 71%.

Definitions

Wheezing was considered to have occurred when the parents gave an affirmative answer to the following question: “Has your child experienced wheezing or whistling sounds in the chest in the first 12 months of life?” Recurrent wheezing (RW) in turn was defined as three or more wheezing episodes in the first year of life.

Childhood eczema was defined when the parents gave an affirmative answer to the following question: “Has your child developed itchy red areas on the skin that come and go anywhere on the body except around the mouth, nose and area covered by the diapers?”

The questionnaire was not specifically designed to determine whether the mother had followed a Mediterranean diet during pregnancy. Nevertheless, the diet was considered to have been followed when the mother gave affirmative answers to the following questions referring to eating habits: “Do you eat olive oil and white or blue fish three or more

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