Incidence of episodes of acute asthma and acute bronchitis in general practice 1976–87

JON G AYRES

N D NOAH

D M FLEMING

SUMMARY. The incidence of episodes of acute asthma and acute bronchitis was analysed for an 11-year period and studied in relation to epidemiological data on viral illness and virus isolation data. Between 1976 and 1987, the weekly returns service estimates of the incidence of acute asthmatic episodes in England and Wales increased from 10.2 to 27.1 per 100 000 patients per week (all ages). The increase was most marked in children up to the age of 14 years. Acute bronchitis attack rates (all ages) increased from 78.7 to 111.9 per 100 000 patients over the same period. Because of this rise in rates of acute bronchitis, it is unlikely that labelling shifts contributed to the increase in reported episodes of asthma. These data support the belief that the rise in the prevalence of asthma is real, and also that in the United Kingdom this rise may even be underestimated by partial concealment in the rates of acute bronchitis. In 1987, if 10% of attacks of acute bronchitis were attacks of asthma, this would represent a 41% underestimation of asthma attack rates. Rates for other respiratory illnesses showed a fall over the same period, apart from the common cold which showed an increase. The winter increase in acute bronchitis coincided with viruses with strong seasonal patterns (respiratory syncytial virus, parainfluenza viruses 1 and 2 and influenza A and B), but there was no evidence that these viruses were related to the overall increase in acute asthma attacks over this 11 year period. Whatever the cause or causes may be, the increasing rates of acute asthma and acute bronchitis represent a substantial workload in both general and hospital practice.

Keywords: asthma; bronchitis; morbidity; viral diseases.

Introduction

ASTHMA is a common condition responsible for considerable morbidity, many visits to general practitioners and an annual mortality in England and Wales of approximately 2000 patients.[1] It has been suggested that asthma mortality has been slowly increasing over the last decade,[2] although this view has been contested.[3,4] There is more conclusive evidence that the number of patients presenting to their general practitioner with a diagnosis of asthma is increasing. Analysis of the second and third general practice based national morbidity surveys has shown an increase in the number of diagnosed male and female asthma sufferers in general practice, affecting all age groups.[5] In addition, a 70% increase in the attack rate for asthma in general practice between 1976 and 1983 was reported in the weekly returns service of the Birmingham research unit of the Royal College of General Practitioners.[6] Anderson has reported a marked increase in hospital admissions for asthma among children, notably since the early 1970s[7] which was not felt to be a result of a shift in diagnostic labelling.

In clinical practice asthma is frequently misdiagnosed as acute bronchitis and this confusion is also a problem in epidemiological research. Viral infections are common causes of exacerbations of asthma in children[8] and are the major identifiable cause of attacks of acute bronchitis.[9,10] The increased prevalence of asthma between the second and third national morbidity surveys was accompanied by a slight increase in the incidence of acute bronchitis (confined to elderly people) and these increases were independent of each other.[5]

This study examines the incidence of episodes of acute asthma and acute bronchitis between 1976 and 1987 in relation to epidemiological data on viral illness and virus isolation data.

Method

Material for this study was collected between 1976 and 1987 and came from the weekly returns service of the Royal College of General Practitioners and from the Communicable Disease Surveillance Centre of the Public Health Laboratory Service.

The weekly returns service has been fully described elsewhere.[11,12] In summary, general practitioners covering a population of around 200 000 (for the period of this study) in England and Wales report weekly the number of cases of a variety of respiratory and infectious diseases, including acute bronchitis and acute asthmatic episodes. Weekly attack rates are expressed as the number of acute episodes per 100 000 population. In this study data were analysed to provide mean weekly attack rates for each year for episodes of acute asthma, acute bronchitis, influenza-like illness, epidemic influenza, the common cold, tonsillitis and laryngitis/tracheitis. Mean weekly rates for each year and for each quarter were analysed for the age groups 0–4 years, 5–14 years, 15–44 years, 45–64 years and 65+ years.

Mean weekly rates for each year and age group and for each of a set of paired conditions (acute asthma and acute bronchitis, acute bronchitis and the common cold, acute bronchitis and influenza-like illness, acute asthma and the common cold) were examined for association using the Pearson correlation coefficient. Seasonal and longer term trends for asthma and acute bronchitis were examined and compared with those of various respiratory viruses.

Laboratory data on virus identifications are sent routinely to the Communicable Disease Surveillance Centre by medical microbiologists in public health and hospital laboratories throughout England, Wales and Northern Ireland.[13] Data are presented as numbers of identifications with respect to time.

Results

Weekly returns service incidence data

Over the period 1976–87 the mean weekly attack rate (all ages) for episodes of acute asthma rose more than two and a half times

J G Ayres, BSc, MD, FRCP, consultant physician, Chest Research Institute, East Birmingham Hospital. N D Noah, FRCP, FFCM, professor of public health and epidemiology, Kings College School of Medicine and Dentistry, London. D M Fleming, FRCGP, director, Research Unit of the Royal College of General Practitioners, Birmingham.

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Table 1. Mean weekly attack rate (all ages) for episodes of acute asthma and acute bronchitis, 1976–87.

Year	Mean no. of attacks per 100 000 patients per week	
	Acute asthma	Acute bronchitis
1976	10.2	78.7
1977	10.4	78.7
1978[a]	14.4	90.7
1979	16.2	80.1
1980	17.8	84.5
1981	17.9	89.4
1982	18.2	103.6
1983	17.3	93.0
1984	18.4	91.5
1985	20.9	111.0
1986	19.4	99.8
1987	27.1	111.9

[a] *International classification of diseases* coding changed.

from 10.2 to 27.1 per 100 000, and for acute bronchitis from 78.7 to 111.9 per 100 000 (Table 1). The increase in rates for acute bronchitis was less uniform than for asthma, which increased steadily. Over the period of study the increase in acute asthmatic episodes was most marked in children in the 0–4 years and 5–14 years age groups (Table 2). In the 0–4 years age group, weekly rates per 100 000 patients per year increased from 13.5 to 74.4 and in the 5–14 years group from 17.4 to 58.9. The rise in acute bronchitis was seen in all age groups (Table 2). In the 0–4 years and 65+ years age groups the respective mean weekly attack rates of acute bronchitis per 100 000 patients in the winter quarter increased from 305 in 1976 to 410 in 1987 and from 170 in 1976 to 230 in 1987.

Epidemic influenza rates remained low following the major epidemic in 1976 (Figure 1). Annual rates (all ages) for most other respiratory illnesses fell steadily. Rates for the common cold were the exception, rising from 148.3 per 100 000 patients in 1976 to 186.5 per 100 000 patients in 1987, with a marked increase between 1980 and 1981. When comparing age specific mean weekly rates for each year for episodes of acute asthma with those for acute bronchitis and those for the common cold, and for acute bronchitis and influenza-like illness there was no evidence of a rise in one diagnosis rate being associated with an equivalent fall in another diagnosis rate for any pairing of diagnoses in any age group. Positive correlation coefficients were found for acute asthma and acute bronchitis in adults and the common cold and acute asthma in children but these were not significant.

Virus identification

Acute bronchitis is primarily a winter condition,[11] so Communicable Disease Surveillance Centre data were examined for viruses showing winter peaks. Three main groups were identified: respiratory syncytial virus, influenza A or B and parainfluenza viruses types 1 and 2. When the seasonal patterns for these viruses were compared with those for acute bronchitis for the years 1981 to 1985 the autumnal rise in acute bronchitis coincided with parainfluenza 1 and 2 identifications. The winter peak of acute bronchitis coincided with respiratory syncytial virus and influenza identifications, rates falling off with the decline in influenza. This was true for all ages but particularly for the 0–4 years age group. For rhinoviruses and adenoviruses there were no consistent seasonal patterns.

Discussion

This study shows increasing attack rates for episodes of both acute asthma and acute bronchitis between 1976 and 1987 in general practice in England and Wales. For asthma the increase was most marked in children, and closely matches the rise in hospital admissions among children reported by Anderson.[7] For acute bronchitis the rise was seen in all age groups. These findings need to be viewed in the light of increased patient consulting rates for asthma (all age groups) between 1970 and 1981, a small increase in consulting rates for acute bronchitis (in age groups 65–74 years and 75+ years), and a reduced consulting rate for chronic bronchitis.[5] Both for asthma and for acute bronchitis the number of episodes per patient consulting scarcely changed between 1970 and 1981.[14,15]

The findings of this study can be interpreted in a number of ways. First, the increase in the number of episodes of acute asthma in children and of acute bronchitis in all age groups may have been real increases in the incidence of these conditions. This assumes that both conditions are diagnosed in distinct and clearly definable ways, which is unlikely: in the clinical situation they are easily confused.

Secondly, the rise in asthma among children may reflect a labelling shift from acute bronchitis. General practitioners contributing to the weekly returns service are not representative of all general practitioners and they may be prone to making labelling changes, such as may have been induced by the north Tyneside study which highlighted the underdiagnosis and undertreatment of asthma in children.[16,17] Were this so, one would expect a fall in acute bronchitis rates equivalent to the rise of

Table 2. Mean weekly attack rates for episodes of acute asthma and acute bronchitis by age group, 1976–87.

Year	Mean no. of attacks per 100 000 patients per week by age group (years)									
	Acute asthma episode					Acute bronchitis				
	0–4	5–14	15–44	45–64	65+	0–4	5–14	15–44	45–64	65+
1976	13.5	17.4	8.9	9.0	6.4	198.7	59.4	47.7	92.9	117.0
1977	13.7	15.2	8.9	10.2	8.3	217.6	63.9	44.1	93.3	117.8
1978	26.6	23.4	11.7	12.2	10.5	240.1	87.2	59.0	89.4	130.0
1979	33.0	25.6	13.4	13.1	11.1	206.3	55.9	53.5	89.3	122.8
1980	31.6	28.8	15.0	14.5	12.9	229.7	73.9	54.2	88.1	120.9
1981	31.3	32.7	15.1	13.8	11.7	268.8	82.1	53.3	90.7	128.6
1982	32.2	31.5	15.6	13.7	13.3	309.1	99.3	58.1	105.1	153.8
1983	35.4	35.7	13.4	11.4	10.7	253.6	83.2	55.6	95.3	142.0
1984	52.4	36.5	13.7	12.5	10.0	248.8	70.9	55.3	98.6	144.2
1985	57.1	43.3	16.2	14.4	10.2	313.1	88.1	67.6	114.1	180.4
1986	52.4	41.4	14.4	12.8	11.8	247.3	81.5	63.2	100.5	169.2
1987	74.4	58.9	20.6	17.1	13.4	283.8	91.5	72.5	116.6	176.1

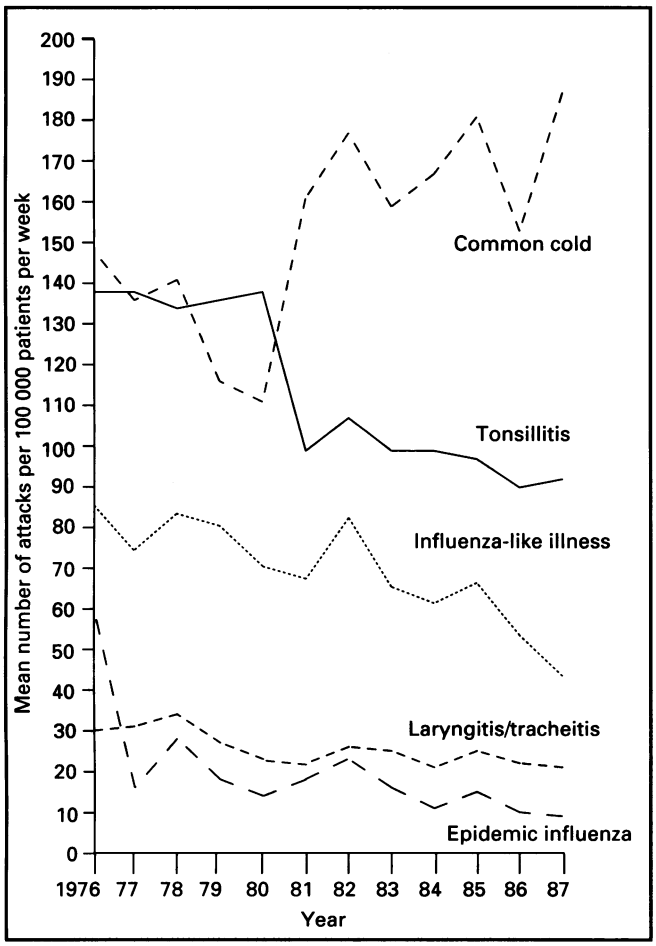

Figure 1. *Mean weekly attack rates (all ages) for the common cold, tonsillitis, influenza-like illness, laryngitis/tracheitis and epidemic influenza, 1976–87.*

asthma rates but no such interchange of rates was found. The rise in acute bronchitis might have been due to a labelling shift from influenza-like illness, even though it has been shown that cough is not regarded as an important criterion for the latter diagnosis.[18] No inverse association was found in rates between acute bronchitis and influenza-like illness in any age group, or between the common cold and asthma. This suggests that labelling shift does not explain the findings presented here. Dual labelling (the same patient labelled as having asthma during one episode of illness and as having acute bronchitis during another) may also present problems for interpretation of prevalence statistics although this would not affect episode data unless dual labelling occurred within an individual episode. The problem of dual labelling was examined in the national morbidity study data for both 1970 and 1981, and did not account for the increased annual period prevalence of either condition.[5]

It is possible that the rises were spurious and due to changes in patient consulting behaviour. The mean consultation rate for all ages of patients combined increased slightly between the national morbidity surveys of 1970 and 1981 with a moderate increase in children and a small increase in the 65 years and over age group.[5] Viral respiratory disorders are particularly prevalent among children and if the threshold for consultation had fallen, an increased incidence would have been reported among them. The increased incidence of the common cold (in which one third of cases were among children aged 0–4 years[12]) supports this hypothesis.

Having established that there has been a sustained rise in asthma attack rates largely in children which was not a result of a labelling shift, the possibility that this might be due to viral infections was addressed. Laboratory data are difficult to interpret quantitatively as they depend, among other factors, on the ease of diagnosis and the varying habits of doctors making further investigations. Although few respiratory infections are investigated virologically, Communicable Diseases Surveillance Centre virus data are useful for identifying trends, both seasonal and in the longer term. The weekly returns service data show that, with the exception of the common cold, episode rates for most acute respiratory infections fell and the virus data did not show an overall increase in virus identifications. Although there was no significant association between acute bronchitis and acute asthma in adults, and the common cold and acute asthma in children the correlation coefficients were both positive which is consistent with the hypothesis that common cold viruses are responsible for some of the increase in asthma seen in general practice in the winter months. They do not, however, provide support for the overall rising trend. Nevertheless, a patient with asthma may suffer an 'acute viral bronchitis' which may aggravate symptoms, prompting a consultation with a general practitioner without necessarily inducing an acute attack of asthma.

The seasonal patterns of acute bronchitis and acute asthma are quite different except that they share an autumnal rise, suggesting a common viral aetiology.[6] Viral exacerbations of asthma are well recognized and may be more difficult to treat than asthma triggered by pollen. This may explain the higher number of hospital admissions for asthma in the last quarter of the year[19,20] compared with general practice consultations where the peak in acute attack rates occurs in the pollen season.[6] Rhinoviruses are the commonest viral precipitants of asthma[21] but exhibit no consistent seasonal pattern. Parainfluenza viruses types 1 and 2 tend to peak every second year, and do so at the same time of year as the start of the rise in acute bronchitis (autumn).[22] In children aged 0–4 years the highest consultation rates for acute bronchitis and acute bronchiolitis coincide with the winter peak for laboratory identifications of respiratory syncytial virus, known to be the major cause of bronchiolitis in this age group.[23] However, associations are not necessarily causal.

We believe that the rise in acute asthma attacks in children is real. The use of the term 'acute bronchitis' is probably causing continuing underestimation of the incidence of asthma attacks, particularly in the older age groups, and the finding of a high prevalence of increased bronchial hyperresponsiveness in patients following acute bronchitis may be important.[10] The findings presented here are compatible with Mitchell's hypothesis of a generalized increase in bronchial reactivity resulting in more patients with symptomatic asthma.[24]

If asthma is increasing across the age range then the effects of environmental factors, such as changes in airborne pollutants, must be considered. Viral infections are important as exacerbators, but there is no evidence to suggest that they are a significant factor in the overall rise in asthma attacks in general practice. Recently, Sears and colleagues have suggested that regular use of inhaled B_2 agonists results in worsening of asthma symptoms.[25] Our results only confirm a rise in acute asthma and do not add further evidence to this particular point. However, the increasing rates of episodes of acute asthma and acute bronchitis will continue to confer a substantial workload both in general and hospital practice, whatever the underlying cause or causes may be. If during 1987, 10% of the acute bronchitis attacks were really acute exacerbations of asthma, this would represent an overall 41% underestimation of asthma attacks.

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Address for correspondence

J G Ayres, Department of Respiratory Medicine, East Birmingham Hospital, Bordersley Green East, Birmingham B9 5ST.