

## ORIGINAL ARTICLES

# International study of asthma and allergies in childhood. Results on rhinitis of first phase in Pamplona, Spain

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### SUMMARY

Background: the ISAAC (International Study of Asthma and Allergies in Childhood) was thought in order to maximize the value of epidemiological research into asthma and allergic diseases in childhood, establishing a standardized methodology and facilitating collaboration and comparison between several countries.

Methods and Results: the written questionnaires in the group of children aged 6-7 years was answered by the parents and the group of children aged 13-14 years self-completed the written questionnaires.

Results: 3,040 children aged 13-14 years answered the questionnaire and 3,002 in the group aged 6-7 years. In the group of children aged 13-14, 49.7% referred rhinitis symptoms some time, and 15.6% in the 6-7 year old group. The prevalence of nasal symptoms in the last year was 35.5% in the 13-14 year group and 10.6% in the 6-7 year group. The presence of nasal symptoms was more frequent in winter. The prevalence of seasonal allergic rhinitis (hay fever) was 6.1% in the 13-14 year group and 4.8% in the group of children aged 6-7 years.

Conclusions: these results can contribute to a better control of some factors and to future studies where the etiology and incidence of the disease could be investigated.

**Key words:** Rhinitis. Epidemiology. Prevalence. Questionnaires. Children. ISAAC.

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### INTRODUCTION

Allergic rhinitis is a frequent pathology in infancy and it has significantly increased in the last three decades (1).

Its prevalence is quite variable depending on the different epidemiological studies, probably because the diagnostic clinical criteria and the case selection have not been standardized. Besides, these studies can present differences depending on the geographic location, differences in the relative numbers of children and adults included, and the validation between the questionnaires used (2).

In the United States, the estimated prevalence of allergic rhinitis is 14.2% of the population (2). The prevalence of seasonal allergic rhinitis diagnosed among patients seen by general practitioners is 11 per thousand in Denmark, 20 per thousand in England and Wales and 86 per thousand in Australia (3). In Germany, Schäfer and Ring found allergic rhinitis symptoms in 9.2% of the 988 pre-school children studied in the period 1989-1991 (1). These statistics tend to be overlooked since there is a percentage of the population with this pathology who medicate themselves and never go to the doctor.

The prevalence of seasonal allergic rhinitis (hay fever) in school age children is lower in the European countries than in the United States or Australia, probably as the result of the allergenicity of the prevailing pollen and inhalant allergens (3).

As far as the age is concerned, the prevalence pick of allergic rhinitis is 5-15 years in England and Wales, 10-19 years in Denmark (3) and 34-49 years in the United States (2).

Allergic rhinitis during the first year of life is an early manifestation of atopic predisposition which

can be exacerbated by environmental exposition or food allergens (4). Besides, those children have more respiratory symptoms and more tendency to develop bronchial asthma (5). When the parents suffer from allergic rhinitis, the children have three to five times more possibilities to present rhinitis (6).

Some epidemiological studies prove that allergic rhinitis is more frequent in urban areas than in rural areas. In the United States, Broder et al (7) studied individuals with allergic rhinitis and found that 75% lived inside the city center while 25% resided in rural areas. In Denmark (4), 19% of the patients studied with rhinitis lived in Copenhagen and 11% in rural areas. The cause of these differences has not been established yet, but the environmental pollution could contribute to the sensitisation process and increase of the allergic rhinitis prevalence (1, 5).

Other factors which could have an influence on the development of seasonal allergic rhinitis are the season of birth (pollen season) and the presence of family history of allergy, according to some studies (8). Wright et al (5) observed that the allergic rhinitis symptoms in the first six months of life were significantly more common among children whose mothers smoked and who began foods other than breast milk in the first two months.

An important factor of the morbidity of allergic rhinitis is the economic consequences, since the treatment of the symptoms and their complications is expensive, as well as the school and work absenteeism it bears (9).

Several epidemiological studies have been performed, but using different evaluation methods and studying different populations, which makes interpretation and comparison of the results difficult. The morbidity data about a disease can be obtained from the records of medical institutions or entities or either by means of questionnaires or taking a census of a whole population, when this is possible, or samples of it taken with the right requirements to assure its representativity (10).

The questionnaires have been tools very frequently used in epidemiological studies and can be applied to the population. When well standardized, they are useful to compare the behaviour of a disease in different communities.

The ISAAC has been performed in order to maximise the value of the epidemiological studies in asthma and allergic diseases in childhood, establishing a questionnaire able to make collaboration among several countries possible (11).

The ISAAC study, has been planned to be used in three consecutive and dependent phases:

- First phase: assess the prevalence and severity of asthma and allergic diseases in populations selected by means of questionnaires answered by the parents in the group of children aged 6-7 years and answered by the children in the 13-14 year group.
- Second phase: investigate possible etiologic factors, especially the ones suggested by the findings in the first phase.
- Third phase: repetition of the first phase after a three year period in order to assess the incidence (11).

The aim of the ISAAC is to allow the performance of an international study able to indicate temporal and determinant tendencies in the prevalence of asthma and allergic diseases in childhood. The results of the first phase of the ISAAC study (12) in Pamplona, Spain, regarding rhinitis, are presented in this work.

## MATERIAL AND METHODS

The ISAAC written questionnaire has been defined with a minimum number of questions, similar to the ones answered to by the parents in the case of the 6-7 year group.

The investigation has been limited to the last twelve months in order to minimise the memory errors and not to interfere with the month when the study was performed. The data were gathered between December 1993 til September 94, when the questionnaires were answered in public and private schools from Pamplona and its surroundings.

A total of 3,040 children aged 13-14 were asked to answer to the questionnaire, and 3,002 of the 6-7 year group. All the questionnaires were reviewed and children who at the moment of the study had a different age to the prefixed (6-7 years and 13-14 years) were excluded.

In order to avoid errors, two different persons introduced all the data independently using the EpilInfo programme and the data were subsequently compared using the "Validate" programme from the EpilInfo packet.

The data were sent to the ISAAC International Center of Data Analysis in New Zealand where they were reviewed in order to find any lack of consistency.

For the statistical analysis the SPSS programme for Windows (6.0) was used.

## RESULTS

In the 6-7 year group, 4,359 letters were sent and 3,231 questionnaires were answered (74.11%),

- ANSWERED: 3231
- DID NOT ANSWER: 1129
- VALID: 3002
- EXCLUDED: 229

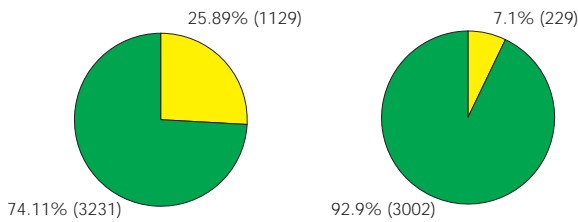


Figure 1.—Data gathering in the 6-7 year old children group.

3,002 (92.91%) of which were valid and 229 (7.09%) were excluded for not abiding by the ISAAC inclusion criteria, as can be seen in figure 1.

3,728 letters were sent to the parents of the 13-14 year children and 3,684 (98.82%) were authorised, of which 3,040 (82.5%) were validated (Fig. 2).

The sex distribution of the children questioned can be observed in table I. In the 13-14 year children, 52.8% were males and 47.2% females, similar to the 6-7 year group, where 51.5% were males and 48.5% females.

According to the questions in the questionnaire, half of the 13-14 year children (49.7%) have had nasal problems sometime in their life. In the 6-7 year group, 15.6% referred nasal symptoms sometime in their life (Fig. 3).

The prevalence of nasal symptoms in the last year was 35.5% (1,080) in the 13-14 year group. Also in this group, 14.6% (444) have had associated symptoms of rhinitis and conjunctivitis in the last year, as observed in figure 4.

Of the 3,002 children in the 6-7 year group, 319 (10.6%) have presented rhinitis symptoms in the last year and 109 (3.6%) had rhinitis and conjunctivitis symptoms in the last year (Fig. 5).

Analysing the answers and comparing both age groups (Fig. 6), the diagnosis of rhinitis in the last

Table I

Sex distribution

Interviewed	13-14 years old		6-7 years old	
	N.º	%	N.º	%
Boys	1.604	52,8	1.546	51,5
Girls	1.436	47,2	1.456	48,5

year or rhinitis sometime was observed to be more frequent in the 13-14 year group.

Regarding the months of the year when the presence of nasal symptoms was most frequent, it was November, December and January in both groups, which correspond to the winter season, being the greatest prevalence in December, as shown in figure 7.

In the group of children aged 13-14, 293 (9.6%) manifested that the nasal symptoms had interfered with their daily activity in the last twelve months, finding significant differences compared with the 6-7 year group, where only 75 (2.5%) of the parents questioned referred this (Fig. 8).

If we compare both groups, the accumulated incidence of rhinitis diagnosed on some occasion was 4.8% in the group of children aged 6-7 years, and 6.1% in the group of children aged 13-14 years, as can be seen in figure 9.

When establishing comparisons with other ISAAC centres in Spain, the prevalence and accumulated incidence of rhinitis was similar, but the accumulated incidence of seasonal rhinitis was lesser (Fig. 10).

The ISAAC method has been developed in other collaborating centers from several countries and the results showed a mean world prevalence of rhinitis of 13.9% in the group of children aged 13-14 years, and 7.2% in children aged 6-7 years.

The prevalence of allergic rhinitis in Pamplona in 6-7 year children was 4.8% and 6.1% in 13-14 year children. The mean prevalence in Spain was 9.3%.

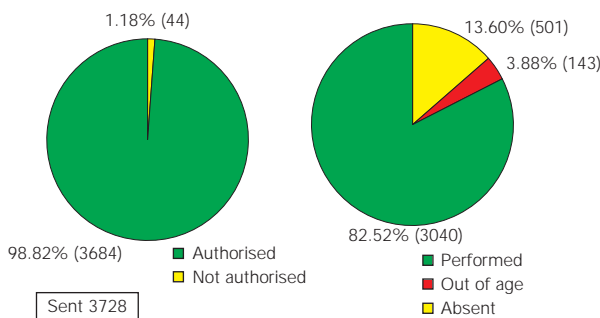


Figure 2.—Data gathering in the 13-14 year old children group.

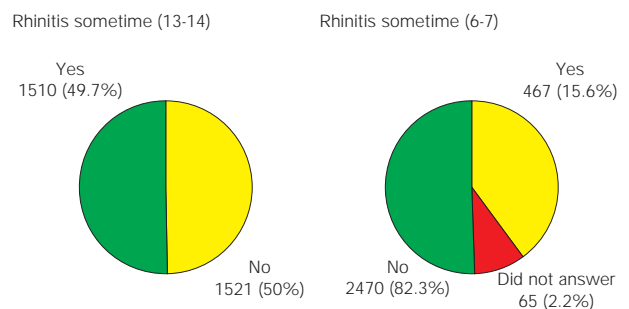


Figure 3.

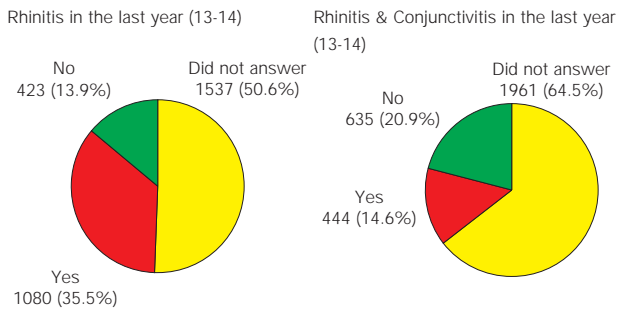


Figure 4.

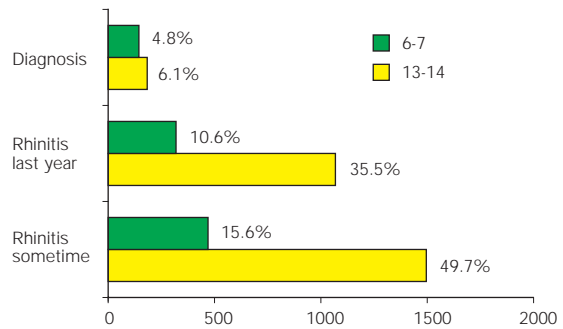


Figure 6.—Comparison between both groups.

**DISCUSSION**

The epidemiological studies in general have failed to reach their objectives due to a lack of standardisation in the definition of the cases of rhinitis and due to the methods employed, which often limited the comparisons.

The ISAAC protocol was thought in order to maximise the value of the epidemiological research into asthma and allergic diseases. It is a multicenter international project with a validated methodology, using an ample sample of the population in different places of the world which allowed to compare their results by using the same questionnaire (13).

In Pamplona, this study obtained a very high participation rate, 98.2% in the group of 13-14 year children, and 74.1% in the 6-7 year children, with no sex-related differences (14).

When comparing the data found, the frequency of rhinitis symptomatology in the 13-14 year group was observed to be approximately three times greater than in the group of children aged 6-7 years, which agrees with the data obtained in other studies and which maintain that the allergic rhinitis symptoms are more frequent in adolescents and young adults (3 and 2), but other authors as Wright et al (5) find a high prevalence (42%) of allergic rhinitis in children aged 0-6 years, but using a different questionnaire.

The frequency of rhinoconjunctivitis was 14.6% in the group of 13-14 year children, and 3.6% in children aged 6-7 years. This pathology is observed to be more common in the second infancy. These results are very similar to the ones found by Nyström et al in Sweden (21), and the study of Remes et al in Finland (22) finds a prevalence of 14.3% and 17% respectively, among adolescents aged 13-14 years. Nevertheless, the lowest results were found by Montfort et al in Malta (15) with a prevalence of 28.9% in children aged 13-14 years.

In Pamplona, the rhinitis symptoms are presented most frequently during the coldest months of the year (November, December and January), probably in relation with the house dust mites and other environmental factors in the houses, as more time is spent in them (14), and not forgetting the greater presence of high airway infections at this time of the year. In another study where 12,002 children were assessed, a higher prevalence in winter was also found (16).

Patients with rhinitis do not only suffer nasal symptoms, since this disease also affects their quality of life, as they can present concentration problems, migraines, sleep disruption, etc. (17). Allergic rhinitis in children is also associated with learning deficit (18) and irritability (19). In our cases, we observed that the

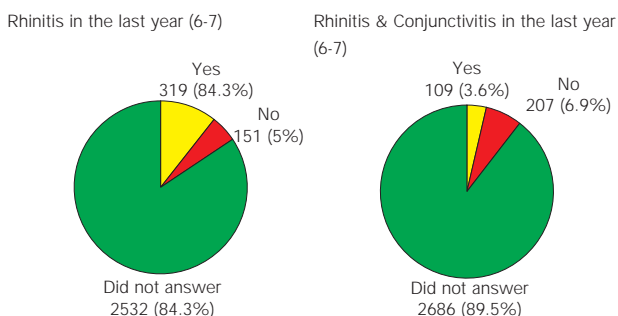


Figure 5.

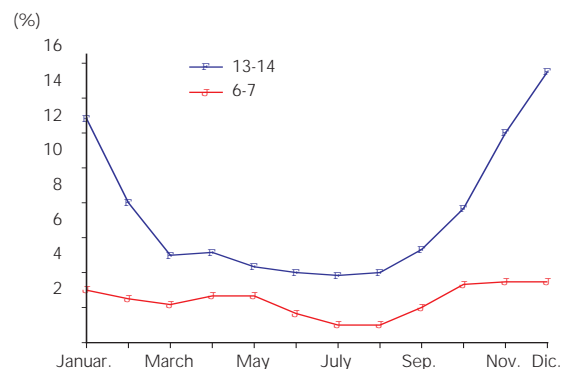


Figure 7.—Distribution of both groups according to months.

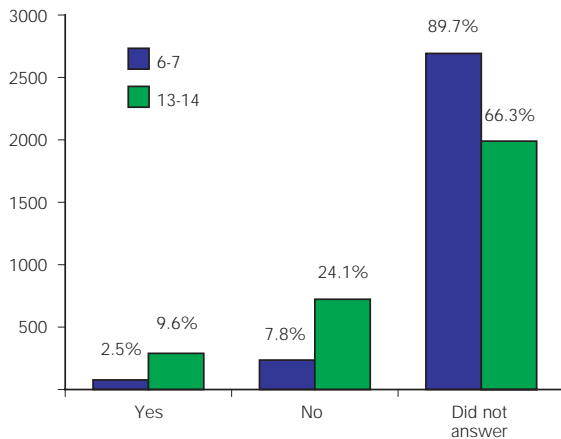


Figure 8.—Daily activity hindered.

nasal symptoms hindered 9.6% of the children aged 13-14 years in their daily activity in the last twelve months, whereas only 2.5% of the children aged 6-7 years referred this fact. Juniper (20) has also observed adolescents referring problems to perform their tasks, but unlike the adults they did not complain from sleeping troubles. According to this author, children aged 6-12 presented a minimum interference in their daily activities (20).

Prevalence and accumulated incidence of rhinitis in Pamplona is similar to other ISAAC centers in Spain, but the incidence of accumulated seasonal rhinitis is lower, probably due to the weather differences (14).

A great variation has been observed in the rhinitis prevalence between the different ISAAC centers in several countries, with a world prevalence ranging between 1.8 and 39.7% in the 13-14 year groups (23). Prevalence of allergic rhinoconjunctivitis in Pamplona among children aged 13-14 years is 14.6% which is near the world mean, but the accumulated incidence of seasonal allergic rhinitis is almost three times lower.

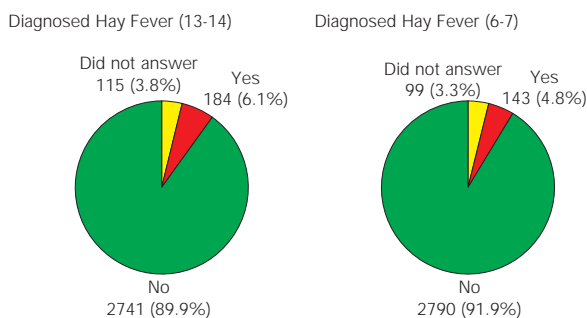


Figure 9.

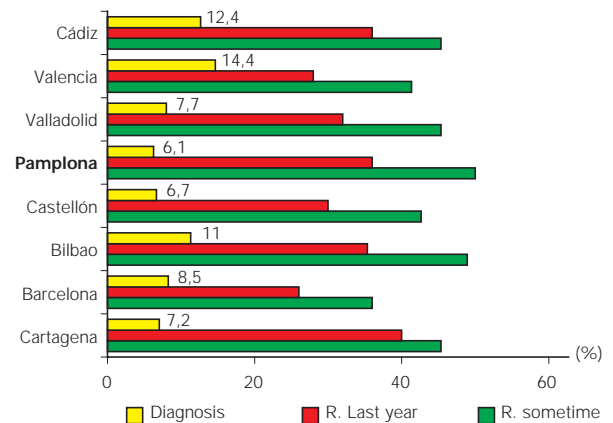


Figure 10.—Distribution according to the Spanish city (13-14).

## CONCLUSIONS

In this first phase of ISAAC in Pamplona rhinitis was demonstrated to be frequent in our environment. The results of this study can contribute to a better control of some factors as well as to future studies where the etiology and incidence could be investigated in order to know the natural evolution of this disease.

## RESUMEN

Introducción: la rinitis alérgica es una patología frecuente en la infancia y en las tres últimas décadas ha ido aumentando de manera significativa. Por otra parte, es una manifestación temprana de predisposición atópica que puede ser exacerbada por exposición a alérgenos y puede preceder al asma bronquial. Los estudios epidemiológicos ponen de manifiesto el incremento en la prevalencia de las enfermedades alérgicas. El proyecto ISAAC ha sido ideado para maximizar el valor de los estudios epidemiológicos en el asma y enfermedades alérgicas en la infancia, estableciendo un método de cuestionario capaz de facilitar la colaboración entre países.

Métodos y Resultados: fueron encuestados un total de 3.040 niños de entre 13-14 años y 3.002 niños de 6-7 años. En los niños de 6-7 años, los cuestionarios fueron contestados por los padres y en los de 13-14 años, por los propios niños.

Síntomas de rinitis alguna vez, refirieron el 49,7% de los niños de 13-14 años frente al 15,6% de los niños de 6-7 años. La prevalencia de síntomas nasales en el último año es de 35,5% en los de 13-14 años y 10,6% en 6-7 años. Es más frecuente la presencia de síntomas nasales en invierno, y la preva-

lencia de rinitis estacional fue de 6,1% en los niños de 13-14 años frente a un 4,8% en los de 6-7 años.

Conclusiones: el conocer la prevalencia de rinitis en nuestro medio contribuye a un mejor control de determinados factores, y a la realización de futuros estudios en los que podamos investigar etiología e incidencia que nos aclaren el curso natural de la enfermedad.

**Palabras clave:** Rinitis. Cuestionario. Niños. ISAAC.

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