

Childhood asthma in a rural county

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As part of a questionnaire study of allergic diseases in Swedish children, information about asthma reported in a rural county was evaluated. Of a total population of approx. 9,000 children 4, 7, 10 and 14 years of age, 5.1 % reported a history of asthma and 2.4 % reported symptoms during the last year. The incidence was highest during the first 2 years of life. A higher incidence in boys than in girls was found only during the first 4 years of life. Cessation of symptoms was most common in children with onset during the first 2 years of life. By checking the medical case records, a high accuracy of the reported information was confirmed.

Key words: asthma; childhood; incidence; epidemiology.

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The prevalence of childhood asthma varies in reports from different countries (8, 10, 11, 12, 14), but there is a trend to increasing figures in more recent decades (11, 12). In 1979–80 a questionnaire study of allergic diseases in schoolchildren was performed in three different areas of Sweden (2). In the total material, 5.1 % had a history of asthma and 2.4 % reported asthma symptoms during the last year.

The aim of the present study was to describe the occurrence of asthma in one of the three areas and to evaluate the questionnaire data by checking the medical case records of children with reported asthma. Regarding early events, it was suspected that there might be some losses in the retrospective information from schoolchildren. Therefore, also the 4 year-old children in the area were included.

MATERIAL AND METHODS

Kronoberg County in the southern inland of Sweden represents both urban, rural and woodland areas with eight municipalities having a total of approx. 170,000 inhabitants in 1979–80. Slightly less than 40,000 children were under 16 years of age. Växjö, with 64,000

inhabitants, is the largest municipality and none of the other municipalities has more than 30,000 inhabitants.

As one part of a study on allergic diseases performed in three areas of Sweden (2), the present study included all children in Kronoberg County who were 7, 10 and 14 years of age as of December 31, 1979. In addition, all children 4 years of age as of December 31, 1980 were included. The total population in these age groups was 9,725 according to the Swedish Central Bureau of Statistics. Questionnaire forms were distributed to the children at their routine health examinations, answered and signed by one of the parents and collected by the child health nurse or the school health nurse. Questions asked were: Has your child ever had asthma or wheezy bronchitis? Age at onset? Age at latest symptom? Presence of symptoms last year? Has the child seen a doctor concerning the symptoms? Name of doctor, clinic, hospital? Corresponding questions were asked also for symptoms of allergic rhinoconjunctivitis, eczema and urticaria. Complete answers were received from 8,979 children, corresponding to 92.3 % of the population. Flawed or incomplete answers were equally distributed

in terms of age and areas, except for one municipality where many of the 14-year-olds refused to answer or gave incomplete answers. For that reason all 123 answers in this group and municipality were excluded, leaving 8,856 answers for analysis.

All available case records of the children with reported asthma or wheezy bronchitis were examined. In addition, during the following 4–5 years, new case records from the cohorts in question studied in the County Hospital of Växjö were carefully checked in order to detect possible underreporting of asthma.

The term “incidence” is used for the proportion of a population with onset of symptom during 1 year (or other specified interval). “Prevalence” is used for symptoms present during the last year, and “cumulative incidence” for past or present symptoms. The significance of group differences was calculated using the chi-square-test.

The study was approved by the Ethics Committee of Gothenburg University.

RESULTS

Past or present symptoms of asthma, including wheezy bronchitis, were reported by 482 children. In 21 of the questionnaires the word asthma was crossed out by the parents or changed to croup or “ordinary” bronchitis. These children were not considered as having asthma. Case records were available for 425 (88 %) of the children. In 11 children the reported asthma symptoms corresponded to congenital stridor, croup or bronchitis without

wheezing according to the case records and were therefore not considered as asthma. Of the remaining 450 children with reported asthma, 414 (92 %) had seen a doctor for asthma or other allergic disease, such as allergic rhinitis/ conjunctivitis, eczema or urticaria. In 70 % of all children with reported asthma, this diagnosis was noted by the doctor and in 61 % audible ronchi were noted in the case records. The reported age at onset and cessation of symptoms were the same in the questionnaires as in the case records.

Table 1 shows cumulative incidence and prevalence in the different age groups. Asthma was more frequent in boys than in girls, but the difference reached a significant level only for the cumulative incidence. No significant difference was found between the municipalities. The cumulative incidence in the group studied at 4 years of age (5.0 %) was higher ($P < 0.05$) than the cumulative incidence at 4 years of age (3.8 %) in the older age groups as estimated from the retrospective information on age at onset.

In Table 2, the age at onset is calculated for all 4 age groups studied and is consequently based on smaller numbers of children with higher age at onset groups. The first 4 years of life represented 60 % of the total calculated cumulative incidence at 14 years of age. During this early period the incidence was significantly higher ($P < 0.001$) in boys than in girls.

The relation between age at onset and cessation of symptoms is illustrated in Fig. 1. In children with onset during the first 2 years of life, the symptoms disappeared in 76 % before

Table 1
Asthma in per cent of all children in Kronoberg County 1979/1980

Groups		Cumulative incidence			Prevalence		
(years)	<i>n</i>	Boys	Girls	Total	Boys	Girls	Total
4	2,097	5.8	4.1	5.0	2.5	2.3	2.4
7	2,278	5.2*	3.5	4.4	2.1	1.6	1.9
10	2,316	6.6**	4.6	5.7	3.0	2.0	2.5
14	2,165	6.7*	4.6	5.7	2.7	2.6	2.7
Total	8,856	6.1***	4.0	5.1	2.6	2.1	2.4

* $P < 0.05$, ** $P < 0.01$, *** $P < 0.001$, indicates the significance of the difference between boys and girls

14 years of age, as compared with 38% in children with later onset ($P < 0.001$).

DISCUSSION

The basis of this study was a questionnaire asking about asthma or wheezy bronchitis. No attempt was made to distinguish between these conditions, which have the same acute clinical picture and are considered by many as being the same basic disorder (6, 10, 13, 14). The accuracy of questionnaire replies depends both on the standard of knowledge and conscientiousness of the responders. A diagnosis of asthma/wheezy bronchitis can as easily be confused with other diseases as can allergic rhinitis and eczema. Therefore, evaluation of the reported symptoms of asthma in one area of multi-center survey of childhood allergic disease can be regarded as a measurement of the accuracy of the reported symptoms in general.

The representativity of the information was high in terms of the design, as it was a total population questionnaire with nearly complete response compliance. The Swedish public medical system, and particularly the Child Health Clinics reach virtually all families with children and provide a high standard of knowledge about common disorders, such as asthma and other allergic disease. A thorough check of the case records revealed that only a small number of responders confused asthma with other conditions, mainly croup. Almost all children with

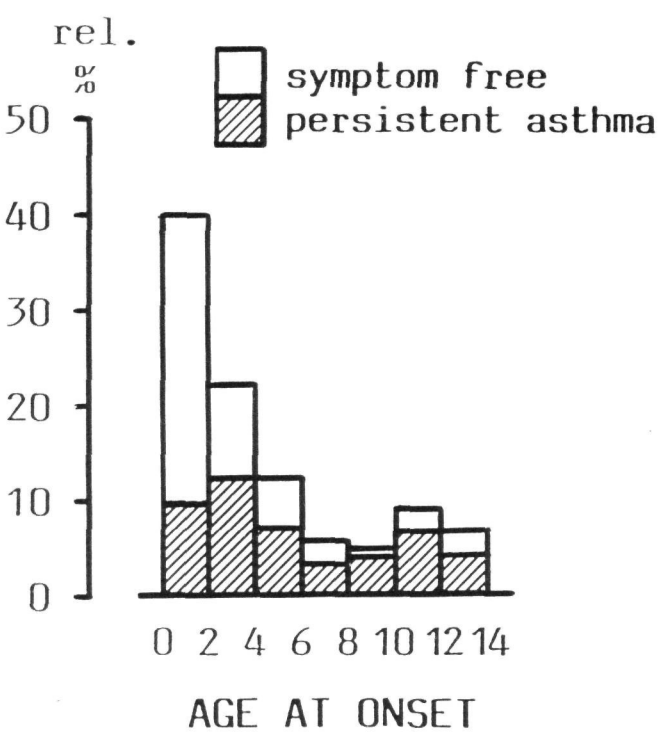


Fig. 1. Distribution of onset of asthma in 14-year-olds ($n = 123$).

reported asthma had seen a doctor for symptoms of an allergic disease and audible ronchi were noted in the majority. All these findings suggest high accuracy of the reported diagnoses. There was only indirect evidence as to the sensitivity of the questionnaire. In the hospital responsible for most of the pediatric and all inpatient care in the area no “missed” cases, indicating underreporting, were found during a 4–5-year period after the questionnaire study.

Most of the symptoms started during the first 4 years of life, during which period slightly higher incidence was reported for the group of 4-year-olds than for the older age groups. This might be due to difficulties in recollection of transient early symptoms with time lapse. Furthermore, the 4-year-olds represented a 4–11 years later birth cohort, and the difference could also reflect a real increase of the incidence with time, as suggested in other reports (1, 11, 12). On the whole, the congruence of the information between the different age groups was high and corroborates the validity of the data. The finding of the highest incidence during the first years of life is similar to findings from selected hospital materials (4, 5), but is less well

Table 2
Distribution of onset of asthma in Kronoberg County in per cent of the total child population.

Age at onset	2-year-incidence		
	Boys	Girls	Total
0-2	3.1***	1.8	2.4
2-4	1.6*	1.1	1.4
4-6	0.7	0.6	0.7
6-8	0.5	0.5	0.5
8-10	0.5	0.3	0.4
10-12	0.4	0.7	0.5
12-14	0.4	0.4	0.4

* $P < 0.05$, *** $P < 0.001$, indicates the significance of the difference between boys and girls.

described in representative population samples. The high recovery rate after early onset was the same as reported in a prospective follow up of wheezy bronchitis (7) in Sweden. The cumulative incidence in the present study was on the same level as found in another rural area of Sweden (9) as well as in the urban area of Gothenburg (2) representing the largest population in the total co-ordinated study, including the present material. An overrepresentation of boys in prevalence of childhood asthma is a general finding (9, 12, 14), but the obvious change in sex ratio with age at onset in the present material has been less well described previously. From a marked difference between the sexes during the first 2 years of life, no significant difference was found from 4 years of age. The lower difference between boys and girls in the prevalence figures than in the cumulative incidence could, accordingly, be because the symptoms disappeared to a higher degree in early onset disease.

In the total material of 14-year-olds from all three areas (3), the same figures of incidence and recovery as in the present paper were found. The trend of changing sex ratio was also the same when a larger number of late onset asthma was included. Except for the possibility of slight underreporting of previous wheezy bronchitis in the schoolchildren, the present study confirms the high accuracy of the questionnaire material from all age groups regarding the asthma diagnosis *per se* as well as the information about age at onset and cessation of symptoms.

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