

## Atopic Diseases in Norwegian Lapps

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The occurrence of atopic diseases in Lapps was estimated by reviewing medical records in the local health centre of Kautokeino. Atopic diseases were found to be present or to have occurred in 306 (10.4%) of the 2,950 individuals reviewed, with no difference between males (10.6%) and females (10.2%). Atopic diseases were detected more frequently in those under 20 years (19.4%) than in those 20 years or older (5.5%). On average, asthma occurred more frequently in males (4.2%) than in females (2.9%), even more so in the younger age group (males = 7.5%, females = 2.5%). Similarly, the occurrence of allergic rhinoconjunctivitis was remarkably low, but found in more males (2.3%) than in females (1.9%) with the frequency increasing in those under 20 years (males = 4.7%, females = 2.9%). A peak prevalence was observed in the age group 10-19 years (6.1%). On the other hand, atopic urticaria was found more frequently in females (1.0%) than in males (0.3%), whereas atopic dermatitis occurred with the same frequency in females (6.4%) and males (6.1%) followed by the frequency in those under 20 years increasing to 13.9% and 13.5%, respectively. **Key words:** Asthma, allergic rhinoconjunctivitis, atopic dermatitis, Lapps, ethnicity, environment

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Atopic dermatitis, bronchial asthma and allergic rhinitis as well as certain forms of gastrointestinal allergy and urticaria are usually referred to as atopic diseases (1). One of the concepts underlying the atopic concept, the inherited constitution as expressed by the tendency to familial clustering, is also one of the main background factors for atopic disease. As early as 1650 a familial occurrence of bronchial asthma was reported by Sennertus (2), and seasonal hay fever has been well recognized since its description by John Bossock in the early 19th century (3, 4). Congestions, secretion from and itching of the nose or eyes in spring or summer was explained later in the 19th century as being caused by pollen exposure (5). Pollen is the most common allergen causing allergic rhinitis (6, 7) even when the screening procedure has included skin testing to multiple allergens such as animal dander, moulds and house dust mite (8).

Atopic dermatitis was recognized as a clinical entity by French dermatologists in the late 19th century and was first given the term "neurodermatitis" (9). Besnier (10) described "prurigo diathésique" as a disease with a tendency to familial occurrence, often associated with symptoms of asthma and allergic rhinitis, and the term "Prurigo Besnier" has been used up to now. The phenomenon of altered reactivity was called "atopy" by Coca & Cooke in 1923 (11), based on observations by Cooke & Van der Veer (12) in a group of patients with asthma, hay fever, urticaria and angioneurotic oedema who showed common features of "anaphylaxis" after sensitization

to certain proteins. An inherited disposition was stated as a major background factor. In 1933, after the atopic concept was established, the term "atopic dermatitis" was suggested to distinguish the disorder from other forms of dermatitis (13). The immunological classification of allergic reactions by Gell & Coombs (14) and the subsequent discovery of immunoglobulin E (IgE) in the 1960s (15, 16) was the basis for an immunological approach to the atopic concept.

The frequencies of atopic diseases show wide variations in different parts of the world and a prevalence of all atopic manifestations in the whole population is estimated to be as high as 20% or even higher (17). Genetic predisposition and environment have been discussed as underlying factors (18). The studies performed, however, are of different designs and comparisons are, therefore, difficult. The variation may be attributed to a multitude of factors such as ethnic differences, inclusion criteria, climate, other environmental factors etc. Studies also vary in the epidemiological definitions they apply and it is not always clear whether the symptoms are present or past. Atopic diseases are common in childhood and cross-sectional surveys of the Norwegian population indicate that 14-17% of the children under the age of 15 have had some kind of atopic disease (19). One particular feature of the variation is the increase over time. In a Norwegian study it was shown that during the 10-year period from 1975 to 1985 the prevalence of allergic rhinoconjunctivitis, asthma and atopic dermatitis was doubled in the age group 0-15 years (19). In a similar Swedish study it was shown that during the 10 year period from 1971 to 1981 the prevalence of asthma in childhood increased from 1.9% to 2.8% and of allergic rhinitis from 4.4% to 8.4% (20). Also in a coinciding study of atopic dermatitis in two Danish twin cohorts born in 1960-64 and 1970-74, the cumulative incidence (in 0-7 years olds) increased from 3 to 10% over the interval (21). A recent Swedish study demonstrated that the prevalence of atopic diseases increases the further north you go (20). Thus, the highest prevalence of asthma and rhinoconjunctivitis in Norwegian schoolchildren is found in the 3 northernmost counties (Bolle R et al., personal communication). The increase of prevalence over time together with the geographic pattern may indicate the appearance of new factors in the outdoor and/or indoor environment acting as adjuvants to common allergens.

There are to my knowledge no published studies of atopic diseases among Lapps other than a study from Finland (22) where 23 (12%) of 185 Lappish subjects over the age of 15 were shown to have or to previously have had some kind of atopic disorder.

The present study was initiated by an interest in the actual prevalence of atopic diseases in this distinct and well-defined ethnic group of people. Moreover, it was of interest to know whether our findings in this study differed from those found in previous studies in non-Lappish individuals in nearby situated

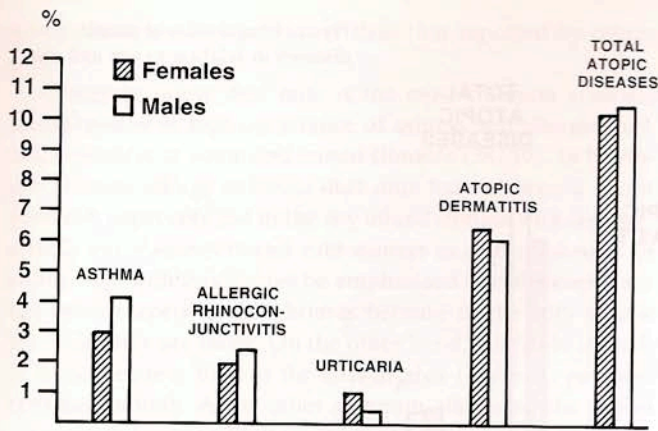


Fig. 1. Atopic diseases in per cent of the total population.

geographical areas, e.g. whether ethnic, environmental or other factors might interfere with the frequency of atopic disease.

#### MATERIAL AND METHODS

In the summer of 1991 the author made a careful registration of all patients who had ever sought medical help or were registered as having atopic diseases by reviewing 2,950 medical records in the local health centre of Kautokeino comprising 99.6% of the 2,963 people living in Kautokeino at that time. Because of the large number of atopic individuals it was not

possible to discriminate between Lapps and non-Lapps in each case. However, it is well known that the population of Kautokeino consists of 85% pure Lapps and 15% non-Lapps.

The  $\chi^2$ -test was used to evaluate group differences.

#### RESULTS

Atopic diseases were found to be present or to have occurred in 306 (10.4%) of the 2,950 individuals reviewed, with no significant difference between males (160/1512 = 10.6%) and females (146/1438 = 10.2%) (Fig. 1). Atopic diseases occurred more frequently in those under 20 years (19.4%) than in those 20 years or over (5.5%) (Table I). On average, asthma occurred more frequently in males (63/1512 = 4.2%) than in females (42/1438 = 2.9%) (Fig. 1), even more so in the younger age group (males 38/510 = 7.5%, females 13/519 = 2.5%) (Fig. 2), which is, statistically, a significant result ( $p \leq 0.001$ ).

Allergic rhinoconjunctivitis also occurred more frequently in males (35/1512 = 2.3%) than in females (28/1438 = 1.9%) (Fig. 1), those under 20 years being responsible for the difference (males 24/510 = 4.7%, females 15/519 = 2.9%) (Fig. 2) without, however, reaching statistical significance.

Atopic urticaria, on the other hand, occurred more frequently in females (14/1438 = 1.0%) than in males (5/1512 = 0.3%) (Fig. 1) whereas atopic dermatitis occurred with the same frequency in females (92/1438 = 6.4%) and males (92/1512 = 6.1%) (Fig. 1). When relating the material to age, however, atopic dermatitis was found in 13.9% of females and

Table I. Frequencies of atopic diseases in different age groups

Age (years)	Asthma	Allergic rhinoconj.	Urticaria	Atopic dermat.	Total atopic diseases
0-4	$\frac{11}{246} = 4.5\%$	$\frac{1}{246} = 0.4\%$	$\frac{3}{246} = 1.2\%$	$\frac{37}{246} = 15.0\%$	$\frac{49}{246} = 20.0\%$
5-9	$\frac{14}{245} = 5.7\%$	$\frac{5}{245} = 2.1\%$	$\frac{3}{245} = 1.2\%$	$\frac{31}{245} = 12.7\%$	$\frac{48}{245} = 19.6\%$
10-14	$\frac{13}{269} = 4.8\%$	$\frac{17}{269} = 6.3\%$	$\frac{4}{269} = 1.4\%$	$\frac{32}{269} = 11.9\%$	$\frac{51}{269} = 19.0\%$
15-19	$\frac{13}{269} = 4.8\%$	$\frac{16}{269} = 6.0\%$	$\frac{3}{269} = 1.1\%$	$\frac{41}{269} = 15.2\%$	$\frac{52}{269} = 19.3\%$
Average	$\frac{51}{1029} = 5.0\%$	$\frac{39}{1029} = 3.8\%$	$\frac{13}{1029} = 1.3\%$	$\frac{141}{1029} = 13.7\%$	$\frac{200}{1029} = 19.4\%$
20-29	$\frac{12}{541} = 2.2\%$	$\frac{8}{541} = 1.4\%$	$\frac{3}{541} = 0.6\%$	$\frac{26}{541} = 4.8\%$	$\frac{43}{541} = 7.9\%$
30-39	$\frac{11}{444} = 2.5\%$	$\frac{8}{444} = 1.8\%$	$\frac{3}{444} = 0.7\%$	$\frac{12}{444} = 2.7\%$	$\frac{27}{444} = 6.0\%$
40-49	$\frac{13}{394} = 3.3\%$	$\frac{5}{394} = 1.3\%$	$\frac{0}{394} = 0\%$	$\frac{3}{394} = 0.8\%$	$\frac{16}{394} = 4.1\%$
50-59	$\frac{5}{230} = 2.2\%$	$\frac{1}{230} = 0.4\%$	$\frac{0}{230} = 0\%$	$\frac{1}{230} = 0.4\%$	$\frac{6}{230} = 2.6\%$
$\geq 60$	$\frac{13}{312} = 4.2\%$	$\frac{2}{312} = 0.6\%$	$\frac{0}{312} = 0\%$	$\frac{1}{312} = 0.3\%$	$\frac{14}{312} = 4.5\%$
Average	$\frac{54}{1921} = 2.8\%$	$\frac{24}{1921} = 1.2\%$	$\frac{6}{1921} = 0.3\%$	$\frac{43}{1921} = 2.3\%$	$\frac{106}{1921} = 5.5\%$

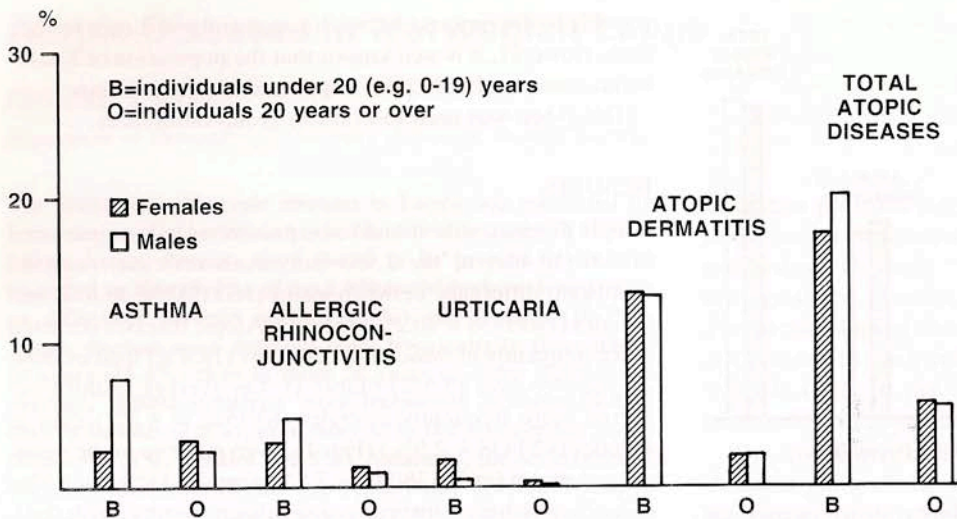


Fig. 2. Frequencies of atopic diseases in relation to sex and age.

in 13.5% of males in those under 20 years with the corresponding figures for those 20 years or over being 2.2% for females and 2.3% for males (Fig. 2). Allergic rhinoconjunctivitis occurred 3 to 4 times more frequent in the age group 10–19 years than in any other age group whereas the frequency of asthma, atopic dermatitis and urticaria was fairly constant in the age groups under 20 years (Table I).

## DISCUSSION

The difficulty of establishing a diagnosis is well known in atopic research (23, 24). The current figures for the frequency of atopic disease are based on the information given in the medical records and are, of course, subject to errors. The diagnosis of asthma, allergic rhinitis, urticaria and atopic dermatitis had been made by general practitioners at the local health centre in Kautokeino, although several cases were confirmed by a pediatrician or a dermatologist. Although the present investigation gives figures for both past and present symptoms of atopic diseases, the prevalence found must be regarded as a minimum prevalence since there are indications that cases of atopic diseases have not been recorded. Atopic dermatitis is usually the first sign of atopy in childhood and most such cases have their onset in infancy. Thus, episodes of atopic dermatitis in infancy can, in some cases have been misunderstood by the doctor or even forgotten by the parents. A diagnosis of bronchial asthma is often made in children 1–6 years of age whilst allergic rhinoconjunctivitis symptoms usually begin between the ages of 5 and 19.

Ethnic origin and inherited disposition are major background factors in atopic diseases (25–27). Regional variations in the frequency of atopic diseases shown by a higher prevalence in Northern than in Southern areas of Scandinavia (20) may be due to ethnic or environmental factors as well as differences in the criteria used for diagnosis.

Immunological responses such as IgE production may be genetically controlled, e.g. under the influence of a dominant gene on chromosome 6 (28), whereas the emergence of the clinical syndrome is probably inherited polygenically as well as being influenced by environmental factors. From previous

studies (29) we know that the Lapps have a different HLA-pattern from non-Lappish Norwegians, and as a unique ethnic group of unknown origin and with a high degree of intermarriage they could have another frequency of atopic diseases than non-Lappish Norwegians. There is, however, no evidence of consistent influence by the HLA-system on atopic diseases (30). Even though our patients consisted of 85% Lappish and 15% non-Lappish Norwegians we believe that possible differences in the frequency of atopic diseases between the two groups will not influence the results as such.

There is a conspicuous distinction in the frequency of atopic diseases between those under and those over 20 years of age in this study. The frequency of about 20% of total atopic diseases in individuals under 20 years found in this study is in accordance with other studies (20, 31–33, Bolle R et al., personal communication), whereas a frequency of 5.5% for those over 20 years is obviously too low. The most likely explanation for this must be that adult people for different reasons are not seeking medical help. Some people might in fact have only minor atopic symptoms which do not lead them to consult a doctor.

The present figures for the frequency of atopic dermatitis in subjects under 20 years (Table I) are in agreement with the findings reported in an unpublished study of atopic diseases among 11,000 schoolchildren in Northern Norway in the age group 7–13 years showing a cumulative incidence of 11.8% for atopic dermatitis (Bolle R et al., personal communication).

The present prevalence of asthma, about 5% in subjects under 20 years, is the same as that found in a previous study from Northern Norway (Bolle R et al. personal communication), in reports from the UK (25), Australia (34) and USA (35), but is in contrast to most Swedish studies (1.4%, 36; 2.7%, 31). Åberg (20), however, found the frequency of asthma (4.1%) in Northern Sweden (Kiruna) more in line with our findings in Kautokeino, i.e. almost twice as high as in Southern parts of Sweden (Gothenburg).

The higher incidence of bronchial asthma and allergic rhinoconjunctivitis in boys than in girls under 20 years (Fig. 2) is in accordance with the findings of others (37). The total frequency of allergic rhinoconjunctivitis for both sexes in this age

group, however, is much lower than that reported by others (20).

Allergy to house dust mite is the most common etiologic factor related to high occurrence of asthma and allergic rhinitis, especially in warm and humid climates (38, 39). In Northern Norway allergy to house dust mite has not been a major problem, especially not in the dry inland climate with comparatively warm summers and cold winters as in Kautokeino. In connection with this it must be emphasized that the Lapps are not using carpets in their houses because of the very special footwear they are using. On the other hand, allergy to moulds is more frequent than in the coastal area (Bolle R, personal communication). As to other common allergens, the pollen exposure is lower in Kautokeino than in other parts of Northern Norway and the pollen season is very short (Høeg HI, personal communication). The nature of the vegetation makes for a sparse pollen production; in fact, most of the pollen found has been brought there from southern parts of Finland. Moreover, the nomadic Lapps move with their reindeer to mountainous coastal grazing areas, which are pollen free, before the pollen season in Kautokeino begins. Subjects with pollen allergy may, therefore, avoid pollen exposure altogether or if symptoms appear, may seek medical help outside Kautokeino. Thus, a possible pollen allergy may not have been recorded by the health centre of Kautokeino. On the other hand, young people (e.g. schoolchildren) remaining in Kautokeino until the school year is finished and the pollen season has started, may be responsible for the peak frequency of allergic rhinoconjunctivitis seen in the age group 10–19 years.

Talking to inhabitants of Kautokeino it appeared that some people, for a short period in the summer, are suffering from a so-called "summer cold" which undoubtedly represents some cases of pollen allergy.

Exposure to animal dander is very high in this area. Besides reindeer, every Lapp family has one or more dogs living close together with the family. In addition there are more smokers in northern areas than in other parts of the country. Similarly, in a Swedish study (20) the number of people smoking was found to be higher in the northern parts of the country (Kiruna) than in other areas. A causal relationship between exposure to animal dander and tobacco smoke and disease could, however, not be proved (20).

Outdoor air pollution such as soot and CO<sub>2</sub> is often mentioned in relation to air passage allergy, but is generally at a lower level in Kautokeino than in most other parts of Norway. Consideration must also be given to how the indoor environment is influenced by the outdoor temperature, i.e. chemical pollution from new building materials remains indoors due to the efficient insulation applied in colder climates in order to save energy. Mucous irritation in the upper respiratory tract usually gives the impression of dry air. Investigations, however, have shown that there is no relationship between this symptom and measured air humidity (40). The Lapps spend most of their time outdoors, moving around with their reindeer. These factors may all contribute to the low frequency of air passage allergy symptoms among Lapps.

In conclusion, the frequency of total atopic diseases among

Lappish individuals under 20 years was comparable with other studies (19, 20, 31–33), whereas those over 20 years had a remarkably low frequency of both allergic rhinoconjunctivitis and atopic dermatitis. The present study gives no answer as to whether ethnic factors may have contributed to these discrepancies. Hence, clinical studies together with IgE and skin testing are needed to clarify possible differences in the frequencies of atopic diseases between Lappish and non-Lappish Norwegians.

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