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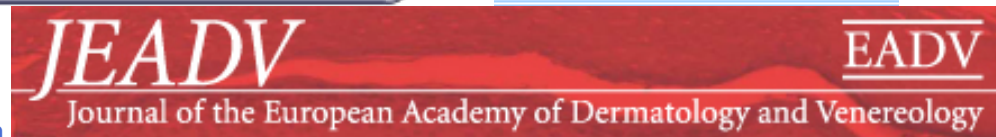
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ORIGINAL ARTICLE

Atopic dermatitis and respiratory symptoms in Russian and northern Norwegian school children: a comparison study in two arctic areas and the impact of environmental factors

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Key words

- ☐ atopic dermatitis

ABSTRACT

Background The increase in atopic diseases during recent decades has been related to environmental factors such as indoor and outdoor pollution and the ingestion of certain foods. On the other hand, studies from Eastern Europe (with heavy air pollution) have reported a lower prevalence of atopic diseases and sensitization in their schoolchildren than in children living in Western Europe.

Objectives This study compares the frequency of atopic diseases and respiratory symptoms in two geographically close arctic areas and points to possible risk factors for development of the diseases.

Methods A total of 1734 schoolchildren (1183 in Nikel and 551 in Sør-Varanger) were studied using identical, four-page, self-administered questionnaires.

Results Atopic diseases were reported in 38.7% of Norwegian and in 24.2% of Russian children ($P < 0.001$). Atopic dermatitis (AD) (23.6% vs 7.9%; $P < 0.001$) and allergic rhinoconjunctivitis (AR) (20.6% vs 14.7%; $P < 0.001$) occurred more frequently in Sør-Varanger, whereas 'self-reported' asthma (12.3% vs 13.1%) was similar in both areas. However, respiratory symptoms such as coughing, wheezing, breathlessness and bronchitis were 3–4 times more frequent in Nikel ($P < 0.001$).

Conclusion This study disproves a previous hypothesis, i.e. that air pollution must be a major risk factor for the development of atopic diseases. Nevertheless, respiratory tract symptoms may be provoked by environmental pollution. Possible explanations for the higher frequency of atopic diseases in Sør-Varanger may be found in socio-economic and lifestyle differences between the two populations.

Introduction

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Atopic diseases now affect more than 25% of children in northern Europe.^{1–4} The increase during recent decades has been substantial^{1–3,5} and some have attributed this increase to environmental factors such as indoor and outdoor pollution, infections and the ingestion of certain foods.^{6–8} A recent Swedish study has also reported higher prevalence of allergy in colder, more northerly regions.²

The International Study of Asthma and Allergies in Childhood (ISAAC) has shown marked variations in the prevalence of atopic diseases between countries.⁹ It concluded that prevalence studies of populations in contrasting environments are important to uncover (existing) hypotheses of the cause of disease.

We conducted a prevalence study based on a questionnaire survey in schoolchildren in a heavily polluted town Nikel, Russia, and in a rural area Sør-Varanger community, northern Norway. This study presents the prevalence of atopic diseases among schoolchildren in view of the cultural and environmental differences in these two areas.

Methods

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Study population and data collection

The study was carried out in Nikel, a town on the Kola Peninsula close to the Norwegian border at 70° latitude north, which is built around the nickel-refining industry (fig. 1). About 23 000 people live in this densely populated arctic town. The study was conducted in the spring of 1994 when a

- ☐ respiratory symptoms
- ☐ environmental factors
- ☐ smoking habits
- ☐ residential factors
- ☐ allergy
- ☐

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Table 1 Cumulative incidence of respiratory and atopic diseases among schoolchildren in Nikel, Russia ...

Results

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The frequency of atopic diseases was significantly higher in Norwegian (38.7%) than in Russian (24.2%) schoolchildren ($P < 0.001$). The risk of developing AD and an itchy rash was significantly higher in Sør-Varanger than in Nikel (Table 1).

Urticaria occurred with similar frequency in the two areas, i.e. Sør-Varanger 13.1% and Nikel 13.3% ($P > 0.05$).

The cumulative incidence of asthma according to our definition was found to be nearly twice as high in Sør-Varanger as in Nikel. In contrast, all other respiratory symptoms showed a higher frequency in Russian than in Norwegian children (Table 1).

A highly significant excess of coughing, wheezing/breathlessness and bronchitis was found in Nikel compared with Sør-Varanger ($P < 0.001$). The prevalence of respiratory symptoms due to cold weather, exercise and 'self-reported' asthma was roughly the same in the two study populations. Moreover, AR occurred significantly more frequent in children in Sør-Varanger than in Nikel (Table 1).

In Table 2 some risk factors that may influence the prevalence rate of the atopic diseases in the two study populations are shown. Norwegian children seem more likely to be influenced by smoking and animals, but not indoor dampness, in eliciting AD. Similarly, the risk of developing asthma by being exposed to smoking was more than three times higher in children in Sør-Varanger than in children living in Nikel. Furthermore, the prevalence rate of asthma in children seems to be influenced by pets, more so in Norway than in Russia. In contrast, children in Nikel who were exposed to indoor dampness had a high occurrence of asthma symptoms.

When considering different predictors for eliciting AR, indoor dampness and carpets (in the children's bedrooms) were responsible for a significantly higher risk in Russian than in Norwegian children. Conversely, in families where parents smoked, Norwegian children ran a higher risk of developing AR than Russian children.

The smoking habits of the two populations surveyed are shown in fig. 3. Smoking was much more common in Sør-Varanger (62.4%) than in Nikel (55.2%) ($P < 0.05$), caused by a higher prevalence of female smokers and other family members (i.e. siblings and grandparents) being smokers in Sør-Varanger. It was quite the opposite in Nikel, where the number of fathers smoking was significantly higher than in Sør-Varanger ($P < 0.001$). Table 3 shows residential characteristics and living habits in the two areas. The standard of living is completely different in these two areas. The majority of children in Nikel live in small blocks of flats where most rooms have carpets and where the floor area is less than 55 m². Additionally, children often sleep in their parents' bedroom. More than half of the children in both Nikel and Sør-Varanger were exposed to animals at home.

Discussion

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The major finding in this study was the significantly higher frequency of atopic diseases in Sør-Varanger, Norway, than in the polluted town Nikel, Russia. However, children in Nikel were more likely to elicit lower respiratory symptoms such as dyspnoea, wheezing (without a diagnosis of asthma) and bronchitis than children in Sør-Varanger. Indoor dampness and smoking were the major environmental risk factors influencing the development of allergy in the study populations.

The children who participated in our study were exposed to many risk factors such as allergens, environmental air pollution and arctic climate, which may explain why more than a third of the children had or had experienced atopic diseases or respiratory symptoms.^{2,3,11} Caution has to be exercised when interpreting these data, but overall the results suggest that environmental factors may be critical in disease expression.^{1-3,5-8}


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Fig. 2 The nickel smelter in Nikel.

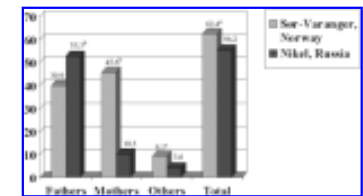

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Fig. 3 Smoking habits in families living in Nikel, Russia, and in Sør-Varanger, Norway: ^a $P < 0.05$; ^b $P < 0.001$...

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There were some methodological limitations in this study. The translation was carried out by two independent translators, both familiar with atopic terminology. However, some language disagreement is to be expected and particularly in questions concerning wheezing and flexural itchy rash.^{9,14} Furthermore, the survey in Sør-Varanger was conducted 2.5 years before the study in Nikel. We do not, however, think that this short space of time would predispose the investigation. Self-administered questionnaires are predominantly used in population studies although the validity may be limited.¹⁻³ A recent study using the same 'symptom-based' questionnaire formula and a clinical examination (by two physicians) showed high specificity and negative predictive value for all three atopic manifestations of AD, AR and asthma, making this questionnaire formula suitable for obtaining a rough estimate of the prevalence of atopic diseases in a study population.¹³ Our two study populations live in completely different political, economical, social and cultural environments, which could have influenced their attitude towards physical complaints and willingness/conscientiousness when replying, i.e. recall bias can therefore not be ruled out.^{9,15,16}

The prevalence of asthma was significantly lower in Nikel than in Sør-Varanger, whereas the 'self-reported' and exercise-induced respiratory symptoms occurred with similar frequency in the two areas. Moreover, lower respiratory infections (i.e. bronchitis/pneumonia) were found to be four times higher in Nikel. To some extent this could be explained by differences in a doctor's diagnosis of asthma as opposed to a lower respiratory infection, i.e. the reflection of different medical practices, diagnostic labelling and number of visits to a doctor. There are no objective methods giving a close relation between bronchitis, bronchial hyper-reactivity and asthma in epidemiological studies.¹⁷ Our results should be interpreted with caution; however, it seems likely that a significant real difference exists in respiratory symptoms in the two investigated areas. Further evidence of this is the doubling in attacks of dyspnoea, wheezing and coughing, which have not been recognized as asthma or a cold. Thus, the higher prevalence of respiratory symptoms in Russian children may to some extent reflect a higher prevalence of undiagnosed non-allergic asthma.

The prevalence of itchy rashes lasting more than 4 weeks, AD and AR were all significantly higher in Sør-Varanger than in Nikel.

The total number of smokers in the families was higher in Sør-Varanger than in Nikel. Furthermore, there was a huge difference in the smoking habits in the two areas, i.e. the number of male smokers was much higher in Nikel than in Sør-Varanger, while the number of female smokers in Sør-Varanger far exceeded that in Nikel. During their first year of life children spend most of their time with their mother. Passive smoking in early life is by far the most documented trigger factor for the development of respiratory symptoms and allergy.^{18,19} Several studies have shown the greater risk of maternal vs paternal smoking, which may to some extent explain the difference in respiratory symptoms in the two areas.^{18,20}

Keeping of pets was widespread and occurred with similar frequency in the two populations; however, the risk of eliciting AD and asthma was higher in Norwegian than in Russian children. This could be a result of differences in the extent to which the children came into contact with pets (i.e. keeping pets outdoors or indoors). Furthermore, modern buildings with poor ventilation, which is reported in 60% of the homes in Sør-Varanger, tend to concentrate allergens indoors and thus elicit atopic symptoms.^{7,8,21,22} Floors with carpets, which may be contaminated with high levels of domestic mite, animal dander, local pollens and mould, etc., were four times more prevalent in Nikel and was found to be a significant risk factor in eliciting AR in Nikel compared with Sør-Varanger.^{8,23} Moreover, exposure to pollen is not likely to be different in these two neighbouring areas.

The border area between Russia and Norway is polluted by Russian smelting industries in Nikel and Zapoljarny on the Kola Peninsula. In the early 1980s extremely high emissions of SO₂ and heavy metals such as nickel, copper and arsenic were measured.¹⁰ During the last decade, however, the release of SO₂ and heavy metals has been reduced, i.e. in 1992 the annual SO₂ emission was 260 000 ton. International guideline values for SO₂, particulate matter and heavy metals are exceeded 10-100 times with unfavourable wind conditions.¹⁰ An increased prevalence of AR, respiratory infections, wheezing and coughing has been reported in children exposed to air polluted with high levels of SO₂ and particulate matter,²⁴⁻²⁶ whereas the primary effect on bronchial hyper-reactivity and asthma is still not clear.^{19,24,27} However, an interesting study from Norway supports the notion that air pollution, such as suspended particulate matter (SPM), may contribute to an allergic response and the inflammation of asthma in at least three different ways. SPM has an irritating effect on the airways, resulting in an inflammatory response and the disruption of the epithelial barrier function. Soot particles in SPM may carry imported allergens down into the airways.²⁸ Moreover, SPM may increase

immunoglobulin E (IgE) production to present allergens in sensitive individuals by modulating the immune response.²⁹ Our study supports the high prevalence of respiratory symptoms such as bronchitis, wheezing and coughing, but not atopic diseases. Thus, our study appears to be consistent with 'evidence' that air pollution is not a major risk factor for the development of atopic diseases, although it may exacerbate atopic skin and respiratory symptoms.³⁰

In conclusion, we found a lower prevalence of atopic diseases in the polluted town Nikel than in Sør-Varanger. Conversely, respiratory illness and non-specific respiratory symptoms occurred more frequently in the Russian area. Factors such as indoor environment, nutrition, western lifestyle and living conditions may share the responsibility for the high prevalence rate of atopic diseases found in Sør-Varanger. Nikel is in many respects similar to what Norwegian towns were like several decades ago. The standard of living is low, the buildings are well ventilated (although smaller and with poor insulation) and thus atopic diseases are less common.

References

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- 1 Ninan T, Russell G. Respiratory symptoms and atopy in Aberdeen schoolchildren: evidence of two surveys 25 years apart. *Br Med J* 1992; **304**: 873–875.
[MEDLINE](#) [MEDLINE](#) [ISI Abstract](#) [ISI Abstract](#) [CSA Abstract](#) [CSA](#)
- 2 Åberg N, Hesselmar B, Åberg B, Eriksson B. Increase of asthma, allergic rhinitis and eczema in Swedish schoolchildren between 1979 and 1991. *Clin Exp Allergy* 1995; **25**: 815–819.
[CrossRef](#) [crossref](#)
- 3 Dotterud LK, Kvammen B, Lund E, Falk ES. An evaluation of atopic diseases in relation to immediate skin test reactions among schoolchildren in the Sør-Varanger community. *Eur Acad Dermatol Venereol* 1995; **5**: 240–249.
[CrossRef](#) [crossref](#)
- 4 Norrman E, Rosenhall L, Nyström L *et al*. Prevalence of positive skin prick tests, allergic asthma and rhinoconjunctivitis in teenagers in northern Sweden. *Allergy* 1994; **49**: 808–815.
[MEDLINE](#) [MEDLINE](#) [ISI Abstract](#) [ISI Abstract](#)
- 5 Robertson CF, Heycock E, Bishop J *et al*. Prevalence of asthma in Melbourne schoolchildren: changes over 26 years. *Br Med J* 1991; **302**: 1116–1118.
[CrossRef](#) [crossref](#) [MEDLINE](#) [MEDLINE](#) [ISI Abstract](#) [ISI Abstract](#)
- 6 Arshad SH, Mathews S, Gant C, Hide DW. Effect of environmental factors on development of allergic disorders in infancy. *Lancet* 1992; **339**: 1493–1497.
[SYNERGY](#) [Blackwell Synergy](#) [ISI Abstract](#) [ISI Abstract](#)
- 8 Dotterud LK, Van TD, Kvammen B, Dybendal T *et al*. Allergen content in dust from homes and schools in northern Norway in relation to sensitization and allergy symptoms in schoolchildren. *Clin Exp Allergy* 1997; **27**: 252–261.
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- 9 The International Study of Asthma and Allergies in Children (ISAAC) Steering Committee. Worldwide variation in prevalence of symptoms of asthma, allergic rhinoconjunctivitis, and atopic eczema: ISAAC. *Lancet* 1998; **351**: 1225–1232.

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MEDLINE

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CSA Abstract

CSA

- 10 Sivertsen B, Baklanov AA, Hagen LO, Makarova T. Air pollution in the border areas of Norway and Russia. Summary report April 1991–March 1993 NILU. *OR* 1994; **56**: 1–14.

- 11 Dotterud LK. Allergy in North Norwegian schoolchildren. An epidemiological study of atopic diseases among schoolchildren in Sør-Varanger community in relation to environmental factors and with particular reference to atopic dermatitis. Thesis. University of Tromsø, Norway, 1995.

- 12 Steen-Johnsen J, Bolle R, Holt J *et al*. Impact of pollution and place of residence on atopic disease among schoolchildren in Telemark county, Norway. *Pediatr Allergy Immunol* 1995; **6**: 192–199.

MEDLINE

MEDLINE

- 13 Dotterud LK, Falk ES. Evaluation of a self-administered questionnaire on atopic diseases: discrepancy between self-reported symptoms and objective signs. *Eur J Public Health* 2000; **10**: 105–107.

ISI Abstract

ISI Abstract

- 14 Asher MI, Keil U, Anderson HR *et al*. International Study of Asthma and Allergies in Childhood (ISAAC): rationale and methods. *Eur Respir J* 1995; **8**: 483–491.

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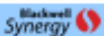
ISI Abstract

CSA Abstract

CSA

- 15 Williams HC, Strachan DP. The natural history of childhood eczema: observations from the British 1958 birth cohort study. *Br J Dermatol* 1998; **139**: 834–839.

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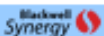
ISI Abstract

CSA Abstract

CSA

- 16 Krämer U, Schäfer T, Behrendt H, Ring J. The influence of cultural and educational factors on the validity of symptom and diagnosis questions for atopic eczema. *Br J Dermatol* 1998; **139**: 1040–1046.

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ISI Abstract

ISI Abstract

CSA Abstract

CSA

- 17 Pattemore P, Asher M, Harrison A *et al*. The interrelationship among bronchial hyperresponsiveness, the diagnosis of asthma and asthma symptoms. *Am Rev Respir Dis* 1990; **142**: 549–554.

MEDLINE

MEDLINE

- 18 Forastiere F, Agabiti N, Carbo GM *et al*. Passive smoking as a determinant of bronchial responsiveness in children. *Am J Respir Crit Care Med* 1994; **149**: 365–370.

MEDLINE

MEDLINE

ISI Abstract

ISI Abstract

- 19 Bråbäck L, Kälvesten L. Urban living as a risk factor for atopic sensitization in Swedish schoolchildren. *Pediatr Allergy Immunol* 1991; **2**: 14–19.

- 20 Young S, Le Souef PN, Geelhoed GC *et al*. The influence of a family history of asthma and parental smoking on airway responsiveness in early infancy. *New England J Med* 1991; **324**: 1168–1173.

MEDLINE

MEDLINE

ISI Abstract

ISI Abstract

- 21 Wickman M, Nordvall SL, Perhagen G *et al*. House dust mite sensitization in children and residential characteristics in a temperate region. *J Allergy Clin Immunol* 1991; **88**: 89–95.

CrossRef



MEDLINE

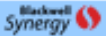
MEDLINE

ISI Abstract

ISI Abstract

CSA Abstract

CSA

- 22 Dotterud LK, Korsgaard J, Falk ES. House dust mite content in mattresses in relation to residential characteristics and symptoms in atopic and non-atopic children living in northern Norway. *Allergy* 1995; **50**: 788–793.
[MEDLINE](#) [MEDLINE](#) [ISI Abstract](#) [ISI Abstract](#) [CSA Abstract](#) [CSA](#)
- 23 Wickman M, Nordvall SL, Perhagen G. Risk factors in early childhood for sensitization to airborne allergens. *Pediatr Allergy Immunol* 1992; **3**: 128–133.
- 24 Von Mutius E, Martinez FD, Fritzsche C *et al*. Prevalence of asthma and atopy in two areas of West and East Germany. *Am J Respir Crit Care Med* 1994; **149**: 348–364.
- 25 Ware JH, Ferris BG Jr, Dockery DW *et al*. Effects of ambient sulphur oxides and suspended particles on respiratory health of pre-adolescent children. *Am Rev Respir Dis* 1986; **133**: 834–842.
[MEDLINE](#) [MEDLINE](#)
- 26 Jaakkola JJK, Paunio M, Virtanen M, Heinonen OP. Low-level air pollution and upper respiratory infections in children. *Am J Public Health* 1991; **81**: 1060–1063.
[MEDLINE](#) [MEDLINE](#) [ISI Abstract](#) [ISI Abstract](#) [CSA Abstract](#) [CSA](#)
- 27 Bråbäck L, Breborowicz A, Dreborg S *et al*. Atopic sensitization and respiratory symptoms among Polish and Swedish schoolchildren. *Clin Exp Allergy* 1994; **24**: 826–835.
[MEDLINE](#) [MEDLINE](#) [ISI Abstract](#) [ISI Abstract](#) [CSA Abstract](#) [CSA](#)
- 28 Ormstad H, Johansen BV, Gaarder PI. Airborne house dust particles and diesel exhaust particles as allergen carriers. *Clin Exp Allergy* 1998; **28(6)**: 702–708.
[SYNERGY](#)  [MEDLINE](#) [MEDLINE](#) [ISI Abstract](#) [ISI Abstract](#)
- 29 Ormstad H, Gaarder PI, Johansen BV, Løvik M. Airborne house dust elicits a local lymph node reaction and has an adjuvant effect on specific IgE production in the mouse. *Toxicology* 1998; **129(2–3)**: 227–236.
- 30 Bascom R, Bromberg PA, Costa DA *et al*. Health effects of outdoor air pollution. Committee of the Environmental and Occupational Health Assembly of the American Thoracic Society. *Am J Respir Crit Care Med* 1996; **153**: 3–50.
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