



ORIGINAL ARTICLE

Good agreement between parental and self-completed questionnaires about allergic diseases and environmental factors in teenagers

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Abstract

Objectives: To study whether the methodological change from parent to index subject as questionnaire respondent affected the prevalence estimates and risk factor patterns for allergic diseases in a longitudinal study.

Study Design and Setting: A prospective study of asthma and allergic diseases among children was begun in 1996 within the Obstructive Lung Disease in Northern Sweden Study. In 2002, about 3,342 (95% of invited) teenagers (13 to 14 years) completed the annual questionnaire. A random sample of 294 (84% of invited) parents also completed the same extended International Study of Asthma and Allergies in Childhood questionnaire. Skin prick tests were performed in 1996 and 2000.

Results: There were no significant differences in the prevalence of rhinitis, eczema, or related environmental factors between parental and self-reports, except for the question of having a dog at home. The absolute agreement was high, whereas the kappa values were fair or moderate. Kappa values of questions regarding parental smoking were 0.8–0.9. Allergic sensitization was the major risk factor for both rhinitis and eczema, and the odds ratios were similar regardless of who reported the condition.

Conclusion: The agreement between the parental and teenagers' reports was good, and the methodological change did not affect the study results. © 2010 Elsevier Inc. All rights reserved.

Keywords: Agreement; Eczema; Parents; Questionnaires; Rhinitis; Teenager

1. Introduction

Most epidemiological studies of asthma and other allergic disorders among children rely on questionnaire reports from their parents [1,2]. In longitudinal studies of children, the participants reach an age when they become a more reliable source of information about symptoms rather than their parents; therefore, a change in methodology along the way is necessary. The consequences of this methodological change in the study of allergic diseases are mainly unknown. Reliable reports from the study respondents are essential for correct conclusions of prevalence, incidence, and risk factor patterns [3].

Even though several longitudinal cohort studies of asthma and allergic conditions have been carried out from early childhood throughout adolescence [2,4–6], only a few studies have compared parental and teenager reports about asthma

symptoms [7–11]. These comparative studies are predominantly based on cross-sectional studies and not evaluations of a methodological change within a longitudinal study [7,8,10,11]. To evaluate the agreement between two observers, a common statistical method to use is the kappa coefficient [12]. In comparative studies focusing on asthma, the agreement between parental and teenager questionnaire reports was good—the kappa estimates were 0.7–0.9—whereas the prevalence of current respiratory symptoms was significantly higher in the reports from the teenagers [7–11]. Results from comparative studies of allergic rhinitis and eczema are very limited. Two available studies reported a fair agreement between parental and teenager reports; kappa estimates were 0.2–0.4 [8,10]. However, the difference in prevalence between the parents' and the teenagers' reports was greater for symptoms of rhinitis than the corresponding difference of disease (i.e., hay fever).

Regarding risk factors for asthma and allergic diseases, such as heredity [13,14] and environmental factors (for instance, indoor dampness [15] and environmental tobacco smoke [16,17]), comparative studies between different sources of information are also uncommon. Two available studies found very good agreement between parental and

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What is new?

- Comparison of parental and teenager questionnaire reports showed a moderate agreement for rhinitis and eczema and very high agreement for environmental factors.
- The methodological change from parent to index subject as questionnaire respondent did not affect the prevalence estimates or risk factor analyses in the longitudinal study.
- Teenagers aged 13 to 14 years were able to complete a questionnaire about allergic diseases and environmental factors in an adequate way.

teenager reports of parental smoking; kappa values ranged from 0.7 to 0.9 [18,19].

The aim of the present study was to examine whether the methodological change from parent to index subject as questionnaire respondent affected the prevalence estimates and risk factor patterns for allergic diseases, mainly rhinitis and eczema, in a longitudinal study.

2. Materials and methods

2.1. Study design

The Obstructive Lung Disease in Northern Sweden (OLIN) pediatric study of asthma, allergy, rhinitis, and eczema started in 1996. The aims and methods have been described previously [2]. All 3,525 children aged 7 to 8 years in three municipalities were invited, and 3,430 (97%) participated. An annual questionnaire was distributed, which included the International Study of Asthma and Allergies in Childhood (ISAAC) questionnaire [1] and additional questions, including respiratory symptoms, allergic conditions, environmental factors, and other potential risk factors [2]. During the first years of the study, the school teachers distributed the questionnaire to the parents annually (response rates: 95%–98%). The questionnaires were completed by the children aged 12 to 13 years in the classroom. In 2002, at 13 to 14 years of age, 3,512 teenagers were invited, and 3,342 (95%) of them completed the questionnaire. Of the responders, 350 teenagers were randomly selected for a comparison study, and the same questionnaire and a prepaid envelope were mailed to their parents, out of whom 294 (84%) completed and returned it [9]. Both questionnaires were completed within a few weeks of each other.

In 1996 and 2000, the children from two of the study areas were invited for skin prick test, and the participation rate at both occasions was 88%. The procedure and the results have been described previously [2,20]. The allergen extracts included a Swedish standard panel of birch, timothy, mugwort,

dog, cat, horse, two mites (*Dermatophagoides farinae* and *Dermatophagoides pteronyssinus*), and two molds (*Cladosporium* and *Alternaria*). A mean diameter of the wheel of 3 mm or more was regarded as a positive test. Of the 294 teenagers who participated in the current comparison study, 187 were skin prick tested in year 2000. The study was approved by the Ethics Committee at Umeå University, Sweden.

2.2. Definitions

The following questions have been answered both by the teenagers and their parents.

Ever rhinitis: Have you/has your child ever had a problem with sneezing or a runny or blocked nose when you/he/she did not have a cold or the flu? [1]

Current rhinitis: In the past 12 months, have you/has your child had a problem with sneezing or a runny or blocked nose when you/he/she did not have a cold or the flu? [1]

Current rhinoconjunctivitis: In the past 12 months, has this nose problem been accompanied by itchy, watery eyes? [1]

Ever hay fever: Have you/has your child ever had hay fever? [1]

Physician-diagnosed rhinitis: Have you/has your child been diagnosed by a physician as having allergic rhinitis or hay fever? [2]

Use of rhinitis medicine in last 12 months: “sometimes, often/periodically/every day” to the question: During the last 12 months, how often have you/has your child taken medicines for allergic rhinitis or conjunctivitis? [2]

Ever eczema: Have you/has your child ever had eczema? [1]

Current eczema: Have you/has your child had this itchy rash at any time in the last 12 months? [1]

Physician-diagnosed eczema: Have you/has your child been diagnosed by a physician as having eczema? [2]

Physician-diagnosed asthma: Have you/has your child been diagnosed by a physician as having asthma? [2]

The teenagers and their parents completed the same questions regarding smoking habits of the parents, house dampness, dog or cat at home, and horse riding during the last 12 months. Data about *family history of rhinitis/eczema* were completed in 1996 by the parents and were defined as a report of rhinitis or eczema in the father, mother, or a sibling.

Allergic sensitization: Having a positive reaction to at least one allergen, based on the results from the skin prick tests performed in 2000.

2.3. Data analysis

The statistical programs Statistical Package for Social Sciences (SPSS Inc, Chicago IL, USA: version 16.0) and Statcalc (Epi Info, Centers for Disease Control and Prevention [CDC], Atlanta GA, USA; Info Version 6) were used

for analyses. Differences in prevalence were calculated using chi-square test, and $P < 0.05$ was considered statistically significant. Missing values (0–5%) in individual questions of symptoms were considered as negative responses in prevalence measurements, whereas missing answers regarding environmental factors were treated as missing and not included in the analyses. The level of agreement between teenagers and parents was assessed by absolute agreement and the kappa coefficient. The absolute agreement is the proportion of matched answers from parents and teenagers, for example, the number of positive responses from both the parent and the teenager added with the negative responses from both the parent and teenager and divided by the total number of responses. The kappa coefficient is a statistical diagnostic test that compares agreement beyond the level of chance [12]. The following definitions of kappa values were used: less than 0.2, slight or poor agreement; 0.21–0.4, fair agreement; 0.41–0.6, moderate agreement; 0.61–0.8, substantial agreement; and more than 0.81, almost perfect agreement [21]. Odds ratios (OR) and 95% confidence intervals (CI) were calculated using multiple logistic regression analysis. The dependent variables were rhinitis and eczema reported by teenagers and parents, respectively. The independent variables included in the model were a family history of the conditions, allergic sensitization, and sex.

3. Results

3.1. Prevalence comparisons

Comparison between the study sample and the entire cohort was made to evaluate selection bias. There were

no statistically significant differences in the prevalence of symptoms between the reports from the randomly selected teenagers in the comparison study and all the teenagers participating in the larger questionnaire study (Table 1). Therefore, the sample was considered to be representative. There were no statistically significant differences between the parents and the teenagers in the prevalence of rhinitis, hay fever, eczema, or use of rhinitis medications. There was a tendency of higher prevalence of rhinitis in the parental reports and higher prevalence of eczema in the teenagers' reports, although these differences were not statistically significant (Table 1). The concordance between teenager and parental reports regarding physician-diagnosed condition is shown in Fig. 1. The greatest concordance between parental and teenager reporting was observed for physician-diagnosed asthma (Fig. 1).

The parents and the teenagers reported almost identical prevalence of smoking mothers (26.1% vs. 26.8%) and fathers (19.0% vs. 20.2%). The prevalence of house dampness, having had a cat at home, and horseback riding were slightly but not significantly higher among the teenagers compared with the parents. However, there was a statistically significant difference in the reports of having had a dog in their home in the last 12 months; 42% according to the teenagers compared with 29% in the parental reports ($P < 0.001$) (Table 1).

3.2. Level of agreement

The absolute agreement was generally high for questions about symptoms ranging from 76% (eczema ever) to 92% (rhinoconjunctivitis in the last 12 months). The level of agreement according to the kappa values was fair to

Table 1

Prevalence of rhinitis, eczema, and environmental factors based on reports from parents and teenagers in the comparison study and all the teenagers in the total questionnaire study, respectively

Variables	Comparison study				Questionnaire study	
	Parents		Teenagers		All teenagers	
	<i>n</i>	%	<i>n</i>	%	<i>n</i>	%
Ever rhinitis	66	22.4	56	19.0	747	22.3
Current rhinitis	55	18.7	41	13.9	549	16.4
Current rhinoconjunctivitis	35	11.9	22	7.5	330	9.9
Ever hay fever	29	9.8	40	13.6	539	16.1
Physician-diagnosed rhinitis/ hay fever	29	9.8	27	9.2	355	10.6
Use of rhinitis medicine in the last 12 months	34	11.6	23	7.8	350	10.5
Ever eczema	113	38.4	132	44.8	1,510	45.2
Current eczema	52	17.7	59	20.0	636	19.0
Physician-diagnosed eczema	63	21.4	58	19.7	631	18.9
House dampness	10	3.5	17	5.9	170	5.2
Cat at home	70	24.4	83	28.9	896	27.3
Dog at home	82	28.6	121	42.2*	1,426	43.4
Father smoker	47	19.0	50	20.2	720	24.1
Mother smoker	72	26.1	74	26.8	908	29.1

* $P < 0.001$.

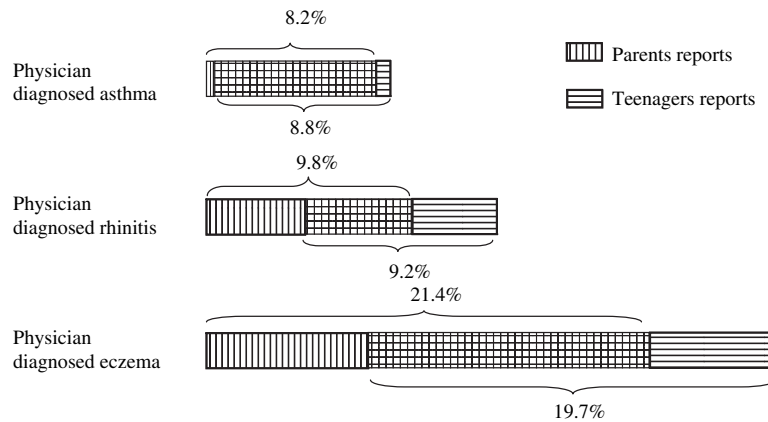


Fig. 1. Prevalence of physician-diagnosed asthma, rhinitis, and eczema as reported by parents and teenagers and their concordance.

moderate, with the highest kappa value for physician-diagnosed eczema (0.58) (Table 2). For environmental risk factors, the agreement between parental and adolescent reports of environmental tobacco smoke exposure from the parents was almost perfect. The kappa value for *father smoker* was 0.83, and for *mother smoker*, 0.87. Because of a few exposed cases, kappa for house dampness was only 0.19 despite 93% absolute agreement.

3.3. Multiple logistic regression

Two statistical models were created with multiple logistic regression analysis; one with the dependent variables reported by the teenagers (Table 3) and the other reported by the parents (Table 4). For the eczema variables, the ORs were similar regardless of who reported the condition. For the rhinitis variables, a tendency of a higher OR was

found in the models based on parental reports compared with the teenagers' reports. Overall, allergic sensitization was the major risk factor for both rhinitis and eczema, and its association with physician-diagnosed rhinitis was very strong; OR was 19.2 (95% CI: 5.8–63.3) for the teenagers' reports and 37.1 (95% CI 7.9–173.3) when the parents reported the condition. A family history of allergic condition reached statistical significance only for the variable ever rhinitis reported by the parents.

4. Discussion

We have compared questionnaire reports from teenagers and their parents to evaluate a methodological change within a longitudinal study. The study showed that the prevalence estimates of allergic diseases, symptoms, and

Table 2

Level of agreement between the teenagers and their parents to questions about rhinitis, eczema, and environmental factors

Parent response	Yes ^a	Yes ^a	No ^a	No ^a			
Teenager response	Yes	No	Yes	No	Kappa	Kappa 95% CI	Absolute agreement %
Variables							
Ever rhinitis	29	37	27	201	0.34	0.21–0.47	78.2
Current rhinitis	24	31	17	222	0.41	0.26–0.55	83.7
Current rhinoconjunctivitis	17	18	5	254	0.56	0.39–0.71	92.2
Ever hay fever	16	13	24	241	0.40	0.24–0.55	87.4
Physician-diagnosed rhinitis/ hay fever	15	14	12	253	0.49	0.32–0.66	91.2
Use of rhinitis medicine in the last 12 months	15	19	8	252	0.48	0.31–0.65	90.8
Ever eczema	88	25	44	137	0.52	0.42–0.62	76.5
Current eczema	31	21	28	214	0.46	0.33–0.58	83.3
Physician-diagnosed eczema	40	23	18	213	0.58	0.46–0.69	86.1
House dampness	3	7	14	263	0.19	0.00–0.41	92.7
Cat at home	65	5	18	199	0.80	0.72–0.87	92.0
Dog at home	80	2	41	164	0.68	0.59–0.77	85.0
Horseback riding	34	1	8	242	0.87	0.78–0.95	96.8
Father smoker	42	5	8	192	0.83	0.75–0.92	94.7
Mother smoker	66	6	8	196	0.87	0.80–0.93	94.9

Abbreviation: CI, confidence interval.

^a Absolute numbers.

Table 3
Risk factor analyses for rhinitis and eczema expressed as odds ratios with 95% confidence interval, (OR 95%CI) reported by teenagers^a

Independent variables	Dependent variables					
	Rhinitis reported by teenager			Eczema reported by teenager		
	Ever	Current	Physician diagnosed	Ever	Current	Physician diagnosed
Family history of condition						
No	1	1	1	1	1	1
Yes	1.25	0.57–2.74	0.48–2.74	1.46	0.78–2.72	1.35
Allergic sensitization						
No	1	1	1	1	1	1
Yes	6.44	2.90–14.30	3.36–19.59	2.84	1.37–5.88	3.60

Abbreviation: OR, odds ratio.

^a Calculations of ORs were performed by multiple logistic regression analysis. Sex was also included in the models.

environmental factors were not affected by who responded to the questionnaire. However, because the agreement between parental and teenager reports of rhinitis and eczema was fair to moderate according to the kappa statistics, the parents and teenagers, to some extent, identified different individuals with the respective diseases.

Compared with other areas, the prevalence of self-reported current rhinoconjunctivitis was slightly lower, whereas that of current eczema was somewhat higher in our study [22]. Although the differences were not statistically significant, there was a consistent tendency of higher prevalence of the rhinitis variables in the parental reports as compared with the teenagers' reports, in contrast to the findings by Renzoni et al. [8]. This was, however, not seen for the eczema variables, where the teenagers tended to report higher prevalence (Table 1). Among the teenagers, symptoms of rhinitis, such as sneezing and a runny or blocked nose, were probably perceived more as nonspecific symptoms, such as a common cold, and not associated with an allergic disease. A visible rash or eczema, on the other hand, could be considered as a more severe symptom among the teenagers, who often are sensitive about their appearance [23].

In a previous comparison of parental and self-reported asthma in this cohort, we found very high level of agreement and only a few significant differences in prevalence of specific asthma symptoms [9]. In comparison, the agreement of rhinitis and eczema between the parental and teenager reports was considerably lower, and we found less-concordant reports of physician-diagnosed rhinitis and eczema than for asthma (Fig. 1). This is in accordance with Sweeting and West, who concluded that the agreement between children and parents was better for asthma compared with other diseases and conditions [24]. One reason for these results could be that asthma is a more well-known disease with specific symptoms, whereas symptoms of rhinitis and eczema may be more nonspecific. However, we found higher level of agreement of both rhinitis and eczema compared with Renzoni et al. [8] and Mallol and Castro-Rodríguez [10], whose kappa values for rhinitis ranged from 0.22 to 0.34 and for eczema, 0.25–0.46. The higher level of agreement in our study could be explained by differences in study design. The participants in the longitudinal cohort study might be more aware of symptoms of allergic diseases compared with the participants in cross-sectional studies.

The study participants and particularly those with disease may underreport or overreport the presence of known or perceived, avoidable environmental risk factors for the condition. A socially unaccepted risk factor, such as parental smoking may be underreported [19], whereas other risk factors, such as indoor dampness, may be overreported as parents seek explanation for their child's disease [25]. However, the prevalence of parental smoking was almost identical according to the two sources of information, and the agreement measures were very high (Tables 1 and 2), in accordance with two previous studies [18,19]. Barnett et al.

		Dependent variables					
		Rhinitis reported by parent			Eczema reported by parent		
Independent variables		Ever	Current	Physician diagnosed	Ever	Current	Physician diagnosed
Family history of condition							
No	1		1	1	1	1	1
Yes	2.28	1.05–4.96	2.26	1.19	1.23	0.65–2.35	1.19 0.53–2.66 1.32
Allergic sensitization							
No	1		1	1	1	1	1
Yes	9.32	4.21–20.62	10.81	37.07	4.31	2.07–8.98	3.02 1.31–6.97 3.89
				7.93–173.27			1.76–8.60

In conclusion, the agreement between parental and teenager reports of rhinitis and eczema was moderate, and there were no significant differences in the prevalence estimates of symptoms. The agreement of reported environmental factors was very good, and the risk factor pattern was similar regardless of parental or teenager reports of disease. The methodological change from parent to index subject as respondent in the longitudinal study did not affect the study results.

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