

Trends in the prevalence and severity of asthma, rhinitis and atopic eczema in 6- to 7- and 13- to 14-yr-old children from the north-east of England

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The aims of the present study were to assess time trends in symptoms of asthma, rhinitis and atopic eczema among children in the north-east of England. Two cross-sectional surveys 6 yr apart, 6- to 7- and 13- to 14 yr of age, using the International Study of Asthma and Allergies in Childhood, core questionnaire were performed. There was a general increase in symptoms for all the three conditions in both the age groups. In the age group 6- to 7 yr, the increase was generally the same in boys and girls, while in the age group 13- to 14 yr, the increase was generally more marked among boys. In the younger age group, indices related to lifetime diagnosed ever had asthma and having hay fever increased in girls but not in boys, while indices related to lifetime diagnosis of ever having eczema increased in boys and girls. In the older age group, indices related to lifetime diagnosis of ever had asthma slightly increased in boys but did not change in girls, while lifetime diagnosis of ever having hay fever slightly decreased in girls but did not change in boys. The prevalence of lifetime diagnosis of ever having eczema increased in boys and girls. Changes observed in the present study could be related to the changes in lifestyle or environmental factors, awareness or management of symptoms.

Key words: asthma; atopic eczema; rhinitis; trends

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The prevalence of asthma and related allergies is increasing especially in western societies (1, 2). Studies from the UK suggests that wheezing disorders are increasing in pre-school children (3). Maziak et al. (4) studied German children, 6- to 7 yr old, and found that symptoms of asthma, rhinitis and eczema are increasing.

Studies using standardized questions and objective measurements can reflect more accurately the trend in asthma prevalence. The International Study of Asthma and Allergies in Childhood (ISAAC) programme, using standardized international methods, was designed to compare prevalence and severity of these disorders (5–9). The Sunderland Centre is one of

the centres of ISAAC and we participated in phase 1 and phase 3 of ISAAC.

Lee et al. (10) studied children (6- to 7 yr) in Hong Kong and found the prevalence of lifetime rhinitis, current rhinitis, current rhinoconjunctivitis and lifetime eczema increased significantly. There was no significant changes in the prevalence of lifetime asthma, lifetime wheeze and current wheeze albeit a significant increase in severe asthma symptoms.

Wang et al. (11) studied children from Singapore and found that the prevalence of current wheeze has increased significantly in the 6- to 7 yr age group and that eczema was the only allergic disease that showed a modest increase in the prevalence in 6- to 7- and 12- to 15-yr age groups.

Anderson et al. (12) studied British children, 12- to 14 yr, and found the prevalence of wheezing in the past 12 months fell from 34% to 28%. Larger proportional falls were observed for frequent attacks, speech limitation, symptoms of allergic rhinoconjunctivitis and atopic eczema. The proportion of children reporting ever having had asthma or eczema increased, as did the lifetime prevalence of ever having hay fever. Recently, two studies in western populations have reported that the increase in prevalence and severity of these disorders seems to have slowed down or plateaued (13, 14).

The prevalence of symptoms of asthma, allergic rhinitis and atopic eczema in children in the UK ranks among the highest in the world (7). Asthma and allergic disorders are a major public health problem in the UK and there is an urgent need for continuous monitoring and assessment of the dynamics of these disorders and factors that influence their trends. Our studies on young children (15) and older children (16) showed high prevalence of asthma, rhinitis and eczema.

The aims of the present study were to assess time trends in the symptoms of asthma, rhinitis and atopic eczema among children in the north-east of England by comparing the data from phase 1 and phase 3 of the ISAAC surveys conducted at Sunderland 6 yr apart which will help to assess changes in the morbidity of these conditions in our population. Our intention was to establish comparable estimates of direction and magnitude of changes in the prevalence of symptoms of asthma, allergic rhinitis and atopic eczema overtime using identical instruments. This is the first UK trend paper looking at 6- to 7 yr olds.

Materials and methods

Two cross-sectional surveys 6 yr apart (1995/1996, 2001/2002) using ISAAC core questionnaire and applying the ISAAC protocol were performed. Two age groups (6- to 7 yr and 13- to 14 yr) were surveyed and the response rates for the 6- to 7 yr olds were 80% and 90%; and for 13- to 14 yr olds, 90% and 92%, respectively. There were 3000 participants in each age group in the 1995/1996 survey and there were 1843 participants in the 6- to 7 yr old, and 2195 participants in 13- to 14 yr olds in 2001/2002 survey. Children chosen from random sample of schools in a defined geographical area. Phase 3 was conducted in the same way as phase 1 so that the data was comparable. The details of the study design and the methods are identical to our previous studies (15, 16). In these studies, samp-

ling frames of mixed sex state schools with over 100 pupils in each school year were prepared through the Department of Education in the north-east region of England. One school from each sampling frame was randomly selected. ISAAC questionnaires were sent to parents or guardians of 6- to 7-yr-old children. Each subject, 13- to 14-yr-old children, was given an ISAAC written questionnaire to complete. The same schools were surveyed in both surveys and during the same season.

Analyses focus on the change in 12-month prevalence symptoms of asthma, rhinitis and eczema. Data were analysed by SPSS (SPSS Inc., Chicago, IL, USA). All analysis have taken a p-value of <0.05 to represent statistical significance. Statistical analysis included percentages, odds ratios and 95% confidence intervals. Proportions between the two surveys were compared using chi-squared tests.

Results

Table 1 shows the demographic characteristics of the respondents from two surveys. Tables 2 and 3 show the prevalence and severity of asthma symptoms and both rhinitis and eczema symptoms in 6- to 7 yr of age in the first and second surveys, respectively. Tables 4 and 5 show the prevalence and severity of asthma symptoms and both rhinitis and eczema in 13- to 14 yr of age in the first and second surveys, respectively. There was a general increase in symptoms for all three conditions in both age groups. In the age group 6- to 7 yr, the increase was generally the same in boys and girls, while in the age group 13- to 14 yr, the increase was generally more marked among boys.

In the younger age group, there were no significant changes in the prevalence of current cough, ever had rhinitis, age at which itchy rash first occurred, the prevalence of the number of wheezing episodes more than 12 in the past year,

Table 1. Descriptive statistics of the study population

	1995/1996 survey (phase 1)		2001/2002 survey (phase 2)	
	N (%)	Mean age (±SD)	N (%)	Mean age (±SD)
6-7 yr age group				
Male	1455 (48.5)	6.80 (0.88)	918 (49.8)	6.90 (0.87)
Female	1545 (51.5)	6.90 (0.78)	925 (50.2)	6.70 (0.80)
Total	3000 (100)	6.70 (0.77)	1843 (100)	6.85 (0.73)
13-14 yr age group				
Male	1510 (50.3)	13.38 (0.89)	1000 (45.6)	13.38 (0.8)
Female	1490 (49.7)	13.42 (0.97)	1195 (54.4)	13.41 (0.9)
Total	3000 (100)	13.40 (0.89)	2195 (100)	13.34 (0.9)

SD, standard deviation.

Table 2. Prevalance (%) of asthma symptoms in 6–7 yr of age in the first and second surveys

Symptoms	Boys					Girls				
	First survey	Second survey	Odds ratio	95% CI	p-value	First survey	Second survey	Odds ratio	95% CI	p-value
Ever wheezed	35.0	39.7	1.24	1.12–1.37	0.01	24.0	31.5	1.46	1.32–1.61	0.01
Current wheeze	21.0	27.6	1.46	1.30–1.58	0.01	15.4	23.3	1.75	1.36–1.8	0.01
Exercised-induced wheezing	16.4	15.4	0.85	0.65–1.07	0.18	11.1	13.0	1.03	0.91–1.15	0.63
Cough	28.6	27.9	1.02	0.90–1.10	0.76	26.0	26.5	1.02	0.88–1.19	0.70
Ever had asthma	27.7	29.8	1.13	1.03–1.24	0.05	18.3	24.1	1.46	1.30–1.60	0.01
Number of wheezing attacks										
1–3	13.4	17.5	1.90	1.66–2.17	0.01	8.8	16.8	1.47	1.32–1.62	0.01
4–12	5.6	7.7	0.85	0.60–1.04	0.16	4.5	4.6	0.98	0.73–1.32	0.88
>12	2.4	2.6	0.97	0.75–1.30	0.80	1.7	3.1	0.85	0.65–1.07	0.19
Woken by wheeze										
<1/wk	9.4	10.9	0.86	0.62–1.02	0.19	5.4	8.3	2.36	1.81–3.07	0.001
>1/wk	6.3	8.2	1.13	1.03–1.24	0.01	5.3	7.8	1.15	1.08–1.34	0.01
Speech limitation	4.2	5.8	0.85	0.64–1.06	0.18	3.1	4.5	0.88	0.72–1.08	0.20

CI, confidence interval.

Table 3. Prevalance (%) of rhinitis and eczema symptoms in 6–7 yr of age in the first and second surveys

Symptoms	Boys					Girls				
	First survey	Second survey	Odds ratio	95% CI	p-value	First survey	Second survey	Odds ratio	95% CI	p-value
Ever had rhinitis	25.0	26.5	1.1	0.91–1.31	0.15	20.4	21.6	1.2	0.95–1.41	0.18
Current rhinitis	22.6	28.8	1.6	1.29–1.98	0.001	18.8	26.1	1.8	1.42–2.28	0.001
Associated itchy eye	11.6	13.5	1.2	0.95–1.41	0.16	8.1	13.2	1.6	1.29–1.98	0.001
Ever had hay fever	12.0	14.7	1.2	0.99–1.48	0.18	7.9	13.3	1.6	1.30–1.95	0.001
Rhinitis: interference with daily activity										
Little	11.9	15.3	1.5	1.18–1.97	0.001	8.8	12.5	1.8	1.35–2.25	0.001
Moderate	2.4	2.3	1.0	0.62–1.59	1.00	1.5	2.6	1.1	0.90–1.31	0.17
Severe	0.4	1.2	1.2	0.95–1.40	0.15	0.7	1.2	1.2	0.97–1.4	0.17
Rash ever	17.8	21.0	1.6	1.29–1.98	0.001	18.7	22.5	1.8	1.35–2.30	0.001
Current rash	14.7	23.3	1.4	1.31–1.61	0.001	16.9	25.0	1.8	1.42–2.28	0.001
Rash with typical distribution	13.2	21.1	1.9	1.41–3.57	0.001	14.7	23.8	1.8	1.35–2.25	0.001
Ever having eczema	27.8	37.0	1.9	1.45–3.55	0.001	27.0	35.5	1.8	1.45–2.45	0.001
Age rash appeared: <2 yr	7.7	14.6	1.5	1.32–1.61	0.001	8.3	14.7	1.6	1.40–2.76	0.001
Age at which rash first occurred										
2–4 yr	3.6	4.9	1.1	0.91–1.20	0.16	4.7	5.0	1.1	0.77–1.27	0.15
>5 yr	5.0	4.2	1.1	0.82–1.10	0.15	4.8	5.5	1.1	0.70–1.20	0.16
Persistent rash without clearing	6.5	8.6	1.3	1.00–1.59	0.40	7.0	10.7	1.5	1.18–1.97	0.01
Kept awake by rash										
<1 each week	4.0	7.8	1.24	1.12–1.34	0.01	5.1	6.9	1.13	1.03–1.24	0.22
>1 each week	2.5	2.8	1.1	0.77–1.0	0.18	2.3	3.3	1.12	1.04–1.24	0.33

CI, confidence interval.

current limitation of speech by wheeze, prevalence of moderate bothersome rhinitis symptoms (rhinitis often interfering with daily activities), and kept awake by rash more than one each week in both boys and girls. However, indices related to lifetime diagnosed ever had asthma and ever having hay fever increased in girls but not in boys, while indices related to lifetime diagnosis of ever eczema increased in boys and girls.

In the older age group, there were no significant changes in the number of wheezing attacks more than 12 in the past year and in the

prevalence of little bothersome rhinitis symptoms in both boys and girls. Indices related to lifetime diagnosis of ever had asthma slightly increased in boys but did not change in girls, while lifetime diagnosis of ever having hay fever slightly decreased in girls but did not change in boys. The prevalence of lifetime diagnosis of ever having eczema increased in boys and girls.

Discussion

The present study is the first study in the UK examining the younger age group (6- to 7 yr).

Table 4. Prevalance (%) of asthma symptoms in 13–14 yr of age in the first and second surveys

Symptoms	Boys					Girls				
	First survey	Second survey	Odds ratio	95% CI	p-value	First survey	Second survey	Odds ratio	95% CI	p-value
Ever wheezed	28.9	31.6	1.13	1.03–1.24	0.01	34.3	29.5	1.21	1.10–1.32	0.01
Current wheeze	18.0	23.2	1.90	1.40–2.60	0.001	21.8	21.4	1.00	0.77–1.42	0.31
Exercise-induced wheezing	19.4	17.7	1.10	1.01–1.21	0.09	28.6	17.6	2.3	1.17–4.55	0.001
Cough	19.1	20.5	1.02	0.87–1.20	0.34	22.6	17.7	1.46	1.32–1.61	0.001
Ever had asthma	22.0	27.00	1.50	1.30–1.68	0.001	23.0	24.6	1.01	0.91–1.15	0.25
Number of Wheezing attacks										
1–3	21.1	17.2	1.90	1.42–2.70	0.001	12.1	14.2	1.13	1.03–1.10	0.32
4–12	3.6	6.3	1.16	0.99–1.48	0.02	5.5	4.6	1.1	0.91–1.31	0.03
>12	1.1	1.9	1.1	0.95–1.28	0.14	2.1	3.5	1.16	0.92–1.30	0.17
Woken by wheeze										
<1/wk	6.3	9.6	1.16	0.88–1.30	0.18	7.8	8.2	1.11	0.90–1.25	0.19
>1/wk	1.7	4.4	1.16	0.90–1.30	0.07	3.2	1.9	1.12	1.02–1.10	0.15
Speech limitation	3.5	5.8	1.13	1.02–1.25	0.10	6.0	4.6	1.15	1.04–1.22	0.18

CI, confidence interval.

Table 5. Prevalance (%) of rhinitis and eczema symptoms in 13–14 yr of age in the first and second surveys

Symptoms	Boys					Girls				
	First survey	Second survey	Odds ratio	95% CI	p-value	First survey	Second survey	Odds ratio	95% CI	p-value
Ever had rhinitis	32.1	28.0	1.8	1.42–2.28	0.001	35.4	23.5	2.3	1.17–4.55	0.001
Current rhinitis	27.5	35.2	1.63	1.48–1.81	0.001	31.7	29.6	1.13	1.03–1.24	0.17
Associated itchy eye	16.1	23.4	1.46	1.32–1.61	0.001	21.3	20.0	1.20	0.95–1.41	0.19
Ever having hay fever	23.1	25.9	1.20	1.01–1.44	0.08	28.1	25.0	1.20	0.95–1.40	0.14
Rhinitis: interference with daily activity										
Little	13.3	15.1	1.20	0.97–1.51	0.16	15.3	14.4	1.10	0.87–1.49	0.19
Moderate	3.2	7.7	1.90	1.66–2.17	0.001	2.7	2.7	1.00	0.84–1.18	1.00
Severe	0.9	2.3	1.20	0.94–1.24	0.14	2.4	2.3	1.1	0.91–1.30	0.17
Ever rash	13.9	15.3	1.1	0.88–1.22	0.09	22.8	17.5	1.6	1.29–1.98	0.001
Current rash	11.3	16.8	1.6	1.30–2.2	0.001	20.5	20.9	1.00	0.89–1.32	1.00
Rash with typical distribution	8.8	19.6	2.36	1.81–3.37	0.001	15.9	19.3	1.5	1.12–1.98	0.001
Ever having eczema	13.9	27.2	6.13	3.52–10.79	0.001	22.8	30.7	1.63	1.48–1.81	0.001
Age at which rash first occurred										
<2 yr	4.2	7.8	1.50	1.18–1.97	0.01	4.6	6.1	1.2	0.95–1.48	0.14
2–4 yr	0.9	3.3	1.50	1.20–1.99	0.01	2.8	3.4	1.10	0.90–1.30	0.16
>5 yr	7.8	6.5	1.10	0.80–1.30	0.13	13.9	10.1	1.10	1.35–2.25	0.001
Persistent rash without clearing	4.7	9.0	1.60	1.29–1.98	0.001	5.8	10.1	1.60	1.30–2.00	0.001
Kept awake by rash										
<1/wk	2.7	5.3	1.50	1.20–1.99	0.01	5.9	6.7	1.10	0.90–1.30	0.17
>1/wk	1.1	1.9	1.00	0.62–1.59	0.18	3.2	0.9	1.50	1.18–1.97	0.01

CI, confidence interval.

Few studies have addressed the trends in the prevalence of allergic disorders in children. Although our study showed a significant increase in most disorders, it did not demonstrate a significant rise in the prevalence of ever had asthma in younger boys and older girls. However, older boys exhibit slight increase in the prevalence of ever had asthma. We followed ISAAC protocol to obviate selection bias by using the same method. Comparing the present findings with the UK national study (12), in the present study the prevalence of current wheezing increased from 18.0% to 23.2% in boys while

there was no change in girls. In contrast to the national study, children in the present study did not show falls in frequent wheezing attacks and atopic eczema (the prevalence rates in these symptoms increased in the present study). However, symptoms of allergic rhinoconjunctivitis in our children followed the same pattern in the national study. The prevalence of ever had asthma in the present study had increased in boys but did not change in girls, while the prevalence of having hay fever increased in boys and decreased in girls. The present study recruited a very large number of children from the

north-east and, therefore, provides better reflection on children from this region compared with the UK national study (12). The present study shows that the trend in certain symptoms in our children differs from the trend shown in the UK national study which might reflect the regional differences in the trends of these disorders.

Symptoms of asthma, rhinitis and eczema were increased in German younger and older children (4). In the present study, only indices related to lifetime diagnosed ever had asthma and ever having hay fever increased in younger girls but not in younger boys. However, indices related to lifetime diagnosis of ever having eczema increased in younger boys and girls. Comparing with German children (4), in the older children in the present study, indices related to lifetime diagnosis of ever had asthma slightly increased in boys but did not change in girls, while lifetime diagnosis of ever having hay fever slightly decreased in girls but did not change in boys. The prevalence of lifetime diagnosis of ever having eczema increased in older boys and girls in the present study. In contrast to Singapore children (11), in the present study, current wheeze increased in our younger children and only in our older boys. There was no change in the current wheeze in older girls. There was no change in the prevalence of ever had rhinitis in our younger children but it decreased in our older children. Changes in the prevalence of ever having eczema in both age groups in the present study followed the same pattern as in Singapore children.

Comparing younger children in the present study with similar age group from Hong Kong (10), in contrast to Hong Kong children, there was no change in the prevalence of lifetime rhinitis in the present study. However, the prevalence rates of current rhinitis and lifetime eczema were increased; followed the same pattern as in Hong Kong children. In contrast to Hong Kong children, the prevalence rates of lifetime asthma, lifetime wheeze and current wheeze were increased in the present study.

Changes observed in the present study could be related to the changes in the lifestyle or environmental factors, awareness or management of symptoms. The data in the present study has direct relevance for health services delivery in the UK as well as providing a basis for understanding these conditions.

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