

## CLINICAL REPORT

# Self-reported Lifetime Prevalence of Atopic Dermatitis and Co-morbidity with Asthma and Eczema in Adulthood: A Population-based Cross-sectional Survey

Kerstin BINGEFORS<sup>1</sup>, Åke SVENSSON<sup>2</sup>, Dag ISACSON<sup>1</sup> and Magnus LINDBERG<sup>3</sup>

<sup>1</sup>Department of Pharmacy, Uppsala University, Uppsala, <sup>2</sup>Department of Dermatology, Skåne University Hospital, Malmö, and <sup>3</sup>Department of Dermatology, University Hospital Örebro and Department of Health and Medical Sciences, Örebro University, Örebro, Sweden

**Atopic dermatitis and its co-morbidity with asthma and allergy is well described in younger age groups. However, population-based studies on adults with atopic dermatitis in childhood are sparse. The aims of this study were to determine: (i) the prevalence of self-reported childhood atopic dermatitis in the population; and (ii) its association with present self-reported hand eczema, eczema, allergy, urticaria and asthma. A questionnaire was sent to a cross-sectional random sample of the Swedish population ( $n=7,985$ ), age range 18–84 years (response rate 61.1%). The questionnaire included the question “Have you had childhood eczema?” and questions on 5 other medical problems (hand eczema, other eczema, asthma, urticaria and allergy). Persons reporting eczema in childhood reported increased odds ratios (OR) for hand eczema (4.01), other eczema (3.88), urticaria (2.50), allergy (2.98), and asthma (2.06) as adults. The combination of eczema, allergy and asthma had an OR of 14.10 (95% confidence interval 8.44–23.54). Adults in the age range 18–84 years reporting childhood atopic dermatitis still have high co-morbidity with eczema, asthma, urticaria and allergy. *Key words: atopic dermatitis; co-morbidity; asthma; epidemiology.***

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Magnus Lindberg, Department of Dermatology, University Hospital Örebro, SE-701 85 Örebro, Sweden. E-mail: magnus.lindberg@orebroll.se

Atopic dermatitis (AD) is a common condition, the prevalence of which has increased in western countries, including Scandinavia, over the past 50 years (1–4). Today, the accumulated prevalence of AD is thought to be approximately 20% for children. Recent data suggest that the prevalence has reached a steady-state level in Nordic countries (5). There are regional variations in the disease (6, 7). AD most often starts within the first years after birth and it may later be followed by asthma and rhino-conjunctivitis (8–13). Atopic dermatitis has a fluctuating course, and in some individuals the symptoms persist into adult life (14–16). In a recent Swedish study it was concluded that eczema among adults is more

common than previously thought (16) and coexistence with self-reported asthma and rhinitis is common. It is commonly agreed that one major pathogenic factor for AD is a defective skin barrier function (17–22). This is a major risk factor in the progress of AD in adolescence (23) and for hand eczema (24, 25). Most studies are based on clinical data for patients/children diagnosed with AD. A risk of these studies is to miss milder forms of AD (26). Cohort studies, such as the BAMSE study (27, 28), the International Study of Asthma and Allergies in Childhood (ISAAC) (6, 29), the Isle of Wight 1989 birth cohort (8) and twin-registers (30), deal with this problem. However, population-based studies among adults or elderly individuals with AD in childhood are sparse (26, 29, 31–33).

The aims of the present cross-sectional population study were to determine: (i) the prevalence of self-reported childhood eczema (CE); and (ii) the association between reported CE and self-reported hand eczema, urticaria, other eczema, asthma and allergy in the Swedish population aged 18–84 years.

## MATERIALS AND METHODS

The study design has been described previously (34). It was a cross-sectional study, with a questionnaire sent to a random sample of the Swedish population ( $n=7,985$ ), age range 18–84 years, in 2004. The response rate after 2 reminders was 61.1% (women=65.2%; men=56.8%). The response rate increased with the age of the participants, up to a cut-off point among the most elderly participants (18–40 years: 51.9%, 41–79 years: 66.6%, 80–84 years: 60.7%) and with higher income (low: 52.6%, high: 66.9%). Participants born in Sweden had a higher response rate (63.6%) than those born in other countries (45.1%). Analysis of non-responders did not show that they differed with respect to age, gender or area of residence in Sweden. Extrapolation of the result to the total population was carried out using calibration with weights to compensate for non-responders (35, 36).

The questionnaire included the validated question: “Have you had childhood eczema?” (37). Specificity was 70.7%, sensitivity 89.9%, and the question may overestimate the prevalence of AD in childhood by a factor of 1.6. Questions on 5 other medical problems were included in the present study. “Have you had hand eczema, eczema on other body parts or urticaria during the past 12 months?”, which could be answered Yes–severe, Yes–mild or No. The data for severe and mild were pooled. The other 2 medical problems were allergy and asthma: “Do you today have any of the following diseases or problems: asthma or allergy?” Possible answers for these questions were Yes or No. For further analysis

of co-morbidity, 3 groups were created based on the 5 medical problems: group 1: eczema (hand eczema and other eczema), group 2: allergy (allergy and urticaria), and group 3: asthma. Reported diseases/problems in 1 or several concomitant groups were studied.

The questions on urticaria and allergy were added to the questionnaire as they are often used by laymen to describe symptoms believed to be allergy. In clinical practice urticaria is not commonly associated with allergy, and the word "allergy" can encompass a diversity of symptoms, of which only a few can be diagnosed as actual allergy.

Logistic regression analysis was used to compare those with or without self-reported CE with regards to the different reported medical problems, controlling for age and gender. The responders were divided into the following age groups: 18–24, 25–34, 35–44, 45–54, 55–64, 65–74 and 75–84 years. The study complied with research ethics legislation, as approved by the Statistics Sweden Ethics Committee.

## RESULTS

In the study population, 13.7% ( $n=666$ ) reported CE (Table I). Women reported more CE than men (significant difference,  $p<0.05$ ) and the prevalence decreased with age (significant decrease,  $p<0.05$ ). The relationships between reported CE and other eczema, urticaria, allergy and asthma are shown in Table II. Statistical analyses (controlling for gender and age) showed that those with CE reported significantly more of the other medical problems compared with the population as a whole. Odds ratios (OR) for hand eczema was 4.01 (95% CI 3.16–5.08), other eczema 3.88 (95% CI 3.16–4.77), urticaria 2.50 (95% CI 1.73–3.62), allergy 2.98 (95% CI 2.50–3.57) and asthma 2.06 (95% CI 1.56–2.71). On studying the co-morbidity between the 3 created groups (eczema, allergy, asthma), it was found that individuals reporting CE also reported present problems fitting into one or more of the 3 groups. Only 39.3% of those reporting CE did not report any of the other

Table I. Number and proportion of the study population who reported having eczema in childhood, by age and gender

Age	Men <i>n</i> (%)	Women <i>n</i> (%)	Total <i>n</i> (%)
18–29 years	297 (18.9)	413 (30.3)	710 (25.5)
30–44 years	535 (13.1)	680 (20.7)	1,215 (17.4)
45–64 years	867 (9.7)	932 (13.5)	1,799 (11.7)
65–84 years	546 (5.1)	605 (6.0)	1,151 (5.6)
Total	2,245 (10.6)	2,630 (16.3)	4,875 (13.7)

medical problems, compared with 66.9% among those not reporting CE. Linear regression demonstrated high OR for those with CE to report other symptoms. The combination of eczema, allergy and asthma had an OR of 14.10 (95% CI 8.44–23.54). It is notable that there was a high OR for eczema and concomitant asthma (4.23) (95% CI 1.61–11.14). The corresponding figure for eczema and "allergy" was 8.64 (95% CI 6.52–11.45).

## DISCUSSION

The results of this cross-sectional population-based survey demonstrate that persons reporting CE also reported more problems with eczema, allergy, urticaria and asthma as adults than the general population. A response rate of 61.1% was obtained, which in comparison with other epidemiological studies, e.g. Moberg et al. (38) with a response rate of 58%, can be considered acceptable. We consider the responders to be representative for the population, as our analysis of non-responders (age, gender, area of residence) showed no differences compared with responders. Furthermore, we used an established method with calibration to handle non-responders (35) and our prevalence figures for hand eczema, eczema and asthma are compatible with those of other population-based studies. Our study was based on self-reporting of diseases.

Table II. Proportion (%) of subjects reporting hand eczema, eczema on other parts of the body, urticaria, allergy and asthma among those having reported ( $n=666$ ) and those having not reported eczema in childhood (CE) ( $n=4,209$ ), by age and gender

Age	Hand eczema		Other eczema		Urticaria		Allergy		Asthma	
	CE	No CE	CE	No CE	CE	No CE	CE	No CE	CE	No CE
<b>Men</b>										
18–29 years	26.8	5.4	30.4	7.1	3.6	2.5	37.5	22.0	12.5	8.3
30–44 years	17.1	4.9	35.7	10.5	2.9	1.3	51.4	24.3	12.9	4.3
45–64 years	16.7	4.5	32.1	8.9	6.0	1.7	31.0	14.0	8.3	4.6
65–84 years	7.1	2.3	28.6	7.7	3.6	1.5	25.0	6.9	10.7	6.2
Total	18.1	4.1	32.4	8.8	4.2	1.6	37.8	15.5	10.9	5.4
<b>Women</b>										
18–29 years	24.0	6.6	32.0	13.9	9.6	5.2	43.2	21.2	13.6	5.9
30–44 years	24.8	8.2	25.5	7.6	9.2	3.7	44.0	22.1	15.6	5.0
45–64 years	17.5	6.7	23.8	9.4	6.3	3.3	46.8	19.5	8.7	6.2
65–84 years	22.2	4.9	19.4	7.6	8.3	1.6	33.3	12.0	5.6	9.5
Total	22.2	6.6	26.4	9.1	8.4	3.2	43.7	18.4	12.1	6.7
<b>Men and women</b>										
18–29 years	24.9	6.0	31.5	10.8	7.7	4.0	41.4	21.6	13.3	7.0
30–44 years	22.3	6.7	28.9	9.0	7.1	2.6	46.4	23.1	14.7	4.7
45–64 years	17.1	5.6	27.1	9.2	6.2	2.5	40.5	16.8	8.6	5.4
65–84 years	15.6	3.7	23.4	7.6	6.3	1.6	29.7	9.6	7.8	7.9
Total	20.7	5.4	28.5	8.9	6.9	2.5	41.6	17.0	11.7	6.1

It has previously been shown that individuals tend to underestimate skin diseases (39), which is also valid for hand eczema (40). In the present study we used a modified version of the hand eczema question (34). This might, in part, explain the low self-reported prevalence found in our study. The question about having had CE has also been validated (31) and might overestimate the prevalence of CE. We found the prevalence of CE to be 13.7% (women 16.3%; men 10.6%), figures in accordance with a previous Swedish population study (29) (14.6%) and the NAC Manchester Asthma and Allergy Study (NAC-MAAS) study (41) (13.1%). Lower figures were presented by Harrop et al. (33) (7.1%) and Wolkewitz et al. (31) (4.3%). Variations in reported prevalence may depend in part on the age groups studied. The reported prevalence of CE decreased with age. This has also been reported in studies based on persons aged 50–75 years (31), 20–59 years (29) and 27–56 years (33). This decrease with age may be due to a real, lower prevalence of CE in these age groups. However, another possibility is the effect of recall bias (17). Recalling having eczema as a child depends on several factors, including the severity and persistence of the eczema. We found that, among persons reporting CE, there were more reported co-morbidities, which supports this notion. If recall bias (forgetting CE) is a major factor in older groups, it implies that reported prevalence of AD in childhood (8) is underestimated for these groups. We can assume that recall bias will be different for the different medical problems and that adults with present medical problems more easily recall their CE (26).

Among persons with CE, 20.7% (women 22.2%, men 18.1%) reported having had hand eczema sometime during the past 12 months, compared with 5.4% (women 6.6%; men 4.1%) among those without. These figures are in accordance with published results (32) and the notion that AD is the major risk factor for hand eczema (42).

In the clinic patients often claim that they have allergy problems, including urticaria. In our analysis of co-morbidity between CE and other reported medical problems, we combined participants reporting allergy and urticaria. The term “allergy” is diffuse and can include several different self-reported symptoms, including hay fever. A specific question on allergic rhinitis (“hay fever”) was not included in the present questionnaire. Urticaria in adults is often not due to an underlying allergy. Thus, our combination of the results for allergy and urticaria will, with high probability, be an overestimation of de facto allergic problems, but indicate that the persons have problems with symptoms they interpret as allergy. However, the prevalences we found are comparable with some published data on rhinitis. In the population-based study by Wolkewitz et al. (31) the authors asked about diseases diagnosed by a physician, and the lifetime prevalence of hay fever was found to be 8.3% in persons over 50 years of age. In contrast, Moberg et al. (38) reported the prevalence for self-reported hay fever to be 33.2% in the population. In the NACMAAS study, 20.1% were

diagnosed with hay fever. Recently the prevalence of self-reported allergic rhinitis in Sweden was reported to be 28.0% (43). In our study, 22.1% answered yes to the questions on having allergy and/or urticaria. Of those with CE, 41.6% reported allergy and 6.9% reported urticaria (see Table II). The high figure for urticaria is interesting. To our knowledge there are no previous data on co-morbidity of eczema and urticaria in adults. It is tempting to speculate that this reflects altered skin reactivity in eczematous skin, e.g. seen as dermographism. These findings merit further study.

Prevalence figures for asthma in the adult population are, in many cases, similar to ours. Wolkewitz et al. (31) reported 5.5%, while Simpson et al. (41) found it to be 15.4%. In Sweden, Moberg et al. (38) reported a prevalence of 8.2%, and Rönmark et al. (16) 9.7%.

Most studies on atopic diseases, prevalence, co-morbidity and risk factors are based on patients and often younger individuals or children. There are few population-based studies including adults or elderly people. Although studies on self-reported diseases or symptoms may have methodological problems, conclusions can be drawn from the present study. Our main finding is that persons reporting CE also, to a significant degree, report problems with hand eczema, other eczema, asthma, urticaria and allergy in adult life. The OR for having eczema, allergy and asthma was 14.1 (95% CI 8.44–23.54) among those reporting having had CE. This implies that, although their eczema might be calm, a substantial portion of these patients do experience medical problems as adults, which present as different clinical symptoms sometimes interpreted by patients as allergy. This knowledge must be implemented in medical care to improve treatment, prevention and, ultimately, the quality of life for these persons.

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