

# Time trends and seasonal variation in hospital admissions for childhood asthma in the Athens region of Greece: 1978-88

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## Abstract

**Background**—The aim of the study was to determine the trend and seasonal variation in hospital admissions for childhood asthma in the Athens region of Greece.

**Methods**—Data were obtained from hospital registries of the three main children's hospitals in Athens between 1978 and 1988. Children admitted with the diagnosis of asthma, asthmatic bronchitis, or wheezy bronchitis were included. The data were expressed as admission rates per 100 000 of the same aged population.

**Results**—There were 9795 admissions for asthma over the 11 years and the admission rate rose by 294%. Admissions among those aged 0-4 and 5-14 rose by 272% and 379% respectively. Monthly admissions showed a pronounced seasonal variation, rising during the cold damp period in the 0-4 age group, but peaking around May in the 5-14 age group.

**Conclusions**—These findings suggest that hospital admissions due to asthma in the Athens region have increased considerably since 1978, and that clear cut seasonal variations exist which are specific to age.

(Thorax 1993;48:1168-1169)

Hospital admission rates for childhood asthma have been increasing over the past

two decades in several countries.<sup>1</sup> This reflects either a change in prevalence and morbidity, or modification of the management of childhood asthma, or both. In addition, seasonal variation in asthma admissions can be used as an indicator of trigger factors provoking asthma attacks in a particular area.<sup>2</sup>

The aim of this study was to determine the time trends and seasonal variation in hospital admissions for childhood asthma in the Athens region of Greece during an 11 year period between 1978 and 1988.

## Methods

Data were obtained from hospital registries of the three main children's hospitals of Athens, covering 80% of the paediatric beds of the region, for the 1978-88 period.

Children admitted with a diagnosis of asthma, asthmatic bronchitis, or wheezy bronchitis living in the region were included. Dates of birth at admission were obtained. The children were classified into two age groups: 0-4 and 5-14 years. Those admitted with a diagnosis of acute bronchiolitis were excluded.

The data were expressed as admission rates per 10<sup>5</sup> population aged the same as the two groups studied. The population estimation aged 0-14 years for each year of the study period was based upon the 1981 census.

Monthly hospital admissions for asthma during each year were converted into percentage of mean monthly admissions for asthma during that year. The resulting values were averaged for each month over the whole period studied.

Trends were tested by  $\chi^2$  analysis.

## Results

During the 1978-88 period 9795 children were admitted to hospital with asthma; 7484 (76.4%) were 0-4 years of age and 2311 (23.6%) were aged 5-14.

The trend in admissions for asthma for children aged 0-14, after adjusting for the missing 20% of paediatric beds in the region, are shown in fig 1. In 1978 the admission rate was 56 per 10<sup>5</sup> population aged 0-14 years, but in 1988 the rate was 222 per 10<sup>5</sup>, an increase of 294% ( $\chi^2$  for trend,  $p < 0.001$ ) with a mean annual rate of increase of 11.8%.

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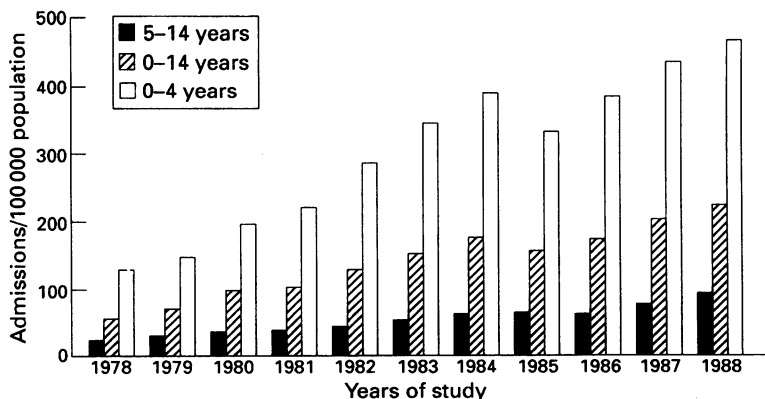


Figure 1 Trends in asthma admissions for children aged 0-14 years, 0-4 years, and 5-14 years in the Athens region during 1978-88.

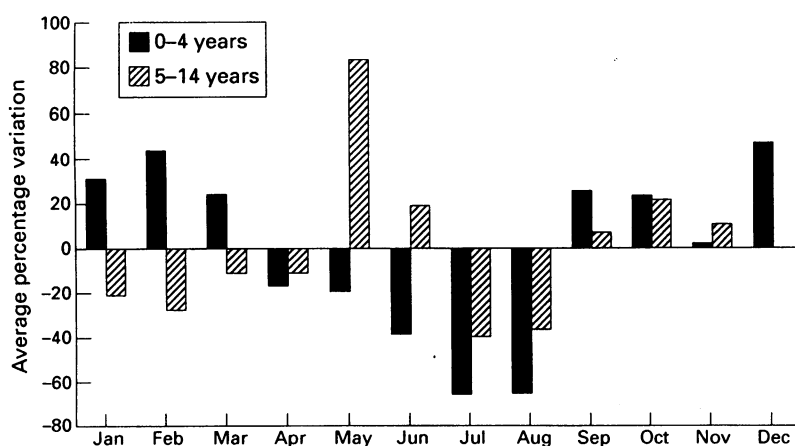


Figure 2 Monthly variation in asthma admissions for children aged 0-4 and 5-14 years in Athens, Greece.

Between 1978 and 1988 asthma admissions in the 0-4 age group increased by 272% ( $p < 0.001$ ) and in the 5-14 age group by 379% ( $p < 0.001$ ). The mean annual rate was 11.1% for the younger group and 14.6% for the older group.

The monthly variation in asthma admissions increased in September to peak in December (38% above the mean) and decrease in April to be lowest in July (59.8% below the mean). On separating the two age groups, those under 5 years showed a similar pattern to the whole group (fig 2). The group of older children, however, had an increased admission rate in late spring, early summer and autumn, but a very strong peak in May (84.6%) and a trough in July (-38.7%).

### Discussion

The results of this study show a steady increase in admission rates for childhood asthma in the Athens region. It should not be considered as an artefact resulting from diagnostic or labelling problems since all the "recurrent wheezers" were included. In addition, the geographical pool where the asthmatic subjects came from was stable for the entire study period.

In order to explain these trends three possible causes have been proposed<sup>1</sup>: (1) a real increase in prevalence of childhood asthma, (2) an increase in prevalence of severe childhood asthma, and (3) a change in the medical management and admissions criteria.

Indications of a real increase in the prevalence of childhood asthma in Athens do exist, since this has already been noted in a recent survey conducted among 8 and 9 year old children in the city of Patra in which the prevalence of asthma was 4.6%, a threefold increase over the past 14 years.<sup>3</sup>

The increase in the prevalence of severe childhood asthma or changes in the medical management and admissions criteria might be responsible for our observations, but there are no data to support this. Consequently, we

were unable to test any hypothesis as to why the childhood asthma admission rate has shown such an increase.

In contrast to the study by Anderson,<sup>4</sup> we found that admissions among the 5-14 age group showed a more rapid increase in trend than that among the 0-4 year group. There is no obvious explanation for this.

The two age groups had a quite different pattern of seasonal variation of admission rate. The increased admission rate during the cold damp period in the preschool age group correlated best with the increased incidence of viral infections at that time of the year.<sup>5</sup> The older children showed an increased admission rate in late spring, early summer and autumn, with a very strong peak in May. As sensitisation to inhaled allergens usually starts after the age of 5 years, the seasonal pattern observed in children aged 5-14 is probably due to the pollen count and less to house dust mites. House dust mites require conditions of high temperature and relative humidity<sup>6</sup> which are prevalent during the same period in Greece. However, indoor mite antigen levels are also high in the Athens region during the winter months (P. Saxonipapageorgiou, unpublished data). Increased airborne pollen concentrations are recorded for olive, grasses and *Parietaria* pollens, which are the commonest sensitising airborne pollen allergens in Greece.<sup>7-9</sup> Furthermore, the trough in the first months of the year makes viral infections a less likely provoking factor in the older age group.

These findings suggest that the annual admission rates due to childhood asthma in the Athens region have shown a fourfold increase since 1978. A different seasonal variation in admissions between the two age groups was detected, indicating the difference in environmental factors implicated in provoking asthma attacks in preschool children, and those of school age.

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