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ORIGINAL ARTICLES

Prevalence of Atopic Dermatitis in Schoolchildren in Granada, Spain

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Abstract. *Introduction.* Atopic dermatitis is a common and increasingly prevalent disorder. The International Study of Asthma and Allergies in Childhood (ISAAC) made a major contribution to the understanding of its epidemiology. *Objectives.* The aim of this study was to estimate the prevalence and severity of atopic dermatitis in a representative sample of 6 to 7-year-old and 13 to 14-year-old children from the province of Granada, Spain, using validated questionnaires and to analyze potential differences between coastal and inland regions.

Material and methods. This was a descriptive cross-sectional observational study of schoolchildren from Granada, Spain, aged between 6 and 7 years and 13 and 14 years. The main instrument was the core questionnaire module for dermatitis used in phase I of the ISAAC study.

Results. Statistically significant differences were found in Granada schoolchildren aged 6 to 7 years in terms of prevalence of dermatitis at some time, typical site, resolution in the last 12 months, and diagnosis of atopic dermatis. No significant differences were observed on comparison of the prevalence of atopic dermatitis between coastal and inland populations. Finally, in the comparison of schoolchildren aged 6 to 7 years, we observed almost significant differences for dermatitis at some time, resolution in the last 12 months, and diagnosis of atopic dermatitis on considering age and geographic location of the study population.

Conclusions. The prevalence of atopic dermatitis is similar in the coastal population and the provincial capital. In terms of clinical symptoms and disease course, atopic dermatitis tends to stabilize with age.

Key words: atopic dermatitis, epidemiology, International Study of Asthma and Allergies in Childhood.

PREVALENCIA DE DERMATITIS ATÓPICA EN ESCOLARES DE GRANADA

Resumen. *Introducción.* La dermatitis atópica (DA) es una enfermedad frecuente cuya prevalencia se ha incrementado progresivamente. En el conocimiento sobre su epidemiología ha desempeñado un papel muy importante el estudio ISAAC (*International Study of Asthma and Allergy in Childhood*).

Objetivos. Estimar la prevalencia y gravedad de la DA en niños de 6-7 y 13-14 años de la provincia de Granada a partir de una muestra representativa mediante encuestas validadas y analizar si existen diferencias, comparando las zonas costeras con el interior.

Material y métodos. Diseño observacional descriptivo transversal de base escolar. La población de estudio fue el alumnado de 6-7 y 13-14 años de Granada. Como instrumento de medición se utilizó el «cuestionario central para dermatitis» que el estudio ISAAC empleó en su primera fase.

Resultados. Respecto a la prevalencia de síntomas en escolares granadinos según edad, se observaron diferencias estadísticamente significativas en escolares de 6-7 años en cuanto a «prevalencia de dermatitis alguna vez», «localización típica», «desaparición en los últimos 12 meses» y «diagnóstico de DA». Respecto a la prevalencia según zona geográfica, no hemos encontrado diferencias estadísticamente significativas. Finalmente, objetivamos diferencias casi significativas para la población de 6-7 años en la prevalencia de «dermatitis alguna vez», «desaparición en los últimos 12 meses» y «diagnóstico de DA» al relacionar los síntomas con la edad y la zona geográfica de la población de estudio.

Conclusiones. La población costera y la de la capital ofrecen una prevalencia similar. Bajo una perspectiva clíni-co-evolutiva la dermatitis atópica tiene tendencia a estabilizarse con la edad.

Palabras clave: dermatitis atópica, epidemiología, estudio ISAAC.

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Introduction

Atopic dermatitis (AD) is a common skin condition whose prevalence has increased progressively during the last few decades, especially in developed countries, suggesting a close relationship with certain lifestyles[1] and making it a serious health problem. It is currently considered the most common skin condition of childhood.

The etiology of AD is multifactorial. Hence the importance of epidemiology, which, through the study of areas such as risk factors and prevalence, will enable us to interpret new data that can help us better understand its pathogenesis. Our knowledge of the epidemiology of AD has been furthered particularly by the International Study of Asthma and Allergy in Childhood (ISAAC)[2], an international, multicenter study whose first phase had the following objectives: *a)* to define the prevalence and severity of asthma, AD, and rhinitis in children from different populations and to make comparisons between countries; *b)* to establish baseline values in order to assess future trends in the prevalence and severity of these diseases; and *c)* to provide a framework for subsequent etiologic research into the factors—genetic, lifestyle, environmental, and health care—that affect these diseases.

This, therefore, is the first international large-scale study (until ISAAC, studies used the criteria of Hanifin and Rajka,[3] although this was never considered a standardized method[4]).

The study is subdivided into 3 phases or stages. Phase I (1992-1996)[5] revealed considerable geographic differences in the prevalence of symptoms of asthma and allergic diseases; these differences were difficult to explain using the knowledge available at the time, thus paving the way for the second phase.

Phase II (1998-2004)[6] focused on and analyzed the risk factors and protective factors that could have explained the international differences found during Phase I.

Phase III (2000-2003)[7] was basically a repetition of the first phase, but with more detailed and standardized data than those used previously.

In Spain, the ISAAC study began at the Clinical Epidemiology Research Unit in Cartagena, the city selected to be the national coordination center. ISAAC centers were also established in other Spanish cities (Barcelona, Bilbao, Castellón, Pamplona, Valladolid, Almería, and Cadiz).[8-10]

Our group's relationship and involvement with the ISAAC project encouraged us to continue working on research directed at increasing our understanding of asthma and allergy; therefore, we decided that our primary objective should be to calculate the prevalence of AD in the city of Granada and on the coast of the province of Granada. Furthermore, the well-known influence of climate on many skin conditions[11-13] provided us with another objective, which was to compare our results from the coast with those found in the city—there are considerable climatic differences between the locations—to determine whether this influence was apparent among schoolchildren aged 6 to 7 years and 13 to 14 years in the 2 areas.

Material and Methods

We used an observational, descriptive, cross-sectional design involving schoolchildren to study the prevalence of AD in children and adolescents.

The study was approved by the Ethics Committee of the Hospital Clínico Universitario San Cecilio, Granada, and the corresponding authorization was sought from the delegates of the public health and education boards.

The study population was composed of schoolchildren aged 6 to 7 years and 13 to 14 years in Granada. Once authorization was given, the principals of all the schools in Granada city and province were contacted to arrange an appointment with the teachers and, subsequently, with the parents of the children in each age group. The principals of the schools selected for the study were informed of its importance and of the possible relevance of the results, since the objective was to determine the prevalence of AD in Granada city and province and to analyze differences in prevalence between children living on the coast and those living inland. It was agreed the results would be made available to the parents once the study had finished.

The sampling unit was composed of all the state and private schools under the authority of the education board of the province of Granada with registered pupils aged 6 to 7 and 13 to 14 (age groups used in ISAAC I). These centers were selected at random in Granada city and province.

Sample size was calculated based on the total number of children (differentiated by sex) registered in Granada city and province and aged 6 to 7 and 13 to 14 (target age groups for study). These data were obtained from the web page of the Spanish National Institute of Statistics.[14] The sample, composed of 381 pupils, was representative in terms of age. This sample size provided an overall margin of error of ± 3.85%, assuming a prevalence of dermatitis in the population was 20%, with significance set at a P value of less than .05.

The children's parents or guardians received an informative letter with a form on which they gave their signed consent for the children to participate. One week after the letter was sent out, the 13 to 14-year-olds authorized by their parents completed the questionnaire validated in the ISAAC study, and the 6 to 7-year-olds' questionnaires, duly completed by their parents, were collected. A few days later, a second visit was made to the schools in order to give to

Table 1. Questionnaire for Children Aged 13 to 14 Years

1. Have you ever had an itchy rash that was coming and going for at least 6 months?	Yes ( ) No ( )
If you have answered "no," please skip to question 6	
2. Have you had this itchy rash at any time during the last 12 months?	Yes ( ) No ( )
If you have answered "no," please skip to question 6	
3. Has this itchy rash at any time affected any of the following places: the folds of the elbows, behind the knees, in front of the ankles, under the buttocks, or around the neck, eyes, or ears?	Yes ( ) No ( )
4. Has this rash cleared completely at any time during the last 12 months?	Yes ( ) No ( )
5. In the last 12 months, how often on average have you woken at night because of this rash?	Never ( ) <1 night/wk ( ) ≥1 night/wk ( )
6. Have you ever had eczema or atopic dermatitis?	Yes ( ) No ( )

Table 2. Questionnaire for Children Aged 6 to 7 Years

1. Has your child ever had an itchy rash that was coming and going for at least 6 months?	Yes ( ) No ( )
If you have answered "no," please skip to question 7	
2. Has your child had this itchy rash at any time during the last 12 months?	Yes ( ) No ( )
If you have answered "no," please go to question 7	
3. Has this itchy rash at any time affected any of the following places: the folds of the elbows, behind the knees, in front of the ankles, under the buttocks, or around the neck, eyes, or ears?	Yes ( ) No ( )
4. At what age did this itchy rash first appear?	Under 2 years ( ) Age 2-4 years ( ) Age 5 or more ( )
5. Has this rash cleared completely at any time during the last 12 months?	Yes ( ) No ( )
6. In the last 12 months, how often has your child awoken during the night because of this itchy rash?	Never ( ) < 1 night/wk ( ) ≥ 1 night/wk ( )
7. Has your child ever had eczema or atopic dermatitis?	Yes ( ) No ( )

those children who were absent at the previous visit a chance to participate.

Schoolchildren were chosen because they are more accessible than other population groups.

The geographic area covered 3 schools in the city of Granada and a further 3 belonging to 2 towns (Motril and Almuñecar) on the coast of the province of Granada, and the study was carried out from October through December 2005.

The main instrument was the core questionnaire on atopic dermatitis used in phase I of the ISAAC study. This was a written questionnaire (Table 1) that was completed directly by the 13 to 14-year-olds with the authorization of their parents. The questionnaire for the 6 to 7-year-olds (Table 2) was completed by the parents.

The questionnaire gathered information on the patient's history of dermatitis (at any time and during the last 12 months), typical site of the lesions, age at onset (this question only applied to the 6 to 7-year-olds), resolution of dermatitis during the last 12 months, nighttime awakenings because of dermatitis, and diagnosis of atopic dermatitis.

The data were processed using a spreadsheet (Microsoft Excel 2000) before being exported to SPSS version 14.0 (SPSS, Chicago, Illinois, USA), which was used for data validation, coding and labeling of the variables, and statistical analysis.

The percentage differences between the study variables according to geographic area and age were analyzed using contingency tables and the χ^2 test. In the case of an insufficient sample, exact tests were performed using Monte Carlo simulations.

Corrected typified residuals were calculated to determine the association between categories of crossed variables.

In addition to stratification by area (city or coast) and age (6-7 years or 13-14 years), correction factors were calculated using population data from the 2001 census (age year to year in Granada, Motril, and Almuñecar) in order to ensure a representative sample.

Results

Sample Description

Using the methodology described above, we collected a sample composed of 381 individuals, of whom 48.8% were from the city of Granada and 51.2% from the coast of the province of Granada (Motril and Almuñecar); 45.4% were aged 6 to 7 years and 54.6% were aged 13 to 14 years (Table 3).

Symptoms of Dermatitis in Granada Schoolchildren

We observed that the prevalence of "dermatitis at some time" among Granada schoolchildren aged 6-7 years or

Table 3. Distribution of the Sample According to Age and Geographic Area of the School

			Age		Total
			6 to 7 years	13 to 14 years	
Geographic area	City of Granada	N	83.0	103	186
		%	44.6	55.4	100
	Granada Coast	N	90.0	105	195
		%	46.2	53.8	100
	Total	N	173.00	208	381
		%	45.4	54.6	100

13-14 years was 16.7% (standard error of the mean [SEM], 1.93), and that the prevalence of "dermatitis during the last 12 months" was 11.5%. Age at onset of dermatitis for children aged 6-7 years was under 2 years for 53%, between 2 and 4 years for 32.3%, and 5 years or over for 10.4% (Table 4).

Lesions affected typical sites in 92% of the study population with AD during the last 12 months, whereas for the overall population, this percentage was 10.9%. Furthermore, 45.3% of this population stated that their dermatitis had resolved during the last 12 months, whereas 29.4% stated the contrary (25.3% did not know or did not reply). In the overall population, resolution of dermatitis was reported in 7.7%.

As for nighttime awakening, 60.7% of the population said that they had never woken because of the dermatitis, 11.8% said they had woken less than once per week, and 2.2% said they had woken once or more per week (25.3% did not know or did not reply). For the overall study population, 10.3% said they had never woken because of dermatitis, 2% said that they had woken less than once per week, and 0.4% said they had woken at least once per week (4.3% did not know or did not reply).

Finally, 29.4% of Granada schoolchildren stated that they had been diagnosed with AD.

Symptoms of Dermatitis in Granada Schoolchildren According to Age

Table 5 shows the results obtained when symptoms of dermatitis were analyzed according to age. Statistically significant differences were observed for prevalence of dermatitis at some time, typical site, resolution in the last 12 months, and diagnosis of AD.

Our analysis of the symptoms of dermatitis in Granada schoolchildren according to age revealed that the prevalence of dermatitis at some time among children aged 6 to 7 years was 21.1% (Table 3). In the 13 to 14-year-olds, the prevalence was significantly lower, 12.7% (odds ratio [OR] for the 6 to 7-year-olds, 1.87; 95% confidence interval [CI], 1.08-3.24). This population also had a lower prevalence of dermatitis during the last 12 months, although the differences with the 6 to 7-year-olds were not significant. Children aged 13 to 14 years had a lower prevalence of dermatitis at typical sites (87.2% vs 95.7% of children aged 6 to 7 years, if we take into account children with dermatitis during the last 12 months, and 8.3% vs 13.8% for the overall study population). Atypical sites were not found among children aged 6 to 7 years with dermatitis, although some samples were lost, and this could slightly affect the result for this variable.

A lower percentage of resolution of dermatitis was observed in children aged 13 to 14 years (4.9% vs 10.8% if we take the overall study population into account; OR for the 6 to 7-year-olds, 5.32; 95% CI, 1.48-19.06), and there were statistically significant differences between the age groups. The high percentage of lost samples among the 6 to 7-year-olds (36.6%) is noteworthy. This could affect the result obtained for this variable and for nighttime awakening due to dermatitis.

Finally, the prevalence of AD among the 6 to 7-year-olds was significantly higher than among the 13 to 14-year-olds (36.1% vs 23.5%; OR for the 6 to 7-year-olds, 1.85; 95% CI, 1.18-2.89).

Symptoms of Dermatitis in Granada Schoolchildren According to Geographic Area

Table 6 shows the results for dermatitis according to the geographic area of the school sampled. No significant differences were observed between Granada city and the coast.

Table 4. Dermatitis in Granada Schoolchildren

		N	%
Dermatitis at some time	No	316	83.0
	Yes	63	16.7
	Lost	1	0.3
Dermatitis during the last 12 months	No	19	29.7
	Yes	44	68.8
	Lost	1	1.5
Dermatitis during the last 12 months (overall population)	No	19	5.0
	Yes	44	11.5
	Lost	1	0.3
	No dermatitis	317	83.2
Typical site of dermatitis	No	2	5.5
	Yes	42	92.0
	Lost	1	2.5
Typical site of dermatitis (overall population)	No	2	0.7
	Yes	42	10.9
	Lost	1	0.3
	No dermatitis	336	88.1
Age at onset (children aged 6-7 years)	< 2 years	13	52.0
	Between 2 and 4 years	8	32.0
	≥ 5 years	3	12.0
	Lost	1	4.0
Resolution of dermatitis during the last 12 months	No	19	29.4
	Yes	29	45.3
	Lost	16	25.3
Resolution of dermatitis during the last 12 months (overall population)	No	19	5.0
	Yes	29	7.7
	Lost	16	4.3
	No dermatitis	316	83.0
Nighttime awakenings caused by atopic dermatitis during the last 12 months	Never	39	60.7
	< 1 time/wk	8	11.8
	≥ 1 time/wk	1	2.2
	Lost	16	25.3
Nighttime awakenings caused by atopic dermatitis during the last 12 months (overall population)	Never	39	10.3
	< 1 time/wk	8	2.0
	≥ 1 time/wk	1	0.4
	Lost	16	4.3
	No dermatitis	316	83.0
Diagnosis of atopic dermatitis	No	268	70.3
	Yes	112	29.4
	Lost	1	0.3

The data obtained on the symptoms of dermatitis in Granada schoolchildren according to geographic area show that the prevalence of dermatitis was similar between Granada city and the coast. However, the percentage for typical sites was lower on the coast (83.9% vs 95.5% for Granada city if we take into account children with dermatitis during the last 12 months, and 10.7% vs 11% if we take the overall study population into account). The percentage for resolution of dermatitis during the last 12 months was also lower on the coast (36.2% vs 48.8% for Granada city if we take into account children with dermatitis, and 6.1% vs 8.3% if we take the overall study population into account).

Lastly, age at onset of dermatitis and the percentage of children who woke at night because of dermatitis were higher on the coast (18.1% vs 12.4% for Granada city if we take into account children with dermatitis, and 3.1% vs 2.1% if we take the overall study population into account).

Table 5. Dermatitis in Granada Schoolchildren According to Age

		6 to 7-year-olds	*13 to 14-year-olds*
Dermatitis at some time[a]	No	78.3%	87.3%
	Yes	21.1%	12.7%
	Lost	0.6%	0%
Dermatitis during the last 12 months	No	34.2%	33.1%
	Yes	63.2%	76.9%
	Lost	2.6%	0%
Dermatitis during the last 12 months (overall population)	No	7.5%	2.9%
	Yes	13.9%	9.6%
	Lost	0.6%	0%
	No dermatitis	78.0%	87.5%
Typical site of dermatitis	No	0%	12.8%
	Yes	95.7%	87.2%
	Lost	4.3%	0%
Typical site of dermatitis (overall population)	No	0%	1.2%
	Yes	13.8%	8.3%
	Lost	0.6%	0%
	No dermatitis	85.6%	90.4%
Resolution of dermatitis during the last 12 months[a]	No	13.7%	53.1%
	Yes	49.7%	38.6%
	Lost	36.6%	8.3%
Resolution of dermatitis during the last 12 months (overall population)[a]	No	3.0%	6.8%
	Yes	10.8%	4.9%
	Lost	7.9%	1.1%
	No dermatitis	78.3%	87.3%
Nighttime awakening caused by atopic dermatitis during the last 12 months	Never	56.6%	66.9%
	< 1 time/wk	6.9%	19.3%
	≥ 1 time/wk	0%	5.5%
	Lost	36.6%	8.3%
Nighttime awakening caused by atopic dermatitis during the last 12 months (overall population)	Never	12.3%	8.5%
	< 1 time/wk	1.5%	2.5%
	≥ 1 time/wk	0%	0.7%
	Lost	7.9%	1.1%
	No dermatitis	78.3%	87.3%
Diagnosis of atopic dermatitisa	No	63.3%	76.5%
	Yes	36.1%	23.5%
	Lost	0.6%	0%

[a]Statistically significant differences ($P<.05$).

Symptoms of Dermatitis in Granada Schoolchildren According to Age and Geographic Area

Table 7 sets out the results obtained if we compare the symptoms of dermatitis according to the age and geographic area of the study population. We can observe for the 6 to 7-year-olds that the differences in prevalence of dermatitis at some time, resolution of dermatitis, and diagnosis of AD were approaching statistical significance in Granada city and on the coast.

Our analysis of the symptoms of dermatitis in Granada schoolchildren according to age and geographic area shows that the prevalence of dermatitis at some time among children aged 6 to 7 years in Granada city was 24.1%, whereas among children of the same age from the coast the prevalence was 13.3%. As for the 13 to 14-year-olds, the prevalence was 10.7% in Granada city and 18.1% on the coast (Table 5). Comparable differences were also observed for prevalence of dermatitis during the last 12 months and for diagnosis of AD, that is, higher in Granada city than on the coast for the 6 to 7-year-olds and lower for the 13

Table 6. Dermatitis in Granada Schoolchildren According to Geographic Area

		Granada City	*Coast*
Dermatitis at some time	No	83.0%	83.1%
	Yes	17.0%	15.8%
	Lost	0%	1.1%
Dermatitis during the last 12 months	No	34.4%	19.4%
	Yes	65.6%	74.2%
	Lost	0%	6.4%
Dermatitis during the last 12 months (overall population)	No	5.9%	3.1%
	Yes	11.5%	11.7%
	Lost	0%	1.1%
	No dermatitis	82.6%	84.1%
Typical site of dermatitis	No	4.5%	7.8%
	Yes	95.5%	83.9%
	Lost	0%	8.2%
Typical site of dermatitis (overall population)	No	0.5%	1%
	Yes	11%	10.7%
	Lost	0%	1.1%
	No dermatitis	88.5%	87.2%
Age at onset (children aged 6-7 years)	< 2 years	53.8%	50.0%
	Between 2 and 4 years	38.5%	10.0%
	≥5 years	7.7%	20.0%
	Lost	0%	20.0%
Resolution of dermatitis during the last 12 months	No	27.9%	33.2%
	Yes	48.8%	36.2%
	Lost	23.3%	30.6%
Resolution of dermatitis during the last 12 months (overall population)	No	4.7%	5.6%
	Yes	8.3%	6.1%
	Lost	4.0%	5.2%
	No dermatitis	83.0%	83.1%
Nighttime awakening caused by atopic dermatitis during the last 12 months	Never	64.2%	51.3%
	< 1 time/wk	9.4%	18.1%
	≥ 1 time/wk	3.0%	0%
	Lost	23.3%	30.6%
Nighttime awakening caused by atopic dermatitis during the last 12 months (overall population)	Never	10.9%	8.7%
	< 1 time/wk	1.6%	3.1%
	≥ 1 time/wk	0.5%	0%
	Lost	4.0%	5.2%
	No dermatitis	83.0%	83.1%
Diagnosis of atopic dermatitis	No	69.5%	72.3%
	Yes	30.5%	26.7%
	Lost	0%	1.1%

[a]Statistically significant differences (P<.05).

to 14-year-olds. If the overall study population is taken into account, the highest percentage of typical sites was observed in 6 to 7-year-olds in Granada city (15.7%), followed by those aged 13 to 14 years on the coast (12.4%).

The high percentage of lost samples among the 6 to 7-year-olds, both in Granada city and on the coast, could affect the results obtained for the remaining variables.

Comparison of Prevalence of Atopic Dermatitis Between Age Groups

We found statistically significant differences (P<.05) for dermatitis at some time (21.1% in the 6 to 7-year-olds compared with 12.7% in the 13 to 14-year-olds). We must remember that, even though the specificity of this question was low, its aim was to differentiate between AD and other

Table 7. Dermatitis in Granada Schoolchildren According to Age and Geographic Area

		6 to 7-year-olds		*13 to 14-year-olds*	
		Granada City	*Coast*	*Granada City*	*Coast*
Dermatitis at some time	No	75.9%	84.4%	89.3%	81.9%
	Yes	24.1%[a]	13.3%[a]	10.7%	18.1%
	Lost	0%	2.2%	0%	0%
Dermatitis during the last 12 months	No	5.0%	16.7%	27.3%	21.1%
	Yes	95.0%	66.6%	72.7%	78.9%
	Lost	0%	16.7%	0%	0%
Dermatitis during the last 12 months (overall population)	No	1.2%	2.2%	2.9%	3.8%
	Yes	15.7%	8.9%	7.8%	14.3%
	Lost	0%	2.2%	0%	0%
	No dermatitis	82.1%	86.7%	89.3%	81.9%
Typical site of dermatitis	No	0%	0%	12.5%	13.3%
	Yes	100.0%	80.0%	87.5%	86.7%
	Lost	0%	20.0%	0%	0%
Typical site of dermatitis (overall population)	No	0%	0%	1%	1.9%
	Yes	15.7%	8.9%	6.8%	12.4%
	Lost	0%	2.2%	0%	0%
	No dermatitis	84.3%	88.9%	92.2%	85.7%
Resolution of dermatitis during the last 12 months	No	10.0%	28.6%	63.6%	36.8%
	Yes	55.0%[a]	28.6%[a]	36.4%	42.1%
	Lost	35.0%	42.9%	0%	21.1%
Resolution of dermatitis during the last 12 months (overall population)	No	2.4%	4.4%	6.8%	6.7%
	Yes	13.3%[a]	4.4%[a]	3.9%	7.6%
	Lost	8.4%	6.7%	10.7%	3.8%
	No dermatitis	75.9%	84.4%	89.3%	81.9%
Nighttime awakening caused by atopic dermatitis during the last 12 months	Never	60.0%	42.9%	72.7%	57.9%
	< 1 time/wk	5.0%	14.3%	18.2%	21.1%
	≥ 1 time/wk	0%	0%	9.1%	0%
	Lost	35.0%	42.9%	0%	21.1%
Nighttime awakening caused by atopic dermatitis during the last 12 months (overall population)	Never	14.5%	6.7%	7.8%	10.5%
	< 1 time/wk	1.2%	2.2%	1.9%	3.8%
	≥ 1 time/wk	0%	0%	1.0%	0%
	Lost	8.4%	6.7%	0%	3.8%
	No dermatitis	75.9%	84.4%	89.3%	81.9%
Diagnosis of atopic dermatitis	No	60.2%	71.1%	77.7%	73.3%
	Yes	39.8%[a]	26.7%[a]	22.3%	26.7%
	Lost	0%	2.2%	0%	0%

[a]Differences approached statistical significance ($.05 < P < .01$).

types of noninflammatory dermatosis and nonatopic eczema.

As for the questions aimed at increasing the specificity of the previous question (dermatitis during the last 12 months and typical site of AD), we found no statistically significant differences.

Resolution of dermatitis in the last 12 months (used as a measure of the disease's duration) also showed statistically significant differences (10.8% in the 6 to 7-year-olds and 4.9% in the 13 to 14-year-olds).

However, the results for nighttime awakening caused by AD (used as a marker of disease severity) were not statistically significant, whereas for the last item on the questionnaire—diagnosis of AD—the differences were statistically significant (36.1% for the 6 to 7-year-olds vs 23.5% for the 13 to 14-year-olds). For this item, we assumed that the diagnosis had been made by a doctor and that the children's parents (in the case of the 6 to 7-year-olds) or the children themselves (in the case of the 13 to 14-year-olds) had heard of the condition.

Comparison of the Prevalence of Atopic Dermatitis Between Geographic Areas

We found no statistically significant differences in any of the questions between the 2 age groups. Nevertheless, in the 6 to 7-year-olds the differences approached significance ($.05<P<.1$) for dermatitis at some time, resolution of dermatitis during the last 12 months, and diagnosis of AD. Thus, 24.1% of children aged 6 to 7 years from Granada city had dermatitis at some time compared with 13.3% of those from the coast. As for resolution of dermatitis during the last 12 months, 13.3% of the 6 to 7-year-olds from Granada city said that their dermatitis had resolved during the last 12 months compared with 4.4% from the coast. With regard to diagnosis of AD at some time, 39.8% of the 6 to 7-year-olds from Granada city said they had been diagnosed with AD compared with 26.7% of the children from the coast.

Discussion

When the prevalence of AD was compared between age groups, the statistically significant differences found in the items dermatitis at some time, diagnosis of AD, and chronic eczema were are consistent with the literature and with the assertion that AD improves with age.

Our results agree with those of Banac et al[15] in the Croatian region of Primorsko-Goranska, where the highest figures for cutaneous symptoms were found in the younger age group. Our data also agree with those of Sugiura et al,[16] whose comparison of different age groups in Japanese schoolchildren over a 20-year period revealed that there was a clear decrease in the prevalence of AD with age. These authors did not follow the ISAAC methodology, but based their diagnosis of AD on the criteria of Hanifin and Rajka.[3] Saeki et al[17] observed the same statistically significant decrease in similar age groups in the populations of 8 Japanese cities (Hokkaido, Iwate, Tokyo, Gifu, Osaka, Hiroshima, Kochi, and Fukuoka). Likewise, in 3 Korean cities (Seoul, Chunchon, and Ulsan), Kim et al[18] observed a higher prevalence in the lower age groups among schoolchildren aged 6 to 8 years, 10 to 12 years, and 16 to 18 years, and Marks et al[19] in Australia observed that the diagnosis of AD based on clinical examination was more common among younger children (4-9 years).

However, our results do not agree with those of other authors. Yamada et al[20] found a higher prevalence among 13 to 14-year-old girls than among 6 to 7-year-olds in São Paulo, Brazil. In Singapore, Goh et al[21] also showed that the prevalence of cutaneous symptoms was higher in older children (12-15 years). Tay et al,[22] who also studied Singaporean schoolchildren, found no improvement in symptoms with age—prevalence was greater in the 16-year-olds than in the 12-year-olds.

As for the comparison of prevalence of AD between geographic areas, it seems that the climatic differences between coastal and inland areas clearly take second place to constitutional and genetic factors, thus explaining the lack of statistical significance in all of the items on the questionnaire. Montnemery et al,[23] on the other hand, did find a statistically significant association in the prevalence of eczema, with higher values among the inhabitants of the Malmö coastline in Sweden than among those who lived inland. The results of Duhme et al,[24] who compared the coastal town of Greifswald in Germany with the inland city of Münster, are also different from ours. Those authors revealed statistically significant differences in favor of Münster for typical site, resolution of dermatitis during the last 12 months, and diagnosis of AD in the 2 age groups they studied (5-8 years and 12-15 years). There were also significant differences in favor of the city of Münster (inland) for dermatitis at some time, but only in the 5 to 8-year-olds.

Despite the influence of environmental factors on AD, we are surprised how few studies have compared coastal areas with inland areas. More studies compare other environmental factors, such as rural vs urban areas; those studies range from ones that found no statistically significant differences, to recent studies that detected a higher prevalence in urban areas, in cities as diverse as Jimma (Ethiopia)[25] and Seoul (Korea).[18] In the case of Seoul, this higher prevalence of AD in urban areas was found in the lowest age groups (6-8 years), though this situation was inverted in rural areas in Chunchon, Korea, in children aged 10 years and over.

Several authors refer to the impact of living in industrialized areas, and find lower prevalences in these areas than in nonindustrialized ones, as is the case in Nikel in Russia[26] and Ulsan in Korea.[18]

We draw the following conclusions:

1. Given the clinical relevance of immune conditions, for example bronchial asthma and AD, we believe that the initiatives encouraged by international prevalence studies such as ISAAC must be accepted and supported as much as possible. In fact, the present work aims to extend the objectives put forward in ISAAC to the province of Granada.
2. Following the recommendations of specialized bodies, and although certain areas can and do require specific methodological approaches, we believe that the widely validated ISAAC questionnaire is the most appropriate instrument for our study.
3. As for clinical outcome, our data allow us to state that AD tends to stabilize with age and symptoms tend to improve.

4. As for prevalence, our data allow us to conclude the following: *a)* the overall sample analyzed shows that the prevalence is similar in the coastal region and Granada city; and *b)* if we only consider the 6 to 7-year-olds, we see that AD is more prevalent in children living in the city. This urges us to search for an explanation related to the environment and habitat, as our group found contradictory results in a neighboring province (Almería), where the sharp rise in the number of greenhouses is changing the environment considerably.

5. Consistent with the literature and with other projects carried out by our group, the data we present here show that most cases involve mild forms, regardless of age or geographic area.

6. In most cases, the form of onset is consistent with the literature—more than 50% of cases start during infancy or before the child is 2 years old.

7. Finally, as a possible application of our work and this project, and given the clinical importance of this increasingly prevalent condition, we would like to see the development of research projects and initiatives aimed at personal health and the environment to prevent in some way the factors that influence this condition.

Conflict of Interests

The authors declare no conflicts of interest.

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