

ORIGINAL ARTICLES

Risk factors for x-ray pneumonia in the first year of life and its relation to wheezing: a longitudinal study in a socioeconomic disadvantaged population

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ABSTRACT

Background: Although thousands of infants under the age of 12 months die each year from pneumonia in Latin America, little is known regarding the true occurrence of pneumonia, wheezing and other related respiratory illnesses in this age group.

Methods and results: In order to describe the prevalence and risk factors for radiologically confirmed pneumonia during the first year of life, a birth-cohort (n = 188) of infants born in a low-income area in Santiago, Chile was followed up monthly. Results: The prevalence of pneumonia during the first year of life was 13.3 % and there were no fatal events. Exclusive breastfeeding during the first 4 months of life was more prevalent in the non pneumonia group; conversely, wheezing episodes during 0-3 and 3-6 months of age, and hospitalization due to lower respiratory infection during 3-6 and 9-12 months of age were more prevalent in the pneumonia group.

After a logistic multivariate analysis, the only risk factor that remained related with pneumonia was wheezing during the first 3 months of life (adjusted OR: 7.7, 95 CI: 1.32-44.92, p = 0.024); while breastfeeding during the first 4 months was an independent protective factor for pneumonia (adjusted OR: 0.11, 95 CI: 0.03-0.44, p = 0.002). Conclusion: The significant protective effect of exclusive breast feeding against pneumonia in this cohort and the evident role of recurrent wheezing as risk factor for pneumonia during the first year of life support the implementation or reinforcement of public policies encouraging exclusive breastfeeding and an adequate management of wheezing since the first months of life.

Key words: Birth-cohort. Breastfeeding. Developing-countries. Infants. Latin-America. Pneumonia. Wheezing.

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INTRODUCTION

Acute lower respiratory infection (ALRI) is one of the most common causes of morbidities and death among children¹. Rates of pneumonia vary with age and are higher in children less than 2 years old compared with older children^{2,3} and especially among the first six months of age⁴. Serious ALRI is more common and carries a higher mortality rate in children from developing populations than those in developed communities, e.g. specific mortality due to ALRI is

10 to 50 times higher in developing countries than in fully developed countries^{1,2,5-7}.

Cross sectional studies have identified several risk factors that increase the likelihood and severity of ALRI such as younger children^{5,7}, measles, malnutrition⁸, large families^{7,9} and environmental pollution^{10,11}. Data obtained from community-based longitudinal studies have identified that male gender, low socio-economic status, mother with limited years of school, exposure to indoor air pollution, low birth weight, immunization status, not exclusively breastfeeding, attendance in child-care facility, having one or more siblings and crowding as additional risk factors for ALRI^{3,12,13}.

Unfortunately, most community-based longitudinal studies have not focused on respiratory events occurring during the first year of life, when most of the morbidity and mortality due to ALRI occurs^{3,12,13}. Although thousands of infants under the age of 12 months die each year from pneumonia in Latin America^{1,14}, little is known regarding the true occurrence of pneumonia, wheezing and other related respiratory illnesses in this age group¹³. A recent report from Chile found a high prevalence of wheezing (80.3 %) during the first year of life¹⁵, in contrast to developed countries where the prevalence ranges from 10 % to 42 %¹⁶⁻²⁰. In the present study, we assessed the risk factors for radiologically confirmed pneumonia during the first year of life in a birth-cohort of infants from a low-income community in Santiago, Chile.

METHODS

This birth-cohort study was carried out in a low-income area in Santiago, Chile, where Hospital CRS El Pino is located, and where the vast majority of families earn the minimum salary (around USD \$250 per month) and the mean parental educational level is 8 or less school-years. The methodology of this birth-cohort was already published elsewhere¹⁵. Briefly, a random sample of 250 non-smokers mothers during their third trimester of pregnancy, monitored in the maternity outpatient clinic of El Pino Hospital were invited to participate in the study. Two hundred and twenty-five mothers accepted the invitation. From this group, only newborn babies who were 36 or more weeks of gestation and with a normal respiratory condition during the following 10 days after delivery, were considered eligible for entry into the study and were scheduled to their first study visit at 1 month of age. Two hundred and fifteen infants fulfilled the study inclusion criteria.

At the initial visit, demographic and environmental data were obtained and study visits were scheduled

every month for 12 months. During each scheduled visits, mothers were asked about their infants' health during the previous 4 weeks and a complete physical examination was performed by the study pediatrician. Infants were followed up at our outpatient clinic using an easy-access system that allowed their mothers to get direct contact with the study pediatricians and nurses in case of disease. Also, mothers were instructed and encouraged to bring their children to the outpatient clinic as soon as they started to have respiratory signs (e.g. sneezing, rhinorrhea, fever, cough, wheezing). Data regarding family history of atopy, breastfeeding, type of pregnancy and delivery, any illness occurred during the first year of follow up (i.e. viral upper respiratory infections or "colds" [URTI]-, acute bronchitis, pneumonia, acute otitis, wheezing episodes and eczema) were collected. Data on passive tobacco smoke exposure, crowding (defined as more than 3 persons over 2 years of age sharing the bedroom with the infant, or more than one familial group sharing the household), parental education level, mother's employment status, pets at home, source of heating and cooking (gas, kerosene, wood, charcoal) were also obtained. Unfortunately, due to economical reasons, no etiological determinations for respiratory illnesses (including pneumonia) or cotinine measures for passive tobacco smoke exposure were made.

Infants were classified as having had pneumonia if the study pediatricians specified this diagnosis on the study form (signs of classic bacterial pneumonia with: fever, cough, tachypnea, respiratory distress and crackles on chest auscultation) and there was a radiographic evidence compatible with this diagnosis. X-ray criteria considered compatible with the diagnosis of pneumonia were the presence of alveolar infiltrates or lobar consolidation. Chest X-rays were not required in the study, and were ordered for clinical reasons only. Children with pneumonia who did not require hospitalization were followed-up daily by the same pediatrician. Infants were divided between those who had pneumonia and those who did not have pneumonia during the first 12 months of life. The study was approved by the Hospital Ethics Committee and a written, signed and fully informed consent was obtained from parents.

Statistical analysis

The statistical analysis for differences between two groups (pneumonia or not) was done using Fisher and Chi-square test for categorical variables and Student t-test for continuous variables, respectively. A multivariate logistic regression model was per-

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