

ORIGINAL ARTICLE

Prevalence of IgE sensitization in Danish children with suspected asthma

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Keywords

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Abstract

Objective: The aim of this article was to estimate the prevalence of IgE sensitization in Danish children with suspected asthma and to characterize the pattern of sensitization. **Study design:** We performed a cross-sectional study including 1744 children from 0 to 15 yr suspected of asthma who were referred to pediatric outpatient clinics in the region of southern Denmark from 2003 to 2005. The children were subjected to an extensive questionnaire-based interview, clinical examination, and both skin prick testing (SPT) and IgE measurements for 17 allergens.

Results: Asthma was confirmed in 1024 of the 1744 children. Among the children in whom the asthma diagnosis was confirmed, sensitization to one or more of the 17 allergens tested was found in 67.5% by either SPT or s-IgE $\geq$ class 2. Sensitization to any food allergen was found in 31.1%, to any outdoor allergen in 36.2%, and to any indoor allergen in 51.8%. Sensitization to cockroach and latex was rare. We found a weak correlation between SPT and s-IgE among food allergens and a more distinct correlation among inhalant allergens. Surprisingly, 30.1% of children in whom the asthma diagnosis was disproven used inhaled corticosteroids (ICS). On the contrary, 32.5% of the children for whom the asthma diagnosis was verified were not treated with ICS.

Conclusion: We have found a high prevalence of sensitization among children with verified asthma. Our study supports relevant allergy testing in all children with verified asthma and emphasizes the importance of a thorough asthma diagnosis before prescribing continuous inhaled corticosteroids to children.

Childhood asthma has become increasingly prevalent on a global scale during the second half of the 20th century and for a period of years seemed to reach a plateau (1). However, a recent review and data from the ISAAC study indicate that the prevalence continues to rise in many parts of the world except from countries with an existing high prevalence of asthma (2, 3). Two cross-sectional surveys found the prevalence of current asthma in Denmark to be unchanged 7.2% (1990–1991) and 5.6% (2001) (4).

Asthma is a complex and heterogeneous disorder where genetic and environmental factors play an interacting role. Several studies have shown childhood asthma to be associated with sensitization to common allergens in 49–78% (5–8), although an Italian study suggests that this association mainly plays a role in genetically predisposed children (9).

Only a few recent studies have examined the prevalence of sensitization in Danish children with asthma. The DARC birth cohort study found that 56% of children with asthma at the age of 6 yr were sensitized to at least one allergen (10).

Several studies including the German MAS cohort showed an association between sensitization to indoor allergens and asthma, wheeze, and bronchial hyper-responsiveness (11–13). Furthermore, sensitization to perennial allergens in the first 3 yr of life has been shown to be associated with a loss of lung function at school age in children with asthma (14) and constitutes a predisposing factor to adolescent-onset asthma (15).

Consequently, it is important to perform allergy testing in children with asthma to identify individuals who might benefit

from specific allergy treatment, including allergen avoidance and specific immunotherapy (16).

The objective of this study was to estimate the prevalence of IgE sensitization in Danish children with symptoms suggestive of asthma and to characterize the pattern of sensitization.

Material and methods

Study design and population

This study is a cross-sectional investigation of all children from 0 to 15 yr referred with symptoms suggestive of asthma to the pediatric outpatient clinics at the hospitals in the region of southern Denmark from October 1, 2003 to November 30, 2005. The hospitals included one university hospital (Odense) and three county hospitals (Kolding, Sønderborg, and Esbjerg).

Methods

The children were primarily referred by their primary care practitioner, and all had at least one visit at a pediatric outpatient clinic. All visits included an extensive questionnaire-based interview (regarding atopic heredity, medical history, and environmental factors), clinical examination by a pediatrician, skin prick testing, and IgE measurements and lung function measurement where appropriate.

Diagnostic workup

Skin prick test

Skin prick test (SPT) was performed according to the guidelines by the European Academy of Allergology and Clinical Immunology (16). The children were tested with five food allergens (milk, egg, peanut, wheat, and soy) and 12 inhalant allergens (birch, grass, mugwort, horse, dog, cat,

Dermatophagoides pteronyssinus, *Dermatophagoides farinae*, *alternaria*, *cladosporium*, cockroach, and latex) using commercial allergen extracts (ALK-ABELLÓ, Hørsholm, Denmark). A positive SPT was defined as a mean wheal diameter of ≥ 3 mm larger than the negative control.

IgE measurements

Specific IgE was measured with ALK MagicLite method (ALK-Abelló). All samples were investigated at the same laboratory (Sønderborg Hospital). The allergens tested were the same as for SPT.

Definitions and diagnostic criteria

Sensitization was defined by positive SPT or allergen-specific IgE (s-IgE) ≥ 0.35 kU/l ($\geq$ class 1).

Sensitization was defined as clinical relevant in case of at least one positive SPT or s-IgE ≥ 0.70 kU/l ($\geq$ class 2) to at least one allergen unless otherwise indicated.

Inhalant allergens were pollen, horse, dog, cat, house dust mites (*Dermatophagoides pteronyssinus* and *Dermatophagoides farinae*), and molds (*alternaria* and *cladosporium*).

Indoor allergens were dog, cat, and house dust mites. Outdoor allergens were birch, grass, mugwort, and molds (*alternaria* and *cladosporium*).

Lung function was measured by spirometry, reversibility test was performed with beta-2-agonists, and exercise testing was performed according to generally accepted methods and criteria (17, 18).

Asthma was diagnosed if the following criteria were fulfilled: (i) recurrence (≥ 3 episodes) or persistence (≥ 1 month) of at least two of three symptoms; cough, wheeze, and shortness of breath (not triggered only by an infection), and (ii) positive exercise or bronchodilator test (FEV1 $\geq 12\%$), or peak flow variability $>15\%$ within 2 wk or response to

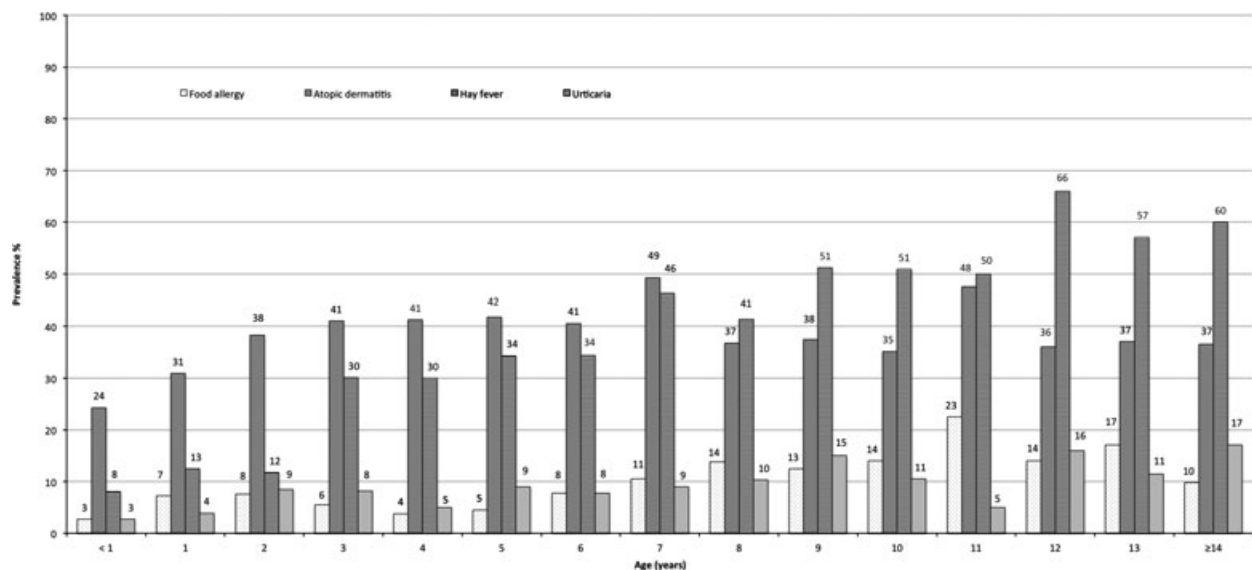


Figure 1 Prevalence of self-reported symptoms in children with verified asthma (n = 1024).

treatment with β_2 -agonist or inhaled corticosteroids (ICS) (17, 18). According to these criteria, the children were classified as having 'verified asthma', 'verified no asthma', or 'inconclusive'.

Other atopic symptoms, that is, hay fever (allergic rhinoconjunctivitis), atopic dermatitis, urticaria, and food allergy, were reported in cases showing typical symptoms, diagnosed by a physician or reported by the parents.

Statistics

Data were entered into a Microsoft Access Database and analyzed using SPSS version 19 (SPSS Inc., Chicago, IL, USA).

Ethics

The local ethics committee approved the study, and informed consent was obtained from all parents and children over 12 yr of age.

Results

Study population

A total of 1964 children with suspected asthma were examined. Two hundred and twenty children were excluded because they did not want to participate or because of language barriers. SPT was performed in 1555 children and IgE measurement in 1513 children.

Asthma was diagnosed in 1024 of 1744 children (median age 6 yr, range 0–15 yr, M/F ratio 1.7). Two hundred and eighty-nine children had the diagnosis dismissed, that is, verified no asthma (median age 3 yr, range 0–15 yr, M/F ratio 1.63), and 431 were classified as inconclusive cases.

In the group of children who had the asthma diagnosis verified, 40.8% (418 of 1024) were exposed to daily smoking, while 55.5% were exposed to pets. The corresponding percentages for the children who had the asthma diagnosis dismissed were 50.5% (156 of 289) and 54.7% (158 of 289). The prevalence of self-reported atopic symptoms according to age is presented in Fig. 1.

In the included population of 1744 children, 59.3% (95% CI: 56.8–61.8) were sensitized to at least one allergen, 28.4% (95% CI: 26.0–30.8) were sensitized to at least one of the five *food allergens*, and 47.9% (95% CI: 45.4–50.4) were sensitized to at least one of the 10 *inhalant allergens*.

A total of 1340 children were tested by both SPT and s-IgE to all *food allergens*. Fifty of these children were sensitized by both SPT and s-IgE, 265 were sensitized by s-IgE only, and 36 children by SPT only. For *outdoor allergens*, 208 children of 1362 were sensitized by both SPT and s-IgE, 44 were sensitized by s-IgE only, and 59 children by SPT only. Three hundred and ninety-nine children of 1367 were sensitized to *indoor allergens* by both SPT and s-IgE, 97 by s-IgE only, and 53 by SPT only.

Sensitization among children with verified asthma

Among the 1024 children with verified asthma, sensitization to one or more of the 17 allergens tested was found in 67.5%

Table 1 Prevalence of sensitization to all 17 allergens in children with verified asthma (n = 1024) and verified no asthma (n = 289)

Allergens	Positive SPT			S-IgE $\geq$ class 1			S-IgE $\geq$ class 2			Positive SPT or S-IgE $\geq$ class 1			Positive SPT or S-IgE $\geq$ class 2		
	Asthma		No asthma	Asthma		No asthma	Asthma		No asthma	Asthma		No asthma	Asthma		No asthma
	%	95% CI		%	95% CI		%	95% CI		%	95% CI		%	95% CI	
Any	52.4	(49.1–55.7)	17.8	61.4	(58.3–64.5)	39.7	56.8	(53.7–59.9)	29.3	70.9	(68.0–73.8)	52.8	67.5	(64.4–70.6)	42.9
Milk	0.9	(0.3–1.5)	0.0	10.7	(8.7–12.7)	9.1	8.3	(6.5–10.1)	7.0	12.1	(9.9–14.3)	10.8	9.5	(7.5–11.5)	8.4
Egg	1.5	(0.7–2.3)	2.1	22.9	(20.2–25.6)	17.4	18.7	(16.2–21.2)	13.2	24.6	(21.7–27.5)	20.7	20.3	(17.6–23.0)	16.5
Peanut	4.3	(2.9–5.7)	2.6	14.3	(11.9–16.7)	12.8	7.7	(5.9–9.5)	5.3	18.2	(15.7–20.7)	17	11.3	(9.1–13.5)	8.0
Wheat	0.7	(0.1–1.3)	0.9	10.6	(8.6–12.6)	6.6	8.7	(6.9–10.5)	5.3	12.2	(10.0–14.4)	9	10.3	(8.3–12.3)	7.5
Soya	1.3	(0.5–2.1)	0.0	2.9	(1.7–4.1)	1.6	1.7	(0.9–2.5)	1.6	4.2	(2.8–5.6)	2.1	3.0	(1.8–4.2)	2.1
Birch	8.3	(6.5–10.1)	2.6	10.8	(8.8–12.8)	2.5	9.9	(7.9–11.9)	2.5	14.1	(11.7–16.5)	4.5	13.4	(11.0–15.8)	4.5
Grass	20.9	(18.4–23.4)	4.7	21.2	(18.5–23.9)	5.3	18.8	(16.3–21.3)	4.5	27.3	(24.4–30.2)	7.8	26.1	(23.2–29.0)	7.3
Mugwort	5.2	(3.8–6.6)	0.4	6.1	(4.5–7.7)	0.8	5.7	(4.1–7.3)	0.4	8.3	(6.5–10.1)	1.5	7.8	(6.0–9.6)	1.0
Horse	6.8	(5.2–8.4)	1.3	9.2	(7.2–11.2)	2.5	7.1	(5.5–8.7)	1.6	12.0	(9.8–14.2)	3.9	10.1	(8.1–12.1)	3.0
Dog	14.5	(12.1–16.9)	2.1	19.2	(16.7–21.7)	9.1	14.0	(11.8–16.2)	4.9	26.7	(23.8–29.6)	11.1	22.5	(19.8–25.2)	6.3
Cat	20.3	(17.8–22.8)	2.9	21.2	(18.5–23.9)	5.8	20.1	(17.6–22.6)	5.3	27.1	(24.2–30.0)	6.7	26.5	(23.6–29.4)	6.3
Derm. pter.*	30.0	(27.1–32.9)	7.3	34.5	(31.4–37.6)	10.3	33.5	(30.4–36.6)	8.6	40.6	(37.5–43.7)	13.2	39.9	(36.8–43.0)	11.4
Derm.†	26.7	(23.8–29.6)	4.1	36.0	(32.9–39.1)	9.9	35.0	(31.9–38.1)	9.1	41.1	(38.0–44.2)	11.4	40.2	(37.1–43.3)	10.4
Alternaria	5.8	(4.2–7.4)	1.2	9.6	(7.6–11.6)	2.5	8.4	(6.6–10.2)	2.5	12.9	(10.5–15.3)	3.8	11.9	(9.7–14.1)	3.8
Cladosporium	1.9	(0.9–2.9)	0.0	3.2	(2.0–4.4)	0.0	2.6	(1.6–3.6)	0.0	4.6	(3.2–6.0)	0	4.1	(2.7–5.5)	0.0
Cockroach	0.0	–	0.0	1.5	(0.7–2.3)	1.2	1.0	(0.4–1.6)	0.4	1.8	(0.8–2.8)	1.8	1.2	(0.4–2.0)	0.6
Latex	1.4	(0.6–2.2)	0.4	2.6	(1.6–3.6)	0.8	2.1	(1.1–3.1)	0.4	4.1	(2.7–5.5)	1.5	3.6	(2.2–5.0)	1.0

*Dermatophagoides pteronyssinus.

†Dermatophagoides farinae.

(95% CI: 64.4–70.6) (Table 1). Sensitization to any *food allergen* was found in 31.1% (95% CI: 28.0–34.2). The most frequent sensitization against *food allergens* was to *egg* 20.3% (95% CI: 17.6–23.0) followed by *peanut*, *wheat*, and *milk*, while sensitization to *soy* was rare 3.0% (95% CI: 1.8–4.2). The prevalence of sensitization to food allergens according to age is presented in Fig. 2. Sensitization to any of the *outdoor allergens* was found in 36.2% (95% CI: 33.1–39.3) with the prevalence increasing steadily with increasing age to peak at the age of 13 yr (Fig. 3). An earlier and more distinct rise in the prevalence of sensitization to *indoor allergens* was seen (Fig. 4). Sensitization to any of the *indoor allergens* was found in 51.8% (95% CI: 48.5–55.1). The most frequent sensitization to *indoor allergens* was to *house dust mites* with a prevalence of 42.6%

(95% CI: 39.3–45.9). Sensitization to *cockroach* and *latex* was rare.

Sensitization among children with ‘verified no asthma’

In the group of 289 children who had the asthma diagnosis dismissed, 42.9% (95% CI: 35.8–50.0) were sensitized to at least one of the 17 allergens (Table 1). Sensitizations to each of the 17 allergens were considerably lower and showed a similar pattern compared with the children with verified asthma. Sensitization to any food allergen was found in 23.6% (95% CI: 17.7–29.5), and sensitization to any inhalant allergen was found in 23.4% (95% CI: 17.5–29.3), 12.2% (95% CI: 7.7–16.7) were sensitized to at least one of the outdoor allergens,

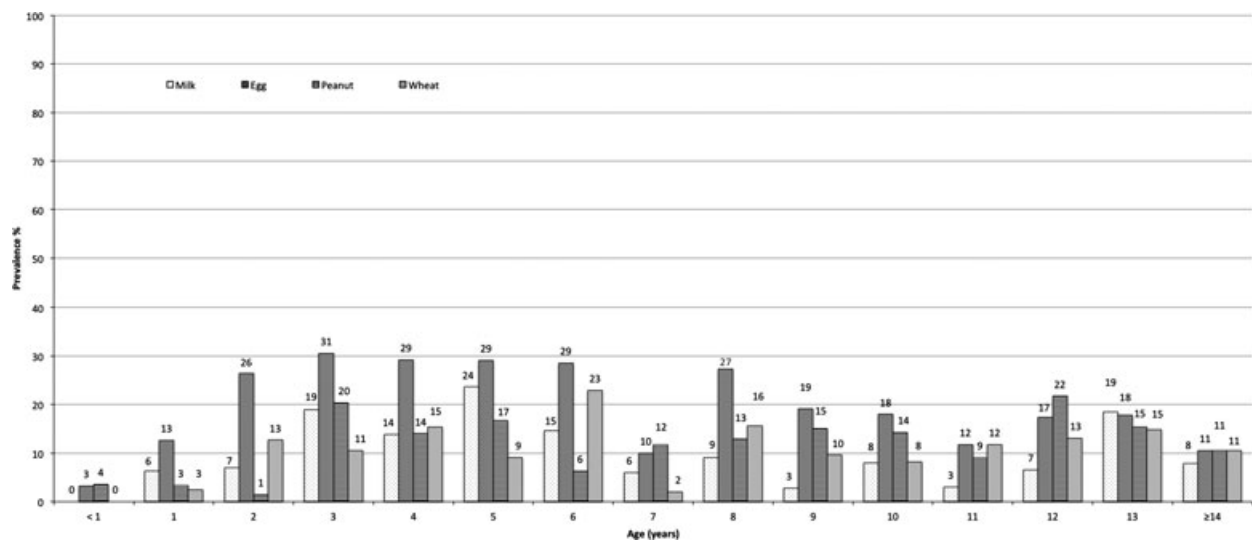


Figure 2 Prevalence of sensitization to food allergens by SPT and/or s-IgE $\geq$ class 2 in children with verified asthma ($n = 1024$).

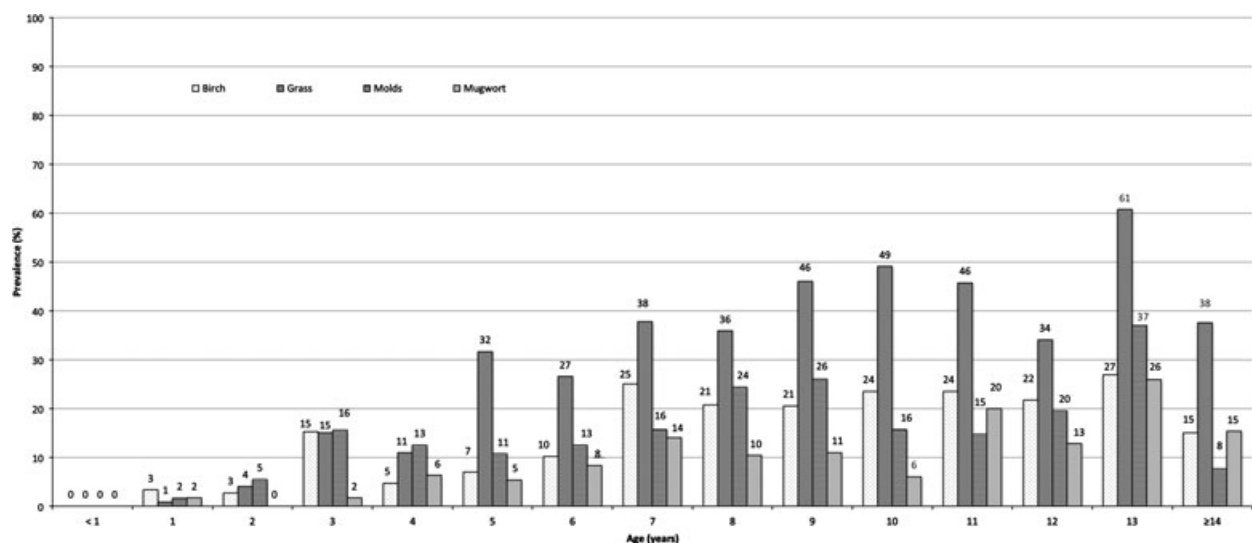


Figure 3 Prevalence of sensitization to outdoor allergens by SPT and/or s-IgE $\geq$ class 2 in children with verified asthma ($n = 1024$).

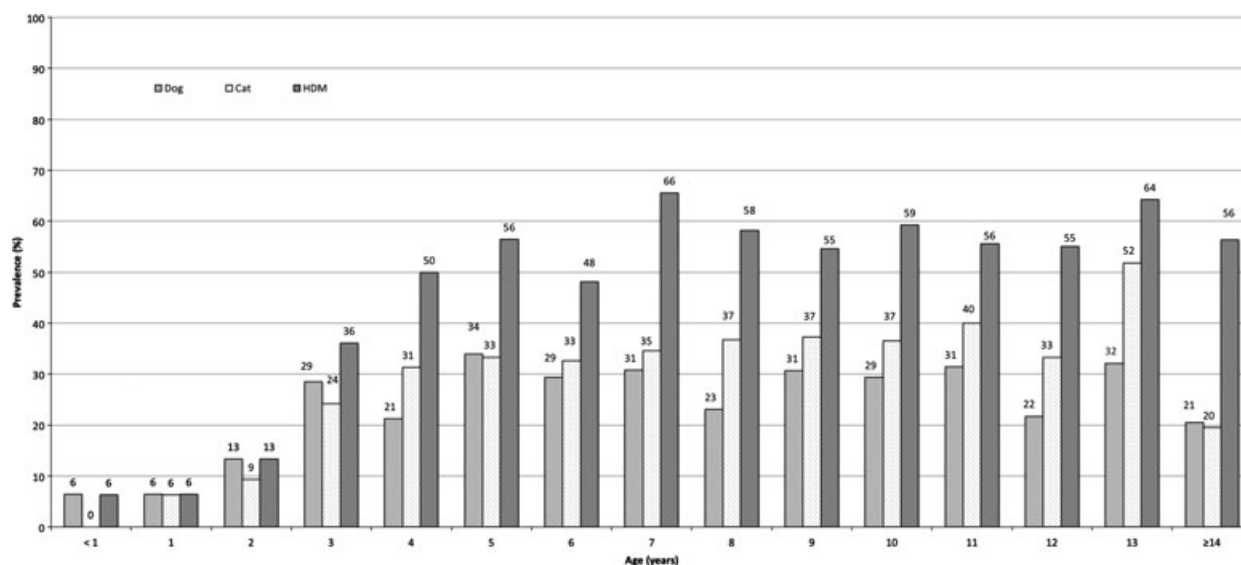


Figure 4 Prevalence of sensitization to indoor allergens by SPT and/or s-IgE $\geq$ class 2 in children with verified asthma ($n = 1024$).

and 17.4% (95% CI: 12.3–22.5) were sensitized to a least one of the indoor allergens.

Sensitization according to age among children with verified asthma

According to age, the children were arbitrarily divided into four groups: *group 1* (0–3 yr; $n = 356$), *group 2* (4–7 yr; $n = 278$), *group 3* (8–11 yr; $n = 264$), and *group 4* (≥ 12 yr; $n = 126$). The prevalence of sensitization to all 17 allergens according to age groups is presented in Table 2.

Sensitization among users of ICS

Among children with verified asthma, 67.5% were using ICS. Of those, 65.7% (95% CI: 62.0–69.4) were sensitized to at least one of the 17 allergens. Of the children with verified asthma not using ICS, 71.2% (95% CI: 65.9–76.5) were sensitized. On the contrary, 30.1% of the children with verified no asthma were using ICS, and 35.0% (95% CI: 22.8–47.2) of these were sensitized. Of those not using ICS, 46.5% (95% CI: 37.9–55.1) were sensitized. This tendency of a discretely higher prevalence of sensitization in children not using ICS was seen for both food and inhalant allergens, but not found significant.

Discussion

To our knowledge, this is the first study in recent years investigating the prevalence of IgE-mediated allergies in a large group of children suspected of asthma. We chose a strict set of diagnostic criteria for asthma including typical symptoms and measures for variable airway obstruction and bronchial hyper-responsiveness, in accordance with current guidelines and other studies (18, 19). It is well known that low-degree sensitization is not necessarily associated with clinical disease (10). Also, studies have demonstrated a stronger association between

persistent/high-degree sensitization and clinical allergic disease (14, 20, 21). Therefore, in this study, we included different levels of sensitization and evaluated a positive SPT and specific IgE levels of at least 0.7 kU/l as 'clinically relevant' sensitization.

We found a high prevalence of sensitization to inhalant allergens among children with respiratory symptoms and an even higher prevalence among children with verified asthma, indicating the importance of allergy testing in this group. The prevalence of sensitization to milk, egg, and wheat was also high, but rarely clinically relevant, and only few reported clinical reactions to foods.

In approximately one-fourth of the children, the asthma diagnosis was neither confirmed nor dismissed.

Interestingly, one-third of children in whom the asthma diagnosis was not confirmed used ICS, whereas one-third of the children with verified asthma did not use ICS, thus underlining the importance of a thorough asthma diagnosis before prescribing continuous ICS to children.

Importantly, the children were referred to the pediatric outpatient clinics because of respiratory symptoms suggestive of asthma, and therefore, ICS might have been prescribed to observe possible treatment response, particularly in toddlers.

The prevalence of sensitization in children varies with different methods of testing (22), and the association between SPT and s-IgE is highly variable depending on which allergen is tested. We found a weak association regarding food allergens and a more distinct association among inhalant allergens. It is possible that the quality of some food allergen SPT extracts is inadequate, which emphasizes the need of s-IgE in diagnosing sensitization to food allergens and the need of controlled elimination/challenge procedures in diagnosing food allergy.

Previous studies have shown that sensitization evolves in order of exposure: first food allergens, the indoor allergens, and later outdoor allergens (23). In our study, these characteristics

Table 2 Differences in sensitization by SPT and/or s-IgE $\geq$ class 2 among age groups in children with verified asthma ($n = 1024$) and verified no asthma ($n = 289$)

Allergens	0-3 yr				4-7 yr				8-11 yr				≥ 12 yr			
	Asthma		No asthma		Asthma		No asthma		Asthma		No asthma		Asthma		No asthma	
	%	95% CI	%	95% CI	%	95% CI	%	95% CI	%	95% CI	%	95% CI	%	95% CI	%	95% CI
Any	42.6	(36.9-48.3)	33.3	(23.7-42.9)	79.4	(74.3-84.5)	48.7	(32.8-64.6)	79.8	(74.7-84.9)	52.9	(35.8-70.0)	77.8	(70.2-85.4)	56.5	(35.7-77.3)
Milk	8.3	(5.2-11.4)	11.3	(5.2-17.4)	14.7	(10.0-19.4)	7.0	(-0.6-14.6)	6.0	(2.9-9.1)	3.1	(-3.0-9.2)	9.9	(4.4-15.4)	4.5	(-4.3-13.3)
Egg	18.7	(14.2-23.2)	20.2	(12.6-27.8)	24.7	(19.0-30.4)	14.0	(3.6-24.4)	20.5	(15.4-25.6)	12.5	(0.9-24.1)	15.2	(8.5-21.9)	9.1	(-3.2-21.4)
Peanut	6.6	(3.7-9.5)	9.7	(4.0-15.4)	12.4	(8.1-16.7)	7.1	(-0.7-14.9)	13.4	(9.1-17.7)	6.3	(-2.1-14.7)	16.4	(9.5-23.3)	4.3	(-4.1-12.7)
Wheat	6.5	(3.6-9.4)	7.8	(2.5-13.1)	12.4	(8.1-16.7)	7.1	(-0.7-14.9)	11.6	(7.5-15.7)	6.3	(-2.1-14.7)	12.6	(6.3-18.9)	9.1	(-3.2-21.4)
Soya	2.6	(0.6-4.6)	2.0	(-0.7-4.7)	3.7	(1.2-6.2)	-	-	3.4	(1.0-5.8)	-	-	1.8	(-0.7-4.3)	9.1	(-3.2-21.4)
Birch	5.4	(2.7-8.1)	2.0	(-0.7-4.7)	11.3	(7.2-15.4)	6.8	(-0.6-14.2)	21.7	(16.4-27.0)	6.3	(-2.1-14.7)	20.5	(13.1-27.9)	9.1	(-3.2-21.4)
Grass	4.6	(2.1-7.1)	1.0	(-1.0-3.0)	26.1	(20.4-31.8)	9.1	(0.5-17.7)	43.4	(37.1-49.7)	14.3	(2.5-26.1)	41.7	(32.7-50.7)	21.7	(4.5-38.9)
Mugwort	1.1	(-0.1-2.3)	-	-	8.3	(4.6-12.0)	-	-	11.1	(7.0-15.2)	3.1	(-3.0-9.2)	16.8	(9.9-23.7)	4.5	(-4.3-13.3)
Horse	6.0	(3.3-8.7)	1.0	(-1.0-3.0)	10.9	(6.8-15.0)	6.8	(-0.6-14.2)	12.7	(8.4-17.0)	3.1	(-3.0-9.2)	13.3	(7.0-19.6)	4.5	(-4.3-13.3)
Dog	12.9	(9.0-16.8)	5.6	(1.3-9.9)	28.5	(22.6-34.4)	6.8	(-0.6-14.2)	28.0	(22.3-33.7)	9.4	(-0.8-19.6)	23.9	(16.1-31.7)	4.5	(-4.3-13.3)
Cat	10.2	(6.7-13.7)	3.7	(0.2-7.2)	32.9	(26.8-39.0)	11.4	(2.0-20.8)	37.3	(31.2-43.4)	9.4	(-0.8-19.6)	32.8	(24.2-41.4)	4.5	(-4.3-13.3)
Derm. pter.*	12.4	(8.7-16.1)	4.5	(0.6-8.4)	50.6	(44.3-56.9)	9.1	(0.5-17.7)	54.7	(48.4-61.0)	27.3	(11.8-42.8)	56.0	(47.0-65.0)	27.3	(8.3-46.3)
Derm. farinae†	13.4	(9.5-17.3)	2.7	(-0.2-5.6)	52.3	(46.0-58.6)	9.1	(0.5-17.7)	53.3	(47.0-59.6)	26.5	(11.8-42.8)	55.3	(46.1-64.5)	27.3	(8.3-46.3)
Alternaria	3.2	(1.2-5.2)	2.8	(-0.3-5.9)	11.9	(7.6-16.2)	4.5	(-1.8-10.8)	19.1	(14.0-24.2)	5.9	(-2.1-13.9)	18.8	(11.5-26.1)	4.5	(-4.3-13.3)
Cladosporium	2.1	(0.3-3.9)	-	-	2.3	(0.3-4.3)	-	-	6.4	(3.3-9.5)	-	-	8.0	(2.9-13.1)	-	-
Cockroach	0.0	-	-	-	1.0	(-0.4-2.4)	-	-	1.4	(-0.2-3.0)	3.7	(-3.6-11.0)	4.0	(0.1-7.9)	-	-
Latex	1.5	(0.1-2.9)	1.0	(-1.0-3.0)	2.3	(0.3-4.3)	-	-	7.0	(3.7-10.3)	3.1	(-3.0-9.2)	4.5	(0.6-8.4)	-	-

*Dermatophagoides pteronyssinus.

†Dermatophagoides farinae.

are not as distinct regarding food allergens. It is obvious to consider that persistent sensitization to food allergens may be associated with verified asthma, although the design of this study does not allow us to make conclusions regarding causations. Sensitization to indoor and outdoor allergens is consistent with previous studies. The decrease in prevalence of sensitization in children aged ≥ 14 yr is subject to uncertainty due to a low number of cases, which is also the case for the prevalence of sensitization among children without asthma. The prevalence of sensitization among children with verified no asthma might also reflect that many had other atopic symptoms especially atopic dermatitis and hay fever. The prevalence of these conditions was high compared with other European studies (24-27), but it also reflects that our study population is highly selected.

Latex allergy in children is usually caused by early latex exposure during multiple surgical interventions (28). The few cases we found sensitized to latex could also be explained by cross-reactions to selected fruits and vegetables. The number of children sensitized to cockroach in our study is low compared with results from a German study (29), which is probably due to low exposure in our population.

We found an overall prevalence of sensitization at 59.3% in children suspected of asthma and 67.5% in children with verified asthma. These results are consistent with previous studies reporting on sensitization among children with respiratory symptoms. Silvestri et al. (6) found a prevalence of sensitization to at least one allergen in 53.9% in a population of 564 children with asthma. In children younger than 3 yr, the prevalence of skin sensitization to common inhalant allergens has been reported to be 58% (7). Martinez et al. (30) reported at least one positive SPT (≥ 2 mm) in 51.1% of children with persistent wheezing at the age of 6 yr. A Swedish cross-sectional study found 49.0% of children with physician-diagnosed asthma to be sensitized by SPT only (5). The Danish DARC birth cohort study found a prevalence of sensitization of 56% (14 of 25) by SPT or s-IgE at 6 yr of age, but because only 25 of 404 children had asthma, this result is subject to uncertainty (10). Differences in prevalence may also be due to a different number of allergens being tested and varying quality of extracts being used for SPT, differences in diagnostic criteria, and selection of children.

Due to our study design, we can neither explore the incidence of sensitization nor the evolution of various allergic phenotypes within our population. The strength of our study is the high sample size and strict diagnostic criteria for asthma. The geographic distribution is a mixture of urban and rural areas representing the whole population of the southern region of Denmark. We consider the transferability of our results to the general population to be high. Nevertheless, selection bias cannot be excluded because of varying referral criteria by primary care practitioners and because children of non-Danish ethnicity were not included.

Conclusion

We found a high prevalence of sensitization among children with verified asthma consistent with previous studies. Our

study supports relevant allergy testing in all children with verified asthma and emphasizes the importance of a thorough asthma diagnosis before prescribing continuous inhaled corticosteroids to children. We find no reason to include cockroach or latex in the routine panel of allergens tested in Danish children with asthma.

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