Clinical profile in children under five year old with acute respiratory tract infections

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Abstract

Objective: to describe the clinical and epidemiological profile of acute respiratory infections (ARI) in children younger than five years old, of both sexes, diagnosed at the University Hospital Júlio Müller.

Methods: this is a descriptive and cross sectional study. A standard questionnaire was answered by the children’s parents, during the period of October/1996 to February/1997. The cases were classified according to the Health Ministry criteria in Upper Airway Infection (UAI) or Acute Lower Respiratory Infection (ALRI). The following data were analyzed: signs and symptoms, clinical diagnosis, socioeconomic variables, nutritional appraisal and passive smoking. The data were analyzed with EPI-Info 6.02b program. The \( \chi^2 \) test was used with confidence interval of 95% (\( \alpha = 5\% \)).

Results: the ARI prevalence in children under five years was 25.6%. From the total number of 491 children, 76.4% (n=375) had UAI and 23.6% (n=116) ALRI. The most frequent diagnosis was nasopharyngitis. The most frequent respiratory symptoms were nasal discharge (82.1%) and cough (80.4%). Around 6.1% of the total number of the cases were due to pneumonia (77.7% of the cases involving hospitalization). There were no associations of ARI with children s nutritional status, family income or passive smoking. There was statistical association between maternal educational status and ALRI (\( \chi^2 = 16.57 \)).

Conclusions: the findings show that most of the children presented nasopharyngitis (UAI), being most of them male. Pneumonia (ALRI) was the main cause of hospitalization. The most common symptoms were nasal discharge and cough. Besides, the most important risk factor associated was the mother’s educational status.


Introduction

Acute respiratory infections (ARI) are recognized as one of the main causes of morbidity and mortality at all ages, particularly in childhood. ARI morbidity is similar in developed and developing countries. However, in developing countries, mortality rates are up to 30 times higher (or more). The high morbidity rate makes ARI the main cause for the utilization of health services, representing in the entire world 20-40% of the appointments at pediatric services and 12-35% of the hospitalizations. According to data provided by OPAS/OMS, pneumonias are responsible for 20-40% of the admissions of children under the age of 5 in developing countries. In urban areas, estimates show that each children present 5-8 ARI episodes/year in their first 5 years of life; in rural areas, children have 1-4 ARI episodes/year.
Studies have shown the importance of education factors for ARI morbimortality, such as family size, education level, and density of dwellers in the residence.\textsuperscript{9,11} We should emphasize the degree of maternal education as a social factor related to the infants’ survival, since the reports point out that the lower the education level is, the higher are the ARI rates and seriousness.\textsuperscript{12-14}

Despite the knowledge about the child’s malnutrition, available data on its association with ARI are scarce. It is known that the lack of essential nutrients interferes with the development of humoral and cellular organic defense systems. Thus, though the incidence of ARI is globally similar, the difference is that infections of the inferior airways, especially pneumonia, are more frequent and severe in developing countries due to several factors, especially malnutrition.\textsuperscript{15,16} Smoking is still a serious public health problem, being particularly significant in childhood, since respiratory problems in children (mainly infants) who are passive smokers are more severe and often require hospitalization.\textsuperscript{17-20}

The study of ARI in public services is justified by the difficulty in optimizing the structure of public health services for this kind of medical assistance. This difficulty in solving health problems ends up with an unsatisfactory involvement between health service agents and relatives. This leads to the negligence of basic orientations, since the natural evolution of most ARI cases is not complicated. This contributes to the misuse of drugs, and to the same child going to different health service offices, which deviates from the objectives of the ARI Program, commended by the Brazilian Ministry of Health.\textsuperscript{21}

Since ARI is the cause for great part of ambulatory assistance, we aim at studying these children’s clinical profile and their association with the following risk factors: nutritional status, smoking, and maternal education.

**Patients and methods**

A descriptive, transversal study carried out at the Hospital Universitário Júlio Müller from October 1996 to February 1997. Every child below the age of 5, both sexes, assisted at the Emergency Pediatrics Assistance and diagnosed with ARI.

The criteria for the definition of ARI cases were those children assisted by the Program of Assistance and Control of ARI, of the Brazilian Ministry of Health.\textsuperscript{21} They were divided into two groups, according to the anatomic pattern of the airways, with the epiglottis as the limit. Thus, every clinical syndrome located above the epiglottis constituted the group denominated infection of the superior airways (ISA), and those located below the epiglottis formed the group infection of the inferior airways (IIA).

We used a standard questionnaire for the collection of data with questions to be answered by the parents or by those responsible for the children. A 2-week pretest was taken. The Ethic Committee at Hospital Universitário Júlio Müller approved this survey.

The following data were analyzed in this study:

1. **Parents’ education:** a) Illiterate; b) Incomplete primary school; c) Incomplete high-school; d) Complete high-school;
2. **Per capita income,** calculated on the sum of all wages received by the family members, divided by the number of people who lived in the same house. Minimum wage at the period: R$112.00 (a hundred and twelve reais);
3. **Passive smoking:** every child who lived with smokers was included in this situation. We quantified the smoking load, considering, on average, the number of cigarettes smoked a day, whether or not they smoked near the child, where inside the house they smoked, and if the mother smoked during pregnancy;
4. **Nutrition:** the rates of weight/age were calculated to evaluate the nutritional status, with the following classification: normal, malnourished at 1st (light), 2nd (moderate) and 3rd (serious) degrees (according to Gomez);
5. **Clinics:** we considered signs and symptoms commended by the Program of Assistance and Control of ARI, of the Brazilian Ministry of Health (1994). Besides these, we also included fever, and, in the category of other symptoms, diarrhea, vomits, irritability, and anorexia, which are not specific, but which usually accompany ARI, especially in infants.

In the statistical analysis, we used the chi-square test, with a 95% CI and a=5%. Fisher’s exact test was used for the correlation between nutritional status and ARI.

**Results**

From October 1996 to February 1997, 3,197 children were assisted at the Emergency Pediatrics Assistance, Hospital Universitário Júlio Müller, out of which 723 presented ARI diagnosis, and 551 (76.2%) were below the age of 5. Out of the 551 children with ARI diagnosis and age below 5 years of age, 60 (10.9%) were excluded because their parents did not agree with the interview. So, 491 children were selected for this study.

The analysis of the 491 children diagnosed with ARI showed a slight predominance of male babies affected (1F:1.2M), and, according to the anatomic region, we verified that 375 (76.4%) presented ISA, and 116 (23.6%) presented IIA. In the distribution of the frequency of clinical diagnoses in relation to the total number of ARI cases, rhinopharyngitis was the most frequent one, with 252 (51.3%) cases (Table 1).

The main related symptoms are shown in Figure 1. There was breathing difficulty (tachypnea, retraction) in 20.4% of ARI cases. In the 491 children diagnosed with ARI, we verified that these symptoms were more frequent.
in children with pneumonia (n=30): 19 (63.3%) presented tachypnea, and 15 (50.0%) presented retraction or indrawing.

Concerning the 491 children with ARI, 459 (93.5%) had already used some sort of drug when they went to the Emergency Pediatrics Assistance at Hospital Universitário Júlio Müller by the time of their medical appointment. Regarding the drugs previously used by these children during the ARI episode, antipyretics (74.9%), anti-inflammatories (19.3%), nasal drops (15.1%), and antitussives (13.6%) were the most frequent. The per capita income varied from 0.1 to 7.1 minimum wages (MW), with half of the families (318-64.9%) living with less than 0.1 MW of per capita income. In relation to the living conditions, 83.7% had brick-made houses, with 65% of these having four or more rooms, with a three people/room ratio. When we analyzed the occurrence of ARI and the relation between the distribution of ISA and IIA cases and the level of maternal education, we could verify that the lower the education level was, the higher the proportion of IIA was, and this difference is statistically significant (Table 2).

According to Gomez’s criteria, 126 (26.5%) children presented 1st-degree or slight malnutrition, 20 (4.1%) presented 2nd-degree or moderate malnutrition, and four (0.8%) presented 3rd-degree or serious malnutrition. In a group of 491 children diagnosed with ARI, 135 presented some level of malnutrition.

Regarding those children classified as malnourished, 11/135 (8.1%) were diagnosed with pneumonia, which is a slightly higher frequency than that found in children diagnosed with ARI and classified as eutrophic (5.3%, n=191/356). This difference was not statistically significant (P=0.29) (Fisher’s non-parametric exact test).

Rhinopharyngitis was more prevalent among children who were classified as eutrophic (39%, n=191/356) than in children with malnutrition (12%, n=61/135). This difference, though, was not statistically significant (P=0.1, Fisher’s exact test).

In the group of 491 children diagnosed with ARI, domestic smoking was acknowledged by 270 (55%) of the interviewees. In a group of 270 children considered as passive smokers, the active smoker was the mother in 77 cases (15.7%), the father in 145 cases (29.5%), or other people who lived with the child. In 33 cases, both the mother and the father were smokers, and lived in the same house.

Table 1 - Distribution of clinical diagnoses according to age group in 491 children diagnosed with ARI at Hospital Universitário Júlio Müller, Brazil

<table>
<thead>
<tr>
<th>Diagnosis</th>
<th>Age group (in years)</th>
<th>Total (n=491)</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>&lt;1 (n=235)</td>
<td>1-5 (n=256)</td>
</tr>
<tr>
<td>ISA</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Rhinopharyngitis</td>
<td>136 51%</td>
<td>56 22.2%</td>
</tr>
<tr>
<td>Acute media otitis</td>
<td>32 38%</td>
<td>26 31%</td>
</tr>
<tr>
<td>Tonsillitis</td>
<td>4 10.3%</td>
<td>7 17.9%</td>
</tr>
<tr>
<td>IIA</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Laryngotraceobronchitis</td>
<td>40 54.1%</td>
<td>16 21.6%</td>
</tr>
<tr>
<td>Bronchiolitis</td>
<td>12 100%</td>
<td>00 00%</td>
</tr>
<tr>
<td>Pneumonia</td>
<td>11 36.7%</td>
<td>10 33.3%</td>
</tr>
</tbody>
</table>

ISA: χ² = 46.24, p<0.005, g.l.=4
IIA: χ² = 13.72, p<0.05, g.l.=4
Discussion

The prevalence of ARI was 25.6%, a frequency that is similar to that found in other studies. Monteiro et al.,23 in São Paulo/SP, found ARI in 29% of the 1,016 children assisted in a period of 10 months. In Belo Horizonte/BH, Santana et al.,24 out of a total of 1,058 children seen from November to December 1984, found a prevalence of 22.7% of ARI in children below the age of 4 years. Other studies show even more elevated ARI rates, like the study carried out in São Paulo, at Pronto Socorro Infantil da Santa Casa de Misericórdia, where Ribeiro et al.25 found a proportion of 41.8% of ARI, data that were ratified by the multicentric work carried out in São Paulo by the same authors,26 which presented variations of 16.43%-59.19% for ARI.

The ARI nosological profile is, most of times, composed of a benign status, with positive outcomes. We verified in this study that the ISA episodes corresponded to 76.4% of the cases, and that only 23.6% of them are IIA cases; these rates are similar to those reported in previous studies.23,27,28 Concerning the in-patients, pneumonia was the most common diagnosis, causing 77.8% of the hospitalizations. In this group, two children died. These data are similar to those reported by Ramos et al.,29 who had pneumonia as the cause of 66.4% of hospitalizations due to ARI in children below the age of 5 in Mexico City.

Regarding the distribution of frequency of the clinical diagnoses, we concluded that rhinopharyngitis was the cause for half (51.3%) of the cases, followed by otitis media (17.1%). Similar data were found by Castro,30 using information from the Secretaria de Saúde e Meio Ambiente do Rio Grande do Sul (SSMA/RS) from July 1983 to June 1984. The importance of rhinopharyngitis for pediatrics practice is reflected here, since, besides the individual suffering that it brings, we also have to deal with its high frequency and the complications that may arise from it: acute otitis media, sinusitis, tonsillitis, and pneumonia.16

Concerning the symptoms presented by the evaluated children, those that indicated benignity were more frequently identified; this information is similar to that reported by Cunha.31 These findings confirmed that ARI presents a benign clinical status, mainly in the initial phases of the process.

The presence of symptoms such as difficulty to breath (tachypnea and retraction), regardless of the smaller percentage, is an important factor for the early detection of pneumonia cases. These signs were adopted by OMS32 as the best and most probable indicators of the need for antibiotics, based on studies by Shann et al.,33 in Papua New Guinea, with tachypnea above 40 t.r.p.m. as the earliest sign, and intercostal recession as an indicator of severity.

Most of the children (93.5%) had already undergone some sort of treatment, and antipyretics (74.9%) were the most widely used. A study on the use of drugs in a nursery school in São Paulo shows that 93% of the drugs were reserved for the ARI treatment, with the misuse of almost half of them.34

Results showed that 17.3% of the children lived in families with a per capita income of < 0.5% minimum wage. On the other hand, the lowest degree of maternal education was associated with a higher prevalence of ARI, in a general way, and with the most serious cases, like those presenting IIA. This information reinforces the urgent need for health education, for this is the corner stone of the whole process involved with ARI complications.

Analyzing the education of the parents of those children hospitalized with ARI in Mexico, we found that 40% of the mothers and 42% of the fathers had an education level equivalent to incomplete primary school.29 Other studies confirmed this tendency: Monteiro et al.35 concluded that, for children below the age of 5 in São Paulo, 68% of the parents had only completed primary school. Sutmoller et al.11 showed, in two communities in Rio de Janeiro, that 44% and 66% of these children’s mothers had only managed to complete the primary school.
Using Gomez’s criteria, 29.6% of the children presented some degree of malnutrition. However, we could not find any statistically significant association between ARI and their nutritional status. Monteiro et al. and Gugelmin et al. observed similar percentage values.

In a study about ARI in Rio de Janeiro, malnutrition was verified to be associated with an increased risk for developing ARI (RR=1.30), and not with an increased risk for IIA. In the same way, Sampaio et al. in a study about ISA and its predisposing factors, could not find out whether or not malnutrition influenced the severity of ARI. This study delineation did not allow us to calculate the relative risk, because the sample was constituted of ARI cases only.

Another important risk factor to be studied is passive smoking. In this study, we verified that more than half (55%) of the children with ARI were passive smokers. Despite these findings, we could not establish a direct relation between the environmental pollution caused by the tobacco smoke and the distribution of ARI. With this elevate rate of children living with and suffering aggressions caused by the cigarette components, some form of associative factor would be expected, but this did not happen.

Possibly the outline of this study had a partial influence on the results; these results conflict with other reports found in literature, which emphatically show the action of home smoking on ARI. The fact that the active smoker is mainly the father (53.7%), in relation to the mother (28.5%) and other relatives (30%), may also have influenced the results presented here.

If we were to study these children’s evolution prospectively, in relation to possible complications, period of the disease, use of drugs, need for hospitalization, and time spent by the parents smoking near the child, the association between these variables and passive smoking would possibly be positive. Darmhage et al. studying risk factors for ARI, found little association between paternal smoking and risk. This risk tended to be higher when the mother or other people (like the grandparents) smoked, reinforcing once again the importance of a prolonged exposition to tobacco, which was not measured in this study.

Finally, we must stress that, despite this study was developed in an emergency assistance structure, with restricted schedule and sample (taken from the population who looked for assistance only), and relatively short period of time, the results were similar to those described in literature, with an expressive prevalence found in children below 5 years of age, and predominance of infections of the superior airways.

From the results obtained, we concluded that most of the children observed were diagnosed with ISA, being rhinopharyngitis the most frequent diagnosis for all age groups. Cough and coryza were the most common signs and symptoms. There was a predominance of male patients. We could not find any association of ARI with malnutrition or passive smoking, though there are reports in literature about the role of these risk factors for the development of ARI in children. The fact that maternal education presented a significant association with IIA diagnosis suggests that the improvement of maternal education may contribute for the reduction of infant morbidity and mortality rates.

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