ORIGINAL ARTICLE

# Prevalence of respiratory symptoms in under 5s: 1993 to 2001

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**Aim:** To describe changes in the prevalence of respiratory symptoms in 1–4 year olds in two general practice populations observed on four occasions over an eight year period.

**Methods:** In 1993, 1995, 1999, and 2001, questionnaires were posted to the parents of patients aged 15 years or younger and registered with either of two general practices. Only children aged 1–4 years at time of questionnaire completion were included in this study. For each survey, the prevalence of five key variables was determined.

**Results:** The response rates for all children in the four surveys were 72.8%, 70.6%, 65.0%, and 60.7% respectively. When respondents aged 1–4 years old were stratified into one-year age bands, there was a decrease in the prevalence of symptoms over the study period. This was statistically significant for wheeze and night cough in 2 year olds and for night cough in 4 year olds. Repeated antibiotic prescriptions decreased significantly for 2 and 3 year olds. There were no changes in the prevalence of hay fever or eczema and family history of asthma.

**Conclusions:** The downward trend in symptom prevalence might represent a real decrease in symptoms or improvements in treatment. In the absence of changes in the prevalence of hay fever and family history of asthma, the downward trend in symptom prevalence may suggest changes in the prevalence of conditions other than asthma.

Most studies concerning respiratory symptoms and asthma in children have included only those aged 5 years or more,[1–5] and there are few reports of younger groups, in whom asthma-like symptoms may be manifestations of other conditions which are transient and may resolve by the age of 3 years.[6]

This paper describes changes in the prevalence of respiratory symptoms, between 1993 and 2001, in 1–4 year olds as part of the Wythenshawe Community Asthma Project (WYCAP). WYCAP is a long term prospective study of respiratory symptoms in two general practice populations in Manchester, UK.

## METHODS

In 1993, 1995, 1999, and 2001, identical postal questionnaires were sent to parents or guardians to complete on behalf of all children aged 15 years or younger, registered with either of two neighbouring general practices on a housing estate in Manchester. Each practice has approximately 7000 registered patients. The questionnaire was based on the International Study of Asthma and Allergies in Childhood study (ISAAC) questionnaire with additional questions concerning history of hay fever or eczema, family history of asthma, and whether the child had more than three courses of antibiotics for chest, throat, or ear problems in the previous 12 months. Reminders were sent to non-responders after 4 and 8 weeks. The questionnaires were mailed using practice headed notepaper, but responses were sent to the general practice research unit. Staff at the two practices had no part in the input of data or the analysis of results. Only data for children aged 1–4 years old at the time of questionnaire completion were included in the present study. For each survey, the prevalence of five key variables was determined:

- Wheeze in past 12 months
- Dry cough at night in the past 12 months, apart from a cough associated with a cold or chest infection
- More than three courses of antibiotics for respiratory infections in the past 12 months
- A history of hay fever or eczema
- A family history of asthma.

### Analysis

Analyses were performed using SPSS for Windows software.[7] Calculations of prevalence were made for all children answering each survey. In addition, each one-year age band was analysed separately, ensuring that children in any one band could only be included in one survey. In this way it was possible to measure the statistical significance of trends in prevalence using the $\chi^2$ test for linear by linear association, stratified by the age of the child (1, 2, 3, or 4 years). While

**Table 1** Response rates for all age groups in the WYCAP 2001 survey

| Age (years) | Number | Percentage |
|---|---|---|
| 0 | 94/140 | 67.1 |
| 1 | 105/179 | 58.7 |
| 2 | 98/161 | 60.9 |
| 3 | 117/191 | 61.3 |
| 4 | 97/165 | 58.8 |
| 5 | 114/208 | 54.8 |
| 6 | 116/180 | 64.4 |
| 7 | 110/189 | 58.2 |
| 8 | 119/189 | 63.0 |
| 9 | 143/223 | 64.1 |
| 10 | 155/258 | 60.1 |
| 11 | 120/207 | 58.0 |
| 12 | 142/232 | 61.2 |
| 13 | 130/218 | 59.6 |
| 14 | 137/216 | 63.4 |
| 15 | 136/227 | 59.9 |

**Table 2** Percentage (number) of children with symptoms in the preceding 12 months by age and year of survey

| | 1993 | 1995 | 1999 | 2001 | $\chi^2$ | p for trend |
|---|---|---|---|---|---|---|
| **Wheeze at age:** | | | | | | |
| 1 | 36.4 (68/187) | 29.6 (32/108) | 35.1 (39/111) | 29.9 (32/107) | 0.789 | 0.37 |
| 2 | 39.1 (79/202) | 30.5 (39/128) | 24.8 (25/101) | 26.6 (25/94) | 6.997 | <0.01 |
| 3 | 30.1 (62/206) | 36.8 (50/136) | 30.4 (35/115) | 30.4 (31/102) | 0.006 | 0.94 |
| 4 | 36.4 (63/173) | 25.6 (40/156) | 27.6 (32/116) | 29.5 (28/95) | 1.708 | 0.19 |
| **Cough at age:** | | | | | | |
| 1 | 36.4 (68/187) | 27.0 (30/111) | 33.6 (37/110) | 27.1 (29/107) | 1.846 | 0.17 |
| 2 | 38.9 (79/203) | 31.5 (41/130) | 20.2 (21/104) | 26.6 (25/94) | 8.922 | <0.01 |
| 3 | 38.0 (79/208) | 47.4 (64/135) | 36.0 (41/114) | 35.0 (36/103) | 0.588 | 0.44 |
| **4** | 48.3 (86/178) | 41.4 (65/157) | 38.3 (44/115) | 34.7 (33/95) | 5.410 | 0.02 |

more sophisticated methods may be appropriate in the analysis of larger samples, this method preserved the independence of the groups across which trend was examined.

## RESULTS

The response rates for all children in the four surveys were 72.8%, 70.6%, 65.0%, and 60.7% respectively, showing a significant reduction over time (overall difference = −12.1%, 95% CI for the difference −8.0% to −16.2%). Age stratified data concerning the number of questionnaires sent out were only available for the last survey. Thus, response rates according to age could only be calculated for 2001 (table 1), when 696 questionnaires were sent in respect of children aged 1–4 years with a response rate of 59.9%. This was very similar to that for all children aged 15 years or younger which was 60.7%, a difference of 0.8% (95% CI for the difference −4.8% to 3.2%). It is likely, therefore, that the response rates quoted above for all children in the previous three surveys also reflect the response rates for those aged 1–4 years.

In all, data were available in respect of 1869 children, aged 1–4 years. The prevalence of wheeze and night cough decreased over the period of the study from 35.4% to 29.1% and 40.2% to 30.8% respectively. Repeated antibiotic prescription decreased from 27.1% to 17.0%. There were no substantive changes in the prevalence of hay fever, eczema, or family history of asthma (fig 1).

When children were stratified into one-year age bands, there was still a downward trend for respiratory symptoms and repeated antibiotic prescriptions over the eight year study period. This was statistically significant in 2 year olds for wheeze and night cough, and for night cough in 4 year olds (table 2). For 2 and 3 year olds the downward trend for repeated antibiotic prescriptions was significant (table 3).

## DISCUSSION

The Wythenshawe Community Asthma Project has carried out questionnaire surveys of children aged 1–4 years old and registered with either of two general practices on four separate occasions between 1993 and 2001.

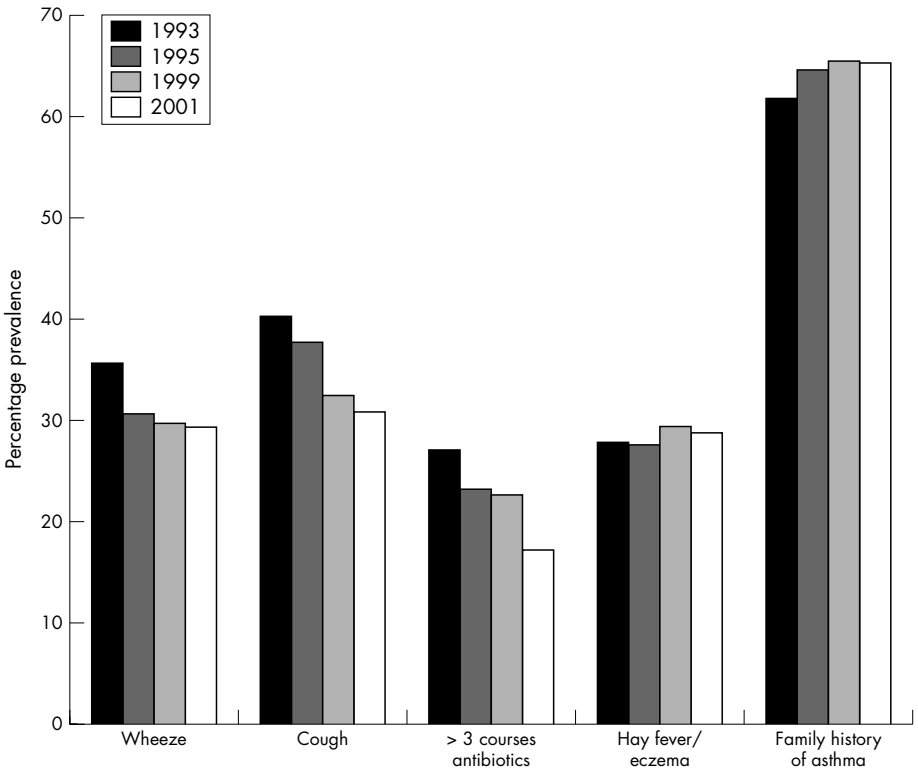


**Figure 1** Percentage of children aged 1–4 with symptoms or related outcomes by year of survey.

**Table 3** Percentage (number) of children with related outcomes by age and year of survey

| | 1993 | 1995 | 1999 | 2001 | $\chi^2$ | p for trend |
|---|---|---|---|---|---|---|
| **>3 courses of antibiotics at age:** | | | | | | |
| 1 | 28.2 (53/188) | 19.1 (21/110) | 26.6 (29/109) | 18.1 (19/105) | 2.384 | 0.12 |
| 2 | 28.4 (57/201) | 26.4 (34/129) | 16.3 (17/104) | 20.2 (19/94) | 4.686 | 0.03 |
| 3 | 25.9 (53/205) | 26.9 (36/134) | 24.3 (27/111) | 12.0 (12/100) | 5.716 | 0.02 |
| 4 | 26.1 (46/176) | 19.1 (29/152) | 22.6 (26/115) | 18.1 (17/94) | 1.768 | 0.18 |
| **Hay fever/eczema at age:** | | | | | | |
| 1 | 30.1 (56/186) | 29.4 (32/109) | 22.4 (24/107) | 29.0 (31/107) | 0.453 | 0.50 |
| 2 | 25.5 (51/200) | 32.0 (41/128) | 31.1 (32/103) | 26.9 (25/93) | 0.241 | 0.62 |
| 3 | 23.6 (49/208) | 27.1 (36/133) | 36.9 (41/111) | 25.2 (26/103) | 1.416 | 0.23 |
| 4 | 32.8 (58/177) | 22.6 (35/155) | 25.9 (30/116) | 34.0 (32/94) | 0.001 | 0.98 |
| **Family history of asthma at age:** | | | | | | |
| 1 | 60.6 (114/188) | 61.8 (68/110) | 64.5 (71/110) | 59.4 (63/106) | 0.002 | 0.96 |
| 2 | 61.6 (125/203) | 69.2 (90/130) | 62.7 (64/102) | 67.7 (63/93) | 0.652 | 0.42 |
| 3 | 58.0 (120/207) | 62.7 (84/134) | 70.4 (81/115) | 64.1 (66/103) | 2.758 | 0.10 |
| 4 | 66.9 (117/175) | 64.1 (100/156) | 63.5 (73/115) | 69.9 (65/93) | 0.064 | 0.80 |

Respiratory symptoms and repeated antibiotic prescription decreased in this age group over the eight years of the study. No significant temporal changes were found in the prevalence of hay fever and family history of asthma.

An advantage of this study was that data were collected at four different time points over an eight-year period, using an identical questionnaire and identical methodology in the same practice populations. This facilitated comparison among the age groups across all the years of the study. Since the study was carried out at intervals of two or more years and asked about symptoms in the previous 12 months only, responses were not duplicated. Stratification by age in one-year bands enabled analysis of trend across independent groups. However, the study was carried out in one area only and might not be representative of 1–4 year olds across the UK.

The response rate decreased each year over the eight-year study period and this appears to reflect a trend noted in other studies with regard to response rates.[8 9]

Owing to the difficulties associated with diagnosing asthma in young children[6] and because the ISAAC questionnaire has not been validated as a tool for identifying asthma in 1–4 year olds, this study concentrated on the identification of respiratory symptoms that are likely to be subjective markers of disease. The decreases in symptom prevalence found in this study could have been real or could have been due to changes in symptom management by the practices or symptom perception by respondents. However, the population was drawn from the same two general practices for each year of the four surveys and it is unlikely that respondents' interpretation of terms such as wheeze changed over time. No attempts were made to describe or define wheeze to the parents involved. Any public campaign to increase awareness of respiratory symptoms during the WYCAP study or any change in parental interpretation of children's symptoms after receiving a WYCAP questionnaire would almost certainly have resulted in an increased reporting of symptoms. Each survey was conducted from the General Practice Research Unit and the doctors and nurses in the practices were not directly involved in the conduct of the study. It is unlikely therefore that the study, in itself, was responsible for any changes in symptom prevalence. However, the possibility that changes in practice over the study period had a part in the changes found cannot be excluded. In the absence of changes in the prevalence of hay fever and family history of asthma, the downward trend in symptom prevalence may suggest changes in the prevalence of conditions other than asthma. The decrease in antibiotic use may reflect changes in the prevalence of respiratory symptoms or changes in prescribing practice.

The results of the present study are in contrast to those of a study from Leicester[10] which reported an increase in the prevalence of current attacks of wheeze in children aged 1–5 years old, from 12% in 1990 to 25% in 1998. It is of interest that the prevalence of symptoms in each of the surveys in the present study was higher than in either of the Leicester surveys. The difference between the two studies may be due to methodological differences (such as the questionnaire used) or to demographic differences (such as socioeconomic status) between the populations studied. The Leicester study included a random sample of all Caucasian children in Leicestershire, while this study included a population of children from one suburb in a deprived area of Manchester.[11] In addition, the Leicester study covered only two time points, whereas this study included four. Measurements of trend are clearer when more than two points of measurement are used.[12]

The prevalence of respiratory symptoms in this population was also higher than in 5–15 year olds in the WYCAP study. The 1999 WYCAP survey found the prevalence of wheeze to be 24.7% in 5–15 year olds, while night cough was reported for 28.3% of respondents.[13] Martinez *et al* reported that while one third of children in a study in Tucson who were 3 years old or younger wheezed, 60% of them had stopped wheezing by the age of 6.[6] Early analysis of longitudinal WYCAP data covering six years of follow up suggests similar results (unpublished data).

The decreases in prevalence of respiratory symptoms observed in this study are likely to represent either a real decrease in symptoms or improvements in treatment and may be a reflection of changes in the prevalence of conditions other than asthma that cause symptoms in young children.

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