

Short communication

Increase of asthma in adults in northern Finland? – a report from the FinEsS study

Background: According to previous studies, the prevalence of asthma has been lower in Finland than in other Nordic countries. In the present study, we assessed the prevalence of asthma and respiratory symptoms in northern Finland and calculated risk factors for these conditions.

Methods: In November 1995, 7937 randomly selected subjects, 20–69 years of age, in northern Finland were invited to participate in a postal questionnaire survey. Complete answers were received from 6633 subjects (83.6%).

Results: Asthma diagnosed by a physician was reported by 6.0%, while 6.3% were using asthma medicines. Asthma was most common in young adults and the elderly. The prevalence of wheezing during the previous 12 months was reported by 19.7%, while wheezing with shortness of breath apart from colds during the previous 12 months was reported by 7.1%. Only small differences between the sexes were found in prevalence of asthma and respiratory symptoms. All symptoms were strongly smoking-dependent. Sixty-three percent of men and 42% of women were current or ex-smokers. Family history of obstructive airway disease was the strongest risk factor for asthma (OR 2.9), while increasing age, smoking, and family history of obstructive airway disease were the most important risk factors for frequent wheeze.

Conclusions: The results indicate that the prevalence of asthma and symptoms associated with asthma in adults in northern Finland is now similar to that observed in Sweden and the other Nordic countries.

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Several epidemiologic studies in the Nordic countries published 20–40 years ago estimated the prevalence of asthma at 1.1–2.8% in adults (1–3). The prevalence was lower in Finland (4, 5) than in the other Nordic countries. Studies published more recently reveal that the prevalence of asthma has increased rapidly worldwide (1–9).

The most recent population-based studies from northern Sweden (10, 11), the Obstructive Lung Disease in Northern Sweden Studies (OLIN), have shown that the prevalence of asthma has increased, and has recently been estimated at about 8% (11). Recent results in Finland from register studies (12, 13) and studies of selected populations (14–17) have been consistent with results from other countries (6–11), indicating an increasing asthma prevalence. However, the prevalence rates of asthma found in the

Finnish studies, including the recent studies based on selected (17) as well as random samples (18), have been lower than in other Nordic countries with the exception of Iceland (19). In Finnish military conscripts 18–19 years of age, the prevalence of asthma increased from 0.3% in 1966 to 1.8% in 1989 (14). Studies of selected populations in northern Finland showed a prevalence of asthma of around 2.6% (20). In a rural population in southern Finland in age groups over 64 years, the prevalence of asthma was 2.9% among men and 3.8% among women (21).

The present study is the first respiratory survey on the general adult population in northern Finland. The prevalence rates for asthma and respiratory symptoms associated with asthma and their relation to demographic data in adults in northern Finland have been investigated by well-validated methods.

Material and methods

Study area

On 31 December 1995, Lapland, the northernmost province of Finland, had a population of 201 411, representing 4% of the entire population of Finland. The area of Lapland is 93 057 km², which is 31% of the area of Finland, and exhibits a low population density. The study area consisted of four towns and their surroundings and nine municipalities, containing 70% of the population of Lapland. The main occupations were pulp and paper industries, social services, forestry, trade, and farming. The yearly mean temperature in the coastal area is +1°C and –1°C inland, and over the whole area the average in July is +15°C and in January –13°C.

Study population

The population in the study area at the end of 1995 was 140 349 persons, of which subjects aged 20–69 years represented 64%. A half (51%) lived on the coast, and a majority (57%) were living in urban areas. A random sample of 8005 subjects 20–69 years of age was taken evenly throughout the study population; i.e., the number of persons invited from the various regions correlated with the number of persons in various age cohorts living in the respective regions.

Questionnaire

The Finnish version of the FinEsS questionnaire (FFQ), which was used in this study, is based on the OLIN questionnaire (OQ) (10), which has been used in several Nordic studies (10, 22, 23). The OQ was developed from a Swedish version of the BMRC questionnaire (24) with modifications from the ATS (25) and Tucson (26) questionnaires, and it included also two questions from the IUATLD (27) and ECRHS (19) questionnaires. The FFQ includes questions about heredity, respiratory symptoms, asthma, chronic bronchitis, symptoms under special circumstances, use of asthma medication, profession, and smoking habits.

Questions about respiratory symptoms and diseases required either yes or no/don't know answers. All symptoms given in the results refer to current symptoms or to occurrence during the last 12 months. When appropriate, the latter has been mentioned in text and tables. Those who currently smoked or had stopped smoking within the 12 months prior to the postal survey were classified as smokers, while those who had stopped more than 12 months earlier were classified as ex-smokers. The questionnaire, and up to two reminders to those who did not respond, were mailed during winter 1996.

Nonrespondents

The 1284 persons who did not respond to the initial letter, or two reminders, were subjected to a non-response study. Of these, a random sample of 385 persons was taken, of whom three persons had died before the nonresponse study was initiated; thus, 382 persons remained. In September 1996, the FFQ was mailed again to these 382 persons. We attempted to contact by telephone those who did not answer by mail.

Analyses

Statistical analyses were performed with SPSS at the National Institute for Working Life in Umeå, Sweden. The chi-square test was used for bivariate analyses and one-way ANOVA to test trends. Multiple logistic regression analysis was used to calculate the influence of different possible determinants of frequent wheeze, attacks of shortness of breath during the previous 12 months, and physician-diagnosed asthma.

Results

Participation

Out of the 8005 invited persons, four had died before they received the questionnaire, and 64 had moved from the study area; thus, the remaining 7937 persons constituted the original study population. After two reminders, a total of 6633 completed answers were collected, yielding a response rate of 83.6%. The proportion of incomplete answers (no answer or answered both yes and no) for the great majority of questions dealing with diseases, symptoms, or smoking habits was below 2% of the study population. Young men had the lowest participation rate, and women responded better than men (Table 1).

Smoking habits

Men were more often current smokers than women (38.5% vs 27.9%). The majority of men (63.1%) were or had been smokers; 24.6% had stopped – the corresponding figures for women were 42.5% and 14.6%, respectively. Men and women in the younger age cohorts were more often current smokers than those in older cohorts. Among men aged 20–29 years, 47.0% were current smokers compared with 25.4% among those aged 60–69 years, while the corresponding figures among women were 39.7% and 12.5%.

Asthma

The prevalence of physician-diagnosed (“Have you been diagnosed by a physician as having ... ?”) asthma was 6.0% and was similar in men and women. Of the subjects with physician-diagnosed asthma, 69% had wheeze during the previous 12 months; 34% had frequent wheeze, 90% had attacks of shortness of breath, and 76% used asthma medication. The prevalence of both physician-diagnosed asthma and ever (“Have you ever had ... ?”) asthma was higher in young persons, lower in middle-aged persons, and higher in the elderly. No significant sex differences were found. Furthermore, asthma was more common in ex-smokers (7.7%) and less common in current smokers (4.5%) than in nonsmokers (6.4%).

Respiratory symptoms

The prevalence of many respiratory symptoms, particularly frequent wheeze, increased with age and was smoking dependent. As for asthma, the prevalence of wheezing during the previous 12 months and of attacks of shortness of breath was higher in young persons, lower in middle-aged persons, and higher in the elderly; this pattern was especially apparent for men. Questions about wheezing yielded a slightly higher prevalence in men, the opposite being found for attacks of shortness of breath

Table 1. The study sample: randomized, deceased, moved from area; original study population; and responders by age and sex (M: male, F: female)

	Age cohort (years)												All M + F
	20–29		30–39		40–49		50–59		60–69		20–69		
	M	F	M	F	M	F	M	F	M	F	M	F	
Randomized sample	819	725	959	936	1071	950	687	698	531	629	4067	3938	8005
Decreased before first contact									2	2	2	2	4
Moved away from Lapland	13	16	14	4	9	1	4	0	1	2	41	23	64
Original study population	806	709	945	932	1062	949	683	698	528	625	4024	3913	7937
Didn't want to participate	0	1	1	0	3	3	1	3	2	6	7	13	20
Answered by mail	538	539	663	706	734	673	490	528	354	458	2779	2904	5683
Completed by telephone	17	17	25	36	44	50	33	34	31	36	150	173	323
Completed after reminder	31	30	53	60	67	103	59	73	79	72	289	338	627
Answers, total	586	586	741	802	845	826	582	635	464	566	3218	3415	6633
% of original study population	73	83	78	86	80	87	85	91	88	91	80	87	84

(Table 2). Wheezing, attacks of shortness of breath, or severe cough were reported by 14.1% when exposed to cold air, 18.4% at physical exertion, and 26.3% at exercise in cold air.

Multivariate relationships

Significant risk factors for asthma were a family history of asthma (OR 2.9) and age. Asthma was significantly more common (OR 1.6) in subjects over 60 years of age, while ages of 30–50 years were associated with a significantly lower risk (OR 0.6) than ages less than 30. Sex, socioeconomic group, area of domicile, and smoking habits were not associated with a significantly increased risk of asthma (Table 3).

The risk of attacks of shortness of breath showed similarities with that of asthma; however, both ex-smoking (OR 1.3), and current smoking (OR 1.4) were significant risk factors for the condition. Significant risk factors for frequent wheeze were increasing age (OR 4.0 for ages 60–69 years vs 20–29 years), family history of obstructive airway disease (OR 2.6), and current and ex-smoking (OR 3.2 and 1.5, respectively). Furthermore, several socioeconomic

groups were associated with an increased risk of frequent wheeze, mainly students and military professionals (OR 2.5), and manual workers (OR 2.2) (Table 3).

Nonrespondents

Out of the 382 persons in the nonresponse study sample, 183 (48%) were successfully contacted. Compared with the responders, the nonresponders were more often young, unemployed men, and smokers. The prevalence rates for symptoms and diseases were not significantly different from the responders of same age and sex in the original study.

Discussion

The results of previously performed, large-scale epidemiologic studies of asthma and respiratory symptoms in general adult populations in Finland were published about 30 years ago (4, 5). They showed a lower prevalence of asthma than in results from other Nordic countries (1–3). Since then, most

Table 2. Prevalence (%) of asthma categories, respiratory symptoms, and combinations of symptoms by age and sex

Disease or symptom	Age cohort (years)													Difference (<i>P</i> value) by		
	20–29		30–39		40–49		50–59		60–69		20–69					
	M	F	M	F	M	F	M	F	M	F	M	F	M + F	Sex	Age class	Smoking habits
Ever-asthma	8.2	6.2	4.0	5.4	3.3	5.9	7.0	7.9	10.0	9.3	6.0	6.7	6.4	0.185	<0.001***	0.004**
Physician-diagnosed asthma	7.7	5.2	3.8	4.7	3.2	5.4	6.9	6.3	10.9	9.6	5.9	6.1	6.0	0.761	<0.001***	<0.001***
Use of asthma medicines	5.8	6.6	3.4	4.6	3.6	5.9	7.6	9.1	5.8	6.9	5.8	6.9	6.3	0.077	<0.001***	0.002**
Wheeze with SOB apart from colds/12 months	7.9	8.8	5.7	6.9	5.6	4.8	6.7	7.6	11.7	7.9	7.1	7.0	7.1	0.025*	<0.001***	<0.001***
Frequent wheeze	4.5	5.0	6.5	4.7	6.0	4.6	8.9	6.3	14.5	10.0	7.6	5.9	6.7	0.006**	<0.001***	<0.001***
Attacks of SOB/12 months	12.9	15.2	8.6	11.2	8.6	12.0	12.2	15.3	15.1	10.8	11.0	12.8	11.9	0.018*	<0.001***	0.009**
Any wheeze/12 months	23.4	21.4	18.2	17.0	17.6	16.8	22.9	19.8	25.6	19.6	20.9	18.7	19.7	0.024*	<0.001***	<0.001***
Long-standing cough	14.8	13.1	15.5	16.3	14.8	17.9	18.0	18.9	20.7	18.9	16.4	17.1	16.7	0.388	<0.001***	<0.001***
Any respiratory symptom	61.3	57.7	52.6	52.0	50.9	57.1	58.4	63.6	62.3	67.8	56.2	59.0	57.7	0.020*	<0.001***	<0.001***

SOB: shortness of breath; M: male, F: female. Difference (*P* values) by age, sex, and smoking habits.

Table 3. Risk factors for frequent wheeze and attacks of shortness of breath during previous 12 months, and physician-diagnosed asthma calculated by multiple logistic regression analysis. Risks in odds ratios (OR) with 95% confidence intervals (CI)

Independent variables		Dependent variables					
		Frequent wheeze		Attacks of shortness of breath		Physician-diagnosed asthma	
Variables	Categories	OR	95% CI	OR	95% CI	OR	95% CI
Age (years)	20–29	1		1		1	
	30–39	1.33	0.90–1.97	0.67	0.51–0.87	0.63	0.43–0.93
	40–49	1.37	0.93–2.02	0.72	0.55–0.94	0.64	0.43–0.93
	50–59	2.27	1.53–3.38	1.03	0.79–1.36	0.95	0.65–1.39
	60–69	4.01	2.72–5.93	0.98	0.74–1.31	1.59	1.10–2.31
Sex	Men	1		1		1	
	Women	0.87	0.69–1.10	1.29	1.08–1.53	1.06	0.84–1.35
Smoking habits	Nonsmokers	1		1		1	
	Ex-smokers	1.51	1.12–2.03	1.34	1.09–1.65	1.24	0.95–1.61
	Smokers	3.24	2.53–4.14	1.39	1.16–1.66	0.77	0.59–1.01
Family history of OAD	No	1		1		1	
	Yes	2.65	2.16–3.25	2.63	2.24–3.08	2.94	2.38–3.64
Area of domicile	Coastal	1		1		1	
	Inland	1.07	0.88–1.31	1.06	0.91–1.24	1.10	0.90–1.36
Socio-economic group	Professionals	1		1		1	
	Manual workers						
	– Industry	2.20	1.45–3.36	1.00	0.76–1.31	1.07	0.75–1.54
	– Service	2.20	1.47–3.31	0.94	0.74–1.21	0.79	0.56–1.12
	Assist. non-manual workers	1.27	0.77–2.10	0.92	0.68–1.24	0.99	0.66–1.47
	Self-employed	1.65	0.90–3.02	0.95	0.63–1.45	1.09	0.65–1.83
	Housewives	1.89	0.82–4.37	0.67	0.37–1.24	0.70	0.31–1.62
	Students/military professionals	2.46	1.33–4.54	1.37	0.94–1.98	1.37	0.82–2.28

OAD: obstructive airways disease.

of the published papers from Finland have been register-based (12, 13), or have dealt with selected populations (14–17, 20).

The study population in our study was larger than in the previously performed population-based Finnish studies (4, 5, 18), and the response rate was high (83.6%). The findings from nonresponders support the result of the original questionnaire survey, indicating that the results are representative of the whole adult population of Finnish Lapland. Furthermore, most of the questions in the FFQ had been widely used and validated in other Nordic studies (10, 11, 22, 23), and the quality of the answers was high. Incorrect answers (no answer or both yes- and no-answers) to most questions were below 2% of all answers. All these aspects contribute to the validity of the results and give a reliable basis for comparison with results from other studies.

The main result from the study is that the prevalence of asthma is on the same level as in other Nordic countries. Two separate questions were used to assess the prevalence of asthma, ever asthma, and physician-diagnosed asthma. According to these two questions, the prevalence of asthma was 6%, a result similar to the results of the 1986 OLIN study in northern Sweden (10) and to recent Swedish results (11). The prevalence of the use of asthma medication was also 6%. Wheezing with breathlessness apart from colds was reported by 7%. This question

combination developed for the IUATLD questionnaire (27) was also used in the ECRHS (19), and yielded a slightly higher prevalence in comparable age groups in the Swedish part of the ECRHS, particularly in northern Sweden (28).

The questions about wheezing yielded higher prevalence rates than have previously been found in Finnish general adult population samples (4, 5). In 1966, any wheeze during the past year was reported by 7% (5). In a selected sample in northern Finland in 1986, wheezing was reported by 10% in cold weather and by 16% in exercise (20). Similar questions yielded prevalence rates of 14% and 18%, respectively, in our study. Furthermore, a considerably higher proportion of adults used asthma medicines than previously (29).

The sex differences in prevalence of asthma and respiratory symptoms were small. As found by others (2, 4, 5, 10, 22, 23), all symptoms were higher among smokers. The risk factor analysis based on multiple logistic regression analysis showed that family history of asthma, as found by others (11, 28), was the most important risk factor (OR 2.9), and, furthermore, that asthma is most common in young and elderly people, results similar to those found in northern Sweden (11).

Smoking was a risk factor mainly for frequent wheeze (OR 3.2), which is a common symptom also in COPD and chronic bronchitis (10). Among the

socioeconomic groups, manual workers, students, and military professionals were associated with increased risk of symptoms, mainly frequent wheeze. The elevated risk for students and the military professionals probably reflects a high prevalence of asthma in young people. Area of domicile had no significant influence on symptoms or asthma in this sparsely inhabited area.

In conclusion, the prevalence of asthma in northern Finland is similar to that in Sweden and other Nordic countries. The increased prevalence of symptoms associated with asthma, as well as increased use of asthma medicines found in our study, show that there has been a real increase in the prevalence of asthma in Finland.

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