Temporal Distribution of Clinical Bronchiolitis in the Jerusalem Area – a Preliminary Report

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Abstract

Objective: Bronchiolitis is a clinical syndrome with a seasonal distribution that varies by location. Data regarding its temporal distribution in Israel are limited, and there are no available data specifically for the Jerusalem area. The aim of this study was to investigate the temporal distribution of cases of bronchiolitis that were clinically diagnosed in a system of urgent-care centers based in and around Jerusalem over eight winters.
Methods: A unified database of five urgent-care clinics was queried for the total monthly visits of children aged less than age 2 years with a discharge diagnosis of bronchiolitis, from January 1, 2002 to February 13, 2009. The database was also queried for total monthly visits of all children aged less than 2 years in order to calculate the percentage of patients presenting with bronchiolitis. The frequency distribution was plotted in graph form against months of the years 2002 to early 2009.
Results: There was a recurring peak in clinical diagnoses of bronchiolitis in December and January for every year evaluated.
Conclusions: Clinical bronchiolitis in the Jerusalem area appears to have a consistent annual peak in December and January. This finding is markedly different from many other reported incidence peaks. Confirmatory virologic studies are needed to determine if the clinical presentation of bronchiolitis in the community reflects the true temporal incidence of the disease.

MeSH words: Bronchiolitis, epidemiology, respiratory tract diseases, viral diseases

Case

Bronchiolitis is a clinical syndrome of respiratory symptoms that presents in children aged less than 2 years. It accounts for a significant proportion of all respiratory illness in both hospital and outpatient settings [1]. Symptoms include rhinitis, wheezing, and cough and may be accompanied by signs of respiratory distress such as tachypnea, use of accessory muscles, and/or nasal flaring. According to the evidence-based review of the American Academy of Pediatrics Committee on Infectious Diseases, most clinicians recognize bronchiolitis "as a constellation of clinical symptoms and signs, including a viral upper respiratory prodrome followed by increased respiratory effort and wheezing " [2]. The disease can be caused by a number of viruses, especially respiratory syncytial virus (RSV). Bronchiolitis is known to have a seasonal distribution, but it varies worldwide [3]. Knowledge of its

seasonality in particular areas acquired clinical importance with the introduction of palivizumab, a monoclonal antibody directed against the F glycoprotein on the surface of RSV, for prophylactic use in high-risk infants during peak periods.

Studies in the United States have shown that the incidence of bronchiolitis increases around October in the south, and later in the year, in late November to December, in other parts of the country [4]. In Switzerland [5] and Finland [6], there is a fixed alternation between minor and major epidemics. Researchers in southern Germany noted a regular biennial rhythm that oscillates in an anti-phase pattern with RSV epidemics in Finland and Sweden [7].

In Israel, only two studies of the temporal occurrence of bronchiolitis have been published to date. The first, conducted in 1993 in hospitalized children in the southern part of the country [8], reported a peak incidence in January and early February. The second, in 2005, analyzed pediatric intensive care unit admissions for bronchiolitis throughout Israel for one year [9] and found a broad temporal range, stretching from November to April.

The aim of the present study was to investigate the temporal distribution of cases of bronchiolitis that were clinically diagnosed in a system of urgent-care centers based in and around Jerusalem.

Methods

Setting

The study was performed in a system of urgent-care centers located in and around Jerusalem, Israel, in which children account for 40% of all patient visits.

Data Source

The system of clinics uses a proprietary electronic medical record system, and a unified data warehouse houses the combined data.

Procedure

The database was queried for the total monthly visits of children aged less than 2 years with a discharge diagnosis of bronchiolitis, from January 1, 2002 to February 13, 2009. The data warehouse was also queried for total monthly visits of all children aged less than 2 years in order to calculate the percentage of patients presenting with bronchiolitis. The frequency distribution was plotted in graph form against months of the years evaluated.

Results

There was a recurring peak in the clinical diagnoses of bronchiolitis in December and January for every year from 2002 to 2008/9. During this 2-month period, bronchiolitis was clinically diagnosed in 1.7% of all visits of 2-year-olds in 2002, 2.1% of all visits of 2-year-olds in 2002-3, 3.5% in 2003-4, 5.2% in 2004-5, 8.4% in 2005-6, 8.8% in 2006-7, 8.6% in 2007-8, and 7.8% in 2008-9. This peak was markedly different from the incidence peaks for bronchiolitis reported in the literature [3-8]. (See Fig. 1)

Discussion

To our knowledge, the sharp December/January peak noted here in clinical cases of bronchiolitis in the Jerusalem area has not been reported previously. Given that this system of urgent-care clinics manages approximately 40% of all urgent/emergent medical conditions in the population of Jerusalem and surrounding areas, it is well placed geographically to capture the local clinical data.

From the winter of 2005/6 on, bronchiolitis accounted for 8-9% of all pediatric visits to the clinics, whereas the range in 2002-2004 was considerably lower (1.7%-5.2%). This difference might be explained by the use of a different data collection program during the earlier years. Nevertheless, since the temporal pattern of an incidence peak in December and January was true for each year examined throughout the study period, we believe the older data (2002-2004) are consistent with the more recent data (2005-2008) in identifying the bronchiolitis season in Jerusalem. Alternatively, the increase in the percentage of cases after 2004 may reflect a true growth in the incidence of the disease. This possibility is supported by the steady increase in the rate of bronchiolits relative to all otherreasons for clinic visits almost from year to year. Further studies are needed to clarify this issue.

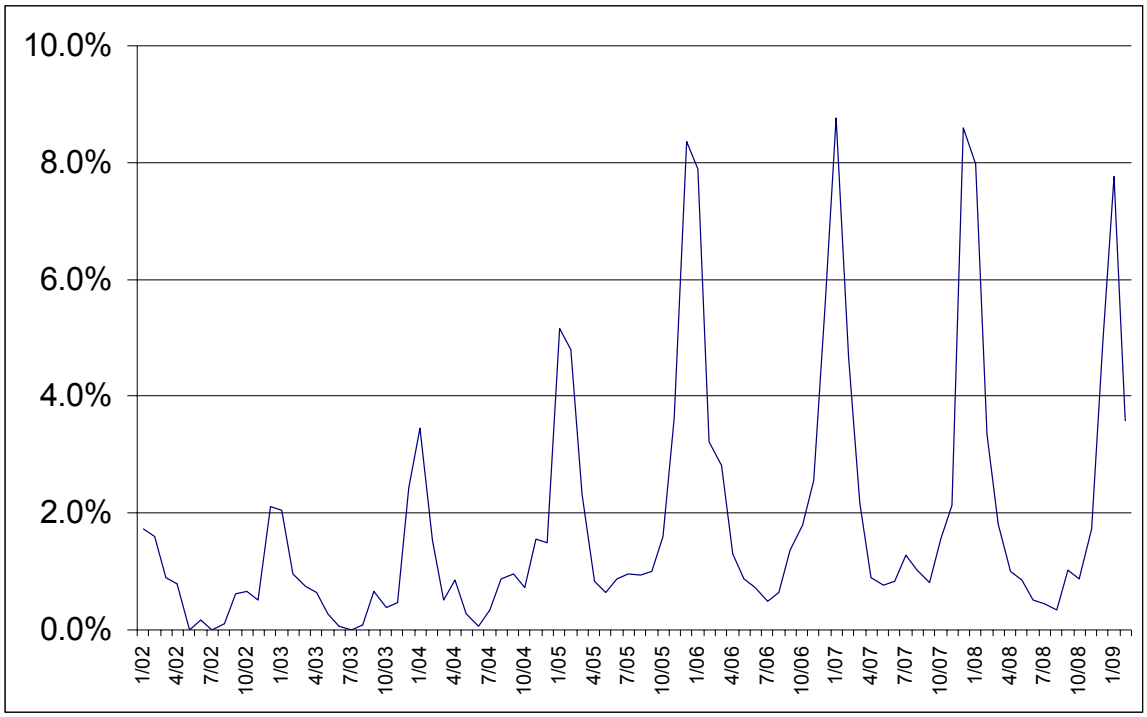

Figure 1: Cases of Clinical Bronchiolitis as a Percentage of All Visits of Children under Age Two Years by Month and Year

The December-January seasonality of bronchiolitis shown in the present study is different from the temporal distribution found by Dagan et al. [8] in southern Israel. Although our study was based on the clinical syndrome alone, such that the data are not directly comparable with the earlier study, the striking consistency of the peak each year suggests that a definitive clinical condition was being documented. Our study examined the incidence in the community and Dagan et al. [8] explored the incidence in hospitalized patients, and this may explain the discrepancy. Further exploration is warranted to determine if there are differences in the timing of the disease between community and in-hospital settings within the same geographic area.

Alternatively, the findings of Dagan et al. [8] may differ from the present findings because the time of the bronchiolitis season shifted during the decade that separates the two studies. It is also possible that there is a difference in bronchiolitis seasonality between the desert-like southern region of Israel and the more central, hilly area surrounding Jerusalem.

Our findings are also not comparable with those of Prais et al. [9], which were derived from data pooled from hospitals throughout Israel. Yet the fact that these authors, too, noted an early peak somewhere in the country suggests that there may be true local variations even within a country as small as Israel. This phenomenon has already been noted in Europe: Terletskaia-Ladwig et al. [7] and Lanari et al. [10] reported differences between relatively close geographic areas in Germany and Italy, respectively.

The consistency of the peak is more striking in Israel than in other locations. The broadness of some of the graphs, such as those from the United States, can be explained by the large geographic areas incorporated in each curve. However, in many European countries, where much smaller areas were reported, there seems to be more variability from year to year. In the nine winters of the study in Edinburgh, peaks of RSV infection occurred four times in December, three times in February and once each in November and March [11].

A unique feature of our study is the use of a data warehouse as the data source. Data warehouses are a relatively new but very powerful tool for identifying patterns in illness. However, because the input to the data warehouse is done primarily for clinical purposes, it may lack the precision required for research purposes or syndromic surveillance. Moreover, query of a computerized

database for a specific field does not allow for the type of confirmation from other points in the record that might be possible with a paper-based chart review. Nonetheless, a computerized database mitigates the difficulties posed by illegible handwriting and non-standard charting.

A major limitation of this study is that the data were based on the clinical diagnosis of bronchiolitis, without virologic confirmation. Because we used a retrospective design, as noted above, a clear case definition could not be delineated in advance. Nevertheless, given that bronchiolitis has well accepted clinical diagnostic criteria, a reasonable consistency in the case definition could be presumed. Furthermore, in community-based practice, virologic confirmation is rarely used in the diagnosis of bronchiolitis. Therefore, we believe there is validity to the striking periodicity of bronchiolitis found in this preliminary study. We hope our findings encourage future research that includes virologic confirmation.

Conclusion

The incidence of clinical bronchiolitis in the Jerusalem area appears to have a consistent peak in December - January. This is somewhat earlier than reported for the south of Israel. Further studies, with confirmatory virology, are needed to determine if the clinical presentation of the disease in the community precedes the peak in hospitalized cases and the possible effect of climate in different geographic areas, even within the same country.

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