Evaluation of a self-administered questionnaire on atopic diseases

Discrepancy between self-reported symptoms and objective signs

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Background: Atopic diseases are considered multifactorial and the cause seems to be an interaction between genetic and environmental factors. The present study was undertaken to evaluate the validity of questionnaires compared with clinical diagnoses. Methods: A self-administered questionnaire about atopic diseases and sociodemographic characteristics was completed by 551 out of 575 school children aged 7-12 years and clinical and immunological examinations were attended by 424. Results: The sensitivity was low and the specificity high for all atopic manifestations. Conclusion: Atopic dermatitis was underestimated and allergic rhinoconjunctivitis overestimated, whereas asthma did not differ. Symptom-based questionnaire studies seem to be useful epidemiological tools for obtaining rough estimates of the frequency of atopic diseases.

Keywords: allergic rhinoconjunctivitis, asthma, atopic dermatitis, sensitivity, specificity

Atopic diseases are common and appear to be increasing. Epidemiological investigations have frequently been carried out on schoolchildren, but data from Arctic areas are limited. Few studies have used both a self-administered questionnaire and a clinical examination to evaluate the prevalence of atopic diseases. A particular problem when studying atopic diseases is separating individuals with mild symptoms of atopy from healthy individuals. It seems that there is rather a continuum and no clear-cut border between healthy people and people with mild illness.

The present study was undertaken in order to evaluate the validity of a questionnaire when compared with physician’s diagnoses based on clinical examinations and skin tests.

METHODS

Study population and data collection

This paper is based on a population study of schoolchildren living in the community of Sør-Varanger, an arctic area in northern Norway populated by 9,810 inhabitants. Between October 1991 and March 1993 a four-page, self-administered questionnaire, previously described in detail, was distributed to all 7-12 year old schoolchildren and completed by 95.8% (551 of the 575 children). A systematic clinical and allergological examination was attended by 424 (77%) and each child was examined by a general practitioner (GP) and a dermatologist. A total of 420 children were skin prick tested and sera were collected from 415 measurements.

Cumulative incidence was defined as the proportion of children with past and/or present symptoms and point prevalence the number of children with symptoms and signs at the time of the investigation.

Questionnaire survey

In this paper atopy refers to the three main atopic manifestations, i.e. atopic dermatitis (AD), asthma and allergic rhinoconjunctivitis (AR).

In the questionnaire survey the diagnosis of AD, asthma and AR was ‘symptom-based’. AD was diagnosed if the child had ever had a rash lasting more than 4 weeks combined with itching and/or localised in typical areas such as face and flexurals areas (e.g. elbows and knees). The asthma diagnosis was based on an affirmative answer to either one or both of the following two questions: ‘Has the child ever suffered from asthma?’ and ‘Does the child wheeze, cough or have attacks of breathlessness (asthma) after exposure to extrinsic factors (grass, animals, food, house dust?)’ AR was defined as periods of symptoms involving the nose/eye (sneezing, stuffy nose/itching).

Clinical study

A clinical diagnosis of AD was set according to the criteria of Hanifin and Rajka. Asthma was diagnosed if the child had had three or more recurring attacks of bronchial obstruction causing wheezing, coughing or heavy breathing due to extrinsic factors such as animal dander,
pollen, house dust or food. A pathological peak expiratory flow (PEF) was used as a supplement for a diagnosis of asthma. AR was defined as described in the questionnaire survey.

Data analysis
To assess the validity of both the symptom-based questionnaire diagnosis and the clinical diagnosis, the sensitivity, specificity and predictive values were computed. The clinical diagnosis served as a reference. The sensitivity indicates what proportion of children with a clinical diagnosis of AD/AR or asthma are identified by a positive symptom-based diagnosis of AD/AR or asthma. The specificity indicates what proportion of children without AD/AR or asthma according to the clinical diagnosis also had a negative symptom-based diagnosis. The positive predictive value represents what proportion of children without AD/AR or asthma according to the symptom-based diagnosis had a negative clinical diagnosis.

RESULTS
The cumulative incidence of atopic diseases is shown in Table 1. Flexural lichenified dermatitis alone or in combination with other features diagnostic for AD was present in 88% of the children. Twenty children reporting symptoms of AD in the questionnaire survey were not clinically investigated and 28 children with AR did not turn up for the clinical examination, whereas four children, who according to the questionnaire had a symptom-based diagnosis of asthma, were not interviewed by the physician.

Table 2 shows the validity of AD reported in the questionnaire compared with the clinical diagnosis made by the physician. Diagnosis of AD was confirmed by clinical examination in 87.3% (96/110) of the cases; however, 19.1% (60/314) of those without a symptom-based diagnosis of AD were not interviewed by the physician.

Table 2 Symptom-based diagnoses from questionnaires compared with clinical diagnoses of atopic diseases

<table>
<thead>
<tr>
<th>Symptoms-based diagnoses</th>
<th>Positive %</th>
<th>Clinical diagnoses</th>
<th>Negative %</th>
</tr>
</thead>
<tbody>
<tr>
<td>AD</td>
<td>61.5</td>
<td>AR</td>
<td>72.4</td>
</tr>
<tr>
<td>Asthma</td>
<td>83.9</td>
<td>AD</td>
<td>94.8</td>
</tr>
<tr>
<td>AR</td>
<td>91.4</td>
<td>AR</td>
<td>95.4</td>
</tr>
<tr>
<td>Asthma</td>
<td>80.9</td>
<td>AR</td>
<td>93.8</td>
</tr>
</tbody>
</table>

Table 1 The cumulative incidence of atopic diseases among schoolchildren in Sør-Varanger community

Sensitivity 61.5; Specificity 87.3; Positive predictive value 83.9; Negative predictive value 80.9.

DISCUSSION
The high frequency of atopic diseases found in the questionnaire survey was confirmed during the clinical examinations. In particular, in the clinical examination the frequency of AD was considerably higher than that found in some previous studies. However, the results compare well with data from other Scandinavian studies. The high cumulative incidence of AD in the

Table 1 The cumulative incidence of atopic diseases among schoolchildren in Sør-Varanger community

Questionnaire study n=551 | Clinical examination n=424
---|---
Atopic dermatitis | 23.6 | 36.8
Asthma | 12.3 | 13.2
Allergic rhinoconjunctivitis | 20.6 | 17.9
Total atopic diseases | 38.7 | 50.0

a: p<0.05 ratio of girls:boys.

Comparison between questionnaires (n=551) and clinical examinations (n=424) in the same group of children.

AD: atopic dermatitis; AR: allergic rhinoconjunctivitis

19.1% (60/314) of those without a symptom-based diagnosis of AD were not interviewed by the physician.
clinical study may include cases of contact dermatitis, urticaria and other dermatoses. Nevertheless, the prevalence of AD obtained in this study may be regarded as reliable since each child was carefully and clinically examined by a dermatologist and 88% of them presented flexural lichenified dermatitis in combination with other features diagnostic for AD.\(^9^,\(^12^\)
The figures for asthma and AR obtained in the questionnaire study may appear high, however, these figures were confirmed by the clinical examination. Self-administered questionnaires are largely used in population studies for epidemiological purposes although the validity is limited.\(^1^,\(^2^,\(^11\)) The accuracy of figures obtained from a questionnaire depends on the precision of the questions, the standard of knowledge of those completing the questionnaires and their willingness and conscientiousness in replying.\(^8^,\(^10\)) Because 96% replied, a selection bias can be ruled out; however, some degree of selection bias and volunteer effect may have occurred in the clinical examination since only 77% were interviewed and examined. This may, to some extent, have led to an overestimation of atopy in the clinical examination. In this study more children who did not report AD in the questionnaire survey did in fact have AD than those with a symptom-based diagnosis followed by a negative clinical diagnosis. Thus, episodes of AD in infancy can, in some cases, have been misunderstood by GPs and neglected or even forgotten by parents. The low sensitivity found in this study may be due to lack of recollection by the study subjects in the two study surveys. Mild symptoms seem to be easily forgotten and may have influenced the sensitivity of the validated questionnaire. Some discrepancy between the symptom-based diagnosis and the clinical diagnosis of asthma and AR was also seen. However, the figures for asthma were similar for both diagnoses, indicating that mild and transient airway obstructions are not so easily overlooked or forgotten by parents. Interestingly, relatively many children reported symptoms of AR, but were found negative in the clinical examination. Nasal symptoms, such as perennial non-allergic rhinitis, polyps and other nasal obstructions or infection rhinitis, may be misclassified as AR in a questionnaire survey. On the other hand, mild symptoms of AR have obviously been misunderstood, neglected or forgotten, i.e. not recognised as AR. Although the present study should have been able to evaluate mild symptoms better than sole questionnaire-based studies, there seems to be a continuum and no clear-cut border between health and mild illness.\(^5^,\(^7\) Thus, it seems preferable to combine a clinical examination and an objective measurement of sensitisation. Biological markers such as specific IgE antibodies and skin prick test sensitivity may, however, both occur positive without clinical symptoms.\(^5^,\(^7\)

Taking this into consideration, the symptom-based questionnaire diagnosis, being a relatively objective measure, may be useful when comparing prevalence figures in different study populations. Because of low sensitivity the symptom-based diagnosis cannot be used as a screening instrument for the detection of cases in large study populations. Subsequent clinical examination of people with a positive questionnaire diagnosis is necessary in order to exclude cases with other skin and respiratory disorders.\(^14\) However, the high specificity and negative predictive value make a questionnaire diagnosis suitable for obtaining a rough estimate of the frequency of atopic diseases in a large study population. Since a negative history of atopic diseases is highly predictive for the absence of atopy, it seems justified to restrict clinical examinations to individuals with a positive symptom-based diagnosis.

**References**


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