

Original Article

Prevalence of asthma symptoms and treatment of children and adolescents from 2 to 14 years of age in Porto Alegre, Rio Grande do Sul, Brazil*

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Background: In recent decades, the prevalence of asthma has increased.

Objectives: To determine the prevalence of asthma symptoms in children and adolescents from 2 to 14 years of age living in Porto Alegre (in the state of Rio Grande do Sul, Brazil) and to determine any potential correlations with socioeconomic profile, treatment and smoking in the home.

Methods: A transversal study based on interviews of all families seeking medical attention in June of 2000.

Results: The prevalence of asthma symptoms was 49.5%. In 66.8% of families, total income was less than four times the minimum wage, and in more than 50% of homes, the parents had had less than five years of schooling. In 98.5%, prophylactic asthma treatment was not used. In the 174 families studied, 38.7% of mothers and 43.7% of fathers were smokers (32.7% overall). Correlations were found between the following variables: exposure to smoking in the home and number of asthma attacks in the last year ($p = 0.02$; RR = 2.9; CI: 1.1 - 4.5); maternal level of education and number of attacks in the last year ($p = 0.03$; RR = 2.03; CI: 1.01 - 4.19); close living quarters and number of attacks in the last year among children exposed to second-hand smoke ($p = 0.04$; RR = 2.7; CI: 1.4 - 5.1); hospitalization and number of attacks in the last year ($p = 0.004$; RR = 1.46; CI: 1.15 - 1.86); hospitalization and close living quarters ($p = 0.03$; RR = 1.47; CI: 1.15 - 1.86). In children below the age of five, there was correlation between maternal smoking and number of attacks in the last year ($p = 0.03$; RR = 1.79; CI: 1.04 - 3.08).

Conclusion: The prevalence of asthma symptoms was high. The community studied has limited socioeconomic resources, and there is therefore a lack of adequate treatment for asthma. Our results demonstrate the need for prioritized, standardized treatment programs that would give healthcare workers access to the appropriate materials and means of evaluation necessary for asthma control.

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INTRODUCTION

Asthma affects a great many people and, in recent decades, its prevalence has increased by 50%, varying among countries and regions^(1,2). An international survey demonstrated a 21% prevalence of asthma symptoms among Brazilian adolescents in the 13 to 14 age bracket⁽³⁾. Asthma is responsible for approximately 2.2 million visits to the pediatrician annually and is the leading cause of school absenteeism and children hospitalization⁽⁴⁾. Asthma can also be fatal. Numerous studies refer to a tendency toward increasing asthma-related mortality worldwide. It is undeniable that asthma presents certain characteristics and criteria (magnitude, vulnerability and transcendence) that qualify it as a public health problem to be prioritized. In addition, improving asthma treatment demands a systematized organization of health care based on guidelines adapted to the reality of the treatment facilities^(5,6).

In view of the magnitude of morbidity from asthma⁽⁷⁾ the disease has been prioritized by the Integrated Management of Childhood Illness (IMCI), a program developed by the World Health Organization (WHO) and the Pan-American Health Organization (PAHO).

Asthma severity and the increasing percentage of extraneous conditions that may be conducive to the development of unfavorable evolution are important in the analysis of asthma-related mortality. In the 1960s there was a peak of asthma-related mortality in various locations, and a decrease from 1967 on. In the late 1970s, there were trends towards an increase again, demonstrating a probable new mortality peak in countries such as New Zealand, Australia, the USA, the United Kingdom and Canada^(8,9).

The data vary widely in Brazil, depending on the region analyzed. Oliveira demonstrated that there was a tendency toward an increase in asthma-related mortality in both the city and the state of São Paulo between 1976 and 1983⁽¹⁰⁾. Subsequently, however, in the state of São Paulo, this tendency reversed, and mortality rates decreased. In the period from 1980 to 1991, asthma mortality coefficients rose from 2.11 to 1.09/100,000 in all age groups and from 0.32 to 0.27/100,000 in the 5–34 age group⁽¹¹⁾. A study conducted in Rio Grande do Sul, however, demonstrated that the asthma-related mortality

rate in certain age brackets presented a definite increase between 1970 and 1991⁽¹²⁾.

Delayed initiation of treatment, caused by either patient misjudgment of the severity of the situation or by excess confidence in inhaled bronchodilators (to the detriment of the use of anti-inflammatories), has been implicated in the increased asthma-related mortality^(13,14). It has been speculated that the increase in mortality may be related solely to the increase in asthma prevalence.

The objectives of this study were to determine the prevalence of asthma symptoms in children and adolescents from 2 to 14 years of age living in a specific community in the city of Porto Alegre, in the state of Rio Grande do Sul, describe their socioeconomic profile and analyze the treatment received by this population. The proximal campus of the *Pontifícia Universidade Católica do Rio Grande do Sul* (PUCRS, Pontifical Catholic University of Rio Grande do Sul), where this assessment was carried out, is an area of extension of the university, created with the philosophy of providing a three-pronged primary health care curriculum consisting of teaching, training and research. Over the last ten years, the PUCRS has been the headquarters of the Center for Acute Respiratory Disease Training, in partnership with the WHO, the PAHO, the Ministry of Health and the Rio Grande do Sul State Department of Health.

METHODS

This was a transversal study that utilized the method recommended by PAHO/WHO in the January 2000 document "Operative Investigations of the Integrated Management of Prevalent Childhood Illnesses"⁽⁷⁾. The study design was approved by the Ethics and Research Committees of the PUCRS Saint Lucas Hospital and the PUCRS School of Medicine.

All families seeking medical attention of any type at the PUCRS during the period from June 1 to June 30, 2000 were interviewed. These families resided with the delimited area consisting of four census sectors and therefore had medical records on file at this health care center. Each interview was carried out only after written informed consent had been obtained. During the period studied, the PUCRS had 1560 family medical records on file. The *Instituto Brasileiro de Geografia e Estatística* (IBGE, Brazilian Institute of Geography and Statistics)

CHART 1

Instructions and recommendations (simplified) for the development of the study

Assessment of symptoms and treatment of asthmatic children and adolescents from 2 to 14 years of age seeking treatment at the PUCRS

1. With the patient interviewed:

- A. All families seeking treatment at the PUCRS from June 1 to June 30, 2000, regardless of the reason, will be interviewed. This is a study of treatment demand.
 - B. The interviewee must give written informed consent
 - C. Only families with medical records on file (i.e. residing in the delimited area served by this health care center) will be included in the study.
 - D. Each family will be interviewed only once. This will be verified according to the identification number of the family medical record, on two occasions in the same period, with the help of Raquel, the secretary.
2. Filling out the questionnaire:
- A. Families with no asthmatic children from 2 to 14 years of age fill out only the header
 - B. Families with children from 2 to 14 years of age presenting asthma symptoms must fill out the entire questionnaire.

estimated the population of the area at 5200, 1378 within the age bracket under study. The researchers referred to the medical records to obtain information regarding the educational level of parents and family income. They utilized a questionnaire recommended by the PAHO/WHO, changing the visual graphics of the presentation to make it more attractive and facilitate its application to the study. The questions presented in this instrument (available at www.jornaldepneumologia.com.br) referred to asthma symptoms or bronchial obstruction syndrome. The manual of instructions and the training were based on the previously mentioned PAHO/WHO document, respecting the peculiarities of the health care facility (Chart 1).

A pilot study, using the same method and also aimed at the statistical validation of the instrument, was carried from May 20 to May 30, 2000.

The interviews were carried out by a trained campus team, under the direct supervision of the researchers. The supervisors verified that each family was interviewed only once, using the registration number of each family medical record as a means of control/tracking.

All individuals seeking medical attention at the PUCRS, regardless of the reason, during the study period were eligible for inclusion. However, those with no family record on file, and therefore not residents of the described area, were excluded.

The variables investigated were the prevalence of asthma symptoms, the treatment given, the number and the causes of hospital admissions, close living quarters as defined by the WHO (one to three people or more than three people per bedroom), the socioeconomic profile and smoking in the home.

The age bracket "below 5 years of age" was considered separately because the IMCI is a strategy that aims to reduce morbidity and mortality in this age group. Various guidelines also recommend that special attention be given to this age group.

Data analysis was carried out through descriptive statistics (frequencies and percentages), and a nonparametric test (chi-square) was utilized to study the correlations among these variables. The level of significance was fixed at 5%.

RESULTS

A total of 378 families were interviewed. In this survey, 244 families had children within the age group studied, and 174 of those had at least one child with asthma symptoms. These 244 families had a total of 556 children within the age bracket studied, 275 of whom presented asthma symptoms. These 556 children represented 40.3% of the 2- to 14-year-old population as estimated by the IBGE in the 1996 recount of the four census sectors. The prevalence of asthma symptoms in the sample was 49.5% (Chart 2).

CHART 2

Prevalence of asthma symptoms asthmatic children and adolescents from 2 to 14 years of age and belonging to the families interviewed

| | |
|---|-------|
| Number of children and adolescents from 2 to 14 years of age belonging to the families interviewed | 556 |
| Number of children and adolescents from 2 to 14 years of age belonging to the families interviewed and presenting asthma symptoms | 275 |
| Prevalence of asthma symptoms in children and adolescents from 2 to 14 years of age belonging to the families interviewed | 49.5% |

Of the 244 families with children within the age bracket studied, 66.8% had a family income of less than four times the minimum wage. Of the 174 families with children presenting asthma symptoms, 69% had a family income of less than four times the minimum wage.

Of these 244 families, 52% of the mothers and 51.6% of the fathers had less than five years of schooling. In the group of the children with asthma symptoms, 61.7% of the mothers and 60% of the fathers had less than five years of schooling, 7.7% of the mothers and 8% of the fathers were illiterate, and only 5% of the women and 7% of the men had over eight years of schooling.

During the last year, 182 children had had wheezing crises and 133 (48.3%) had been hospitalized at least once with respiratory disease. According to the terms used by the mothers or their legal guardians, bronchitis, asthma and asthmatic bronchitis accounted for 77.4% of hospital admissions.

A total of 98.5% of the patients received no treatment between asthma attacks, and 1.5% used drugs not recommended by the guidelines for asthma management (Figure 1).

In the 174 families whose children presented asthma symptoms, 38.7% of mothers and 43.7% of fathers were smokers. In 14.5% of the families, there was another household member who smoked (Figure 2). Among mothers, 46.5% had been smoking for 14 years or more, compared to 57.9% of the fathers. Among smokers who were parents of children under the age of 5, 89.3% of fathers and 84.5% of mothers had been smoking for over 60 months. Among smokers who were parents of children aged 5 and older, 82.7% of fathers and 69% of mothers smoked ten or more cigarettes a day, compared with 76.5% and 77.8%, respectively, among those who were parents of children under the age of 5.

Of the (275) children presenting asthma symptoms, 37% slept with less than three people in the room, whereas 63% slept with three or more people in the room. Among children aged 5 and older, 65.3% were living in close quarters as defined by the WHO, compared to 70.2% of children below the age of 5.

Tables 1, 2 and 3 show the correlations among the variables considered.

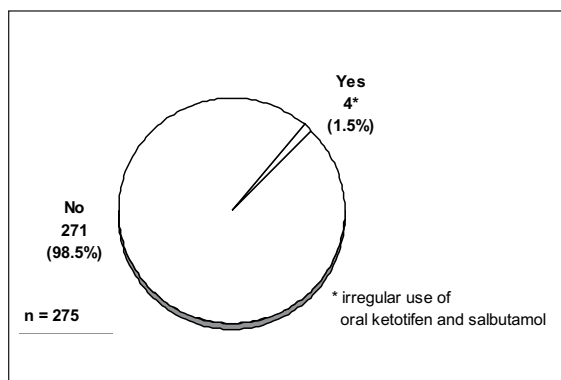


Figure 1 - Preventive treatment (between attacks) in children and adolescents presenting asthma symptoms

DISCUSSION

This study demonstrated a high prevalence of asthma symptoms in children and adolescents from 2 to 14 years of age, belonging to families who sought medical treatment at the PUCRS (49.5%). Nearly two-thirds of the families interviewed had at least one child with asthma symptoms within the age group studied. This elevated prevalence, together

TABLE 1

Correlations among variables in children and adolescents presenting asthma symptoms

| Correlated variables | p | RR | 95% CI | n |
|--|-------|------|------------|-----|
| Exposure to smoking* vs. no. of attacks in the last year** | 0.02 | 2.9 | 1.1 – 4.5 | 165 |
| Maternal education*** vs. no. of attacks in the last year | 0.03 | 2.03 | 1.01– 4.19 | 125 |
| Close living quarters vs. no. of attacks in the last year (among children exposed to smoking) | 0.04 | 2.67 | 1.4 – 5.1 | 125 |
| Hospitalization vs. close living quarters | 0.03 | 1.47 | 1.02–2.13 | 272 |
| Hospitalization vs. no. of attacks in the last year | 0.004 | 1.46 | 1.15–1.86 | 272 |

*father and mother are smokers, there are smokers in the home during all periods of the day; there are smokers in the home in one or two periods

**less than two attacks; two or more attacks

***less than five years of schooling; five or more years of schooling

RR: relative risk; 95% CI: 95% confidence interval

with the lack of programs designed to confront and control this disease and its risk factors, such as smoking in the home, justifies the concern over the magnitude of this complaint, which is even more damaging under conditions of poverty and low levels of education, as is the case in this community.

These patients tend to seek access to treatment at a specific point in time (when experiencing an attack), and there is no established comprehensive program that provides follow-up treatment for these patients, furnishing the medication of their choice and establishing an educational process for the family. The socioeconomic and cultural conditions deprive these patients of access to the therapeutic arsenal currently available to patients belonging to the more privileged classes. This discrimination goes against the constitutional principle of equity.

Demand for treatment at the PUCRS in June 2000 was used with the intention of identifying possible failures in the healthcare system treatment offered to the population. Since all the people who had sought treatment, regardless of the reason, were interviewed, the seasonality bias was ruled out.

The presupposition that patients who seek treatment at health care centers are those who are of higher socioeconomic and cultural status was not confirmed, since the entire community was equally disadvantaged, presenting very low family incomes and educational levels. The treatment offered by the PUCRS fulfills the requirements of the fundamental principle of accessibility in primary health care. This might be related to the fact that residents have enjoyed easy geographic access and availability of health care for the last 20 years, as well as to the use of family medical records, which addresses the question of longitudinality and integration, including time and affiliation.

Of the 275 children with asthma symptoms studied, 133 (48.3%) had been hospitalized at least once. The high number of hospital admissions probably reflects the lack of standardized asthma treatment in this community, a situation that puts children at risk.

Taken together, the high prevalence of asthma symptoms, high number of hospital admissions, low levels of education and income, environmental aspects (close living quarters), life habits (smoking parents) and use of medication restricted to asthma attacks, creates a certain profile of this group, demonstrating that asthma is not yet considered a priority by professionals working in health care facilities, who do

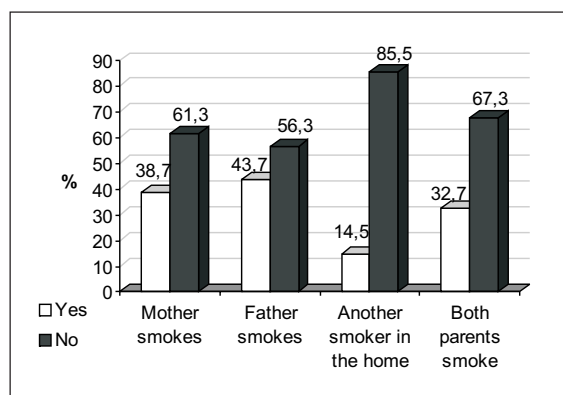


Figure 2 - Smoking habits in the 174 families of children and adolescents presenting asthma symptoms

TABLE 2
 Correlations among variables in children and adolescents five years of age or older and presenting asthma symptoms

| Correlated variables | <i>p</i> | RR | 95% CI | <i>n</i> |
|--|----------|------|-------------|----------|
| Exposure to smoking* vs. no. of attacks in the last year | 0.9 | 1.01 | 0.5– 2.0 | 133 |
| Maternal education vs. no. of attacks in the last year | 0.6 | 1.17 | 0.5 – 2.5 | 107 |
| Close living quarters vs. no. of attacks in the last year | 0.6 | 1.21 | 0.65 – 2.25 | 170 |
| Close living quarters vs. no. of attacks in the last year (among children exposed to smoking) | 0.1 | 2.74 | 0.77– 9.73 | 130 |
| Hospitalization vs. close living quarters | 0.04 | 1.36 | 1.10–1.68 | 170 |
| Hospitalization vs. no. of attacks in the last year | 0.87 | 1.05 | 0.6–1.84 | 173 |
| Maternal smoking vs. no. of attacks in the last year | 0.78 | 1.17 | 0.37– 3.7 | 58 |

RR: relative risk; 95% CI: 95% confidence interval

not recognize it as a severe chronic disease that requires continuous treatment, follow-up assessment. There is also little awareness of the need for an appropriate educational process, capable of transforming attitudes, habits and perceptions regarding this disease.

Lloyd *et al.*⁽¹⁵⁾ demonstrated that professionals still use various combinations of criteria and symptoms in the diagnostic characterization of asthma, a practice that may occasionally lead to delayed initiation of an effective and efficient treatment plan. The heterogeneity of the diagnostic process has often prevented professionals and families from providing early treatment for the disease, resulting in more problematic control, as well as injury to the respiratory system. In addition, studies such as that carried out by Erzen *et al.*⁽¹⁶⁾ have shown that patients of low socioeconomic status and educational level have less access to early diagnosis and treatment.

The guidelines establish norms and standardize asthma management through resources such as proper treatment of attacks, continued use of medication and education toward health⁽¹⁷⁾. In our study, it was evident that, within this population group, these objectives have not yet been achieved,

since only 1.5% of the patients sought treatment in the period between attacks, and then inconsistently, without significant difference between the two age brackets studied.

The lack of access to these resources comes from the fact that these health care facilities lack a fully funded, prioritized treatment protocol that is realistic and includes training, monitoring and supervision of the health care teams. The children and adolescents in our study group were only treated during asthma attacks and with limited resources.

In the homes of the asthmatic children, over one-third of the mothers and nearly half of the fathers were smokers. In some homes, there was even a third smoker. It has been previously demonstrated that passive smoking in the home is a significant risk factor for developing asthma symptoms and for increasing the severity of existing asthma symptoms in children^(18,19).

A strong correlation ($p = 0.02$) was found between exposure to smoking and asthma attacks during the last year. When the father, the mother or both were smokers and were present in the home for two periods of the day or more, the chance that

TABLE 3

Correlations among variables in children less than five years of age and presenting asthma symptoms

| Correlated variables | <i>p</i> | RR | 95% CI | <i>n</i> |
|--|----------|------|-------------|----------|
| Exposure to smoking* vs. no. of attacks in the last year** | 0.02 | 1.87 | 1.11 – 3.13 | 104 |
| Hospitalization vs. no. of attacks in the last year | 0.000 | 3.0 | 1.56 – 5.77 | 104 |
| Exposure to smoking mother vs. no. of attacks in the last year | 0.03 | 1.79 | 1.04 – 3.08 | 103 |

*father and mother are smokers, there are smokers in the home during all periods of the day; there are smokers in the home in one or two periods

**less than two attacks; two or more attacks

RR: relative risk; 95% CI: 95% confidence interval

their children had had more than two attacks during the last year was three times higher. To better characterize the level of exposure, this variable was established based on the length of stay of the smoker in the home because, in the present situation, in which there are high levels of unemployment and work in the informal market, the presence of the father, the mother, or both, in the home varies considerably. Since the age bracket studied was from 2 to 14, and 46.5% of the mothers and 57.9% of the fathers had been smoking for 14 years or more, these parents were already smokers before the birth of their now asthmatic children.

The smoking histories of the parents lead us to reflect upon questions related to the different stages of growth, from intrauterine life, in which children are susceptible to passive smoking, with lifelong consequences for their health⁽²⁰⁾.

A smoking father or mother was present in almost half of the homes where there were asthmatic children below the age of 5, and 80% of those smokers had been smoking for five years or more. In the reality of this community where there isn't Due to the insufficient number of daycare centers in this community, preschool-age children are restricted to the home and therefore more exposed to environmental contamination.

In children below the age of five, there was also a correlation between exposure to smoke and number of asthma attacks during the last year, the risk of which was almost doubled. Hospital admission was also correlated with more asthma attacks within the last year. In this same age group, the mere presence of a smoking mother correlated with more asthma attacks.

Regarding the WHO concept of close living quarters, it was determined that this variable correlated with a history of hospitalization.

We also found a correlation between exposure to smoking in the home during two or more periods of the day and a history of more than two attacks during the last year. However, when this relationship was analyzed regarding close living quarters, it was observed that when there were three or more people in the bedroom with the child the correlation between periods and attacks persisted, whereas when there were less than three people in the bedroom with the child this correlation was not observed.

Considering the socioeconomic and migration situation in this community, in which 63.2% of people live in close quarters, we are confronted with

a reality that is very difficult to change, i.e. it is not possible to make any specific intervention in health regarding this variable, at least not in the short- or medium-term. Such an intervention would have to be carried out on another level. At the present moment, in this community, there is no proposal for enlarging the homes, which would relieve these children of the burden and risk of living in these close quarters. Therefore, the only feasible course of action at the moment is to improve the quality of the treatment available. The establishment of an assertive and consequently effective program that prioritizes health needs has to be made part of the IMCI strategy and adapted to the current situation of morbidity and mortality in this community.

The team that treats the children and adolescents of this community is composed of professionals who have mastered the use of the entire spectrum of asthma treatment modalities. Feelings of indignation related to the inequity and social injustice of the limited access these asthma patients have to a first-class treatment is part of everyday life for the members of this team. Their experiences inspire them to transform this indignation into action by implementing specific measures, already in place in some sectors, creating a unified collective proposal based on multidisciplinary action and focusing on the treatment of asthma.

Collectively, the data presented here reveal that the level of asthma control in this community falls far short of the recommended goals. Asthma is a disease that, although highly prevalent and treatable, is still excluded from standardized health facility programs.

In other programs, such as that for diarrhea and the establishment of the practice of oral rehydration therapy, health care professionals did not wait for structural and situational changes to save lives. In dealing with asthma, it is also mandatory that those who plan and manage health care decide to accept the challenge of holistic treatment, without delayed diagnosis, providing first class medication accessible to the population and administered by sensitive and qualified professionals, accompanied by greater investment in health education^(21,22).

This will require a financial investment that is certainly much smaller than the cost of hospitalizing asthmatic children, not to mean the immeasurable social and economic costs of school absenteeism and working days missed by the parents. In the long run, this investment will also be smaller than the resources needed to treat the sequelae of severe

pulmonary lesions when these children reach adulthood.

In conclusion, the high prevalence of asthma in this group of patients, together with the inherent risks of their impoverished situation, limited schooling of the parents, smoking in the home and close living quarters, makes this situation very difficult to resolve. This will only be accomplished when a treatment program specifically targeted at these children and adolescents, featuring a unified spectrum of health care with guaranteed funding and resources, is established.

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