

Epidemiology of Allergic Rhinitis in Allergy Consultations in Spain: *Alergológica-2005*

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■ Abstract

Background: Allergic rhinitis (AR) is considered to be the most frequent allergic disorder.

Objective: To present the data from the *Alergológica-2005* on the characteristics of patients with AR.

Methods: An observational, descriptive, cross-sectional epidemiologic study was performed on 4991 patients consulting for the first time in Allergology services in Spain.

Results: Fifty-five percent of patients consulting Allergology services for the first time were diagnosed with AR, of whom 65% also had conjunctivitis and 37% asthma. Two out of every three subjects with AR consulted their primary care physician twice in the previous 4 months. One third was treated by another specialist in the preceding year and one of every five required treatment in emergency departments. AR affected the quality of life (SF-12), in some cases causing time off work and school. The most frequently involved allergens were pollens (51%), followed by dust mites (42%). Polysensitization was found in 31% of cases. Antihistamines and nasal topical corticoids were the most widely used drugs. In 38% of patients, treatment with specific immunotherapy was begun.

Conclusions: AR was the leading cause of consultations in *Alergológica-2005*. Rhinitis was frequently associated with other allergic disorders in 65% of patients with conjunctivitis and 37% with asthma. The illness led to a substantial use of healthcare resources and significantly affected the quality of life of the sufferers.

Key words: Allergic rhinitis. Rhinoconjunctivitis. Quality of life. Healthcare resources. Treatment.

■ Resumen

Antecedentes: La rinitis alérgica (RA) está considerada como la enfermedad alérgica más frecuente.

Objetivo: Presentar los datos del estudio *Alergológica-2005* sobre las características de los sujetos con RA.

Métodos: Se realizó un estudio epidemiológico (*Alergológica-2005*) prospectivo observacional descriptivo de tipo transversal, en 4991 sujetos atendidos por primera vez en consultas de alergología en España.

Resultados: Fueron diagnosticados de RA el 55% de los pacientes que acudieron por primera vez a consultas de Alergología, de los cuales el 65% tenían también conjuntivitis y el 37% asma. Dos de cada tres sujetos con RA acudió a consulta de su médico de Atención

Primaria dos veces en el último trimestre. Un tercio fue atendido por otro médico especialista en el último año, y uno de cada cinco precisó atención en urgencias. La RA afectó a la calidad de vida (SF-12), produciendo en algunos casos bajas laborales y escolares. Los pólenes fueron los alérgenos más frecuentemente implicados (51%), seguidos de los ácaros (42%). Se encontró polisensibilización en el 31% de los casos. Los antihistamínicos y los corticoides tópicos nasales fueron los fármacos más utilizados. En el 38% se inició tratamiento con inmunoterapia específica.

Conclusión: La RA ha sido el principal motivo de consulta (55%) en *Alergológica-2005*. La rinitis se asoció con frecuencia con otras entidades, en un 65% con la conjuntivitis y en un 37% con el asma. Generó una importante utilización de recursos sanitarios, y alteró de forma significativa la calidad de vida de los sujetos que la padecen.

Palabras clave: Rinitis alérgica. Rinoconjuntivitis. Calidad de vida. Recursos sanitarios. Tratamiento.

Introduction

Allergic rhinitis (AR) is an inflammatory disease of the nasal mucosa, mediated by immunoglobulin E (IgE) antibodies. The symptoms (pruritus, sneezing, rhinorrhea and/or nasal obstruction) appear when individuals are exposed to allergens to which they are sensitized. It is the most common allergic disease and is usually associated with bronchial asthma and in particular with ocular symptoms, as a result of which it is common to use the term rhinoconjunctivitis [1].

The prevalence in the general population is estimated to be between 10% and 25% and marked increases have been noted in recent decades, especially in developed countries, although the exact figures vary depending on the age of the patients in the sample or their geographic distribution [1]. In some international epidemiologic studies such as the International Study of Asthma and Allergies in Childhood [2], carried out in 1994 in children from 56 countries, very variable prevalence rates were found (1.4% - 39.7%) with intermediate figures for Spain (11.7% - 21.8%). In the same period, in the European Community Respiratory Health Survey [3], prevalence was found to be 12% - 18% in Spanish adults. More recent studies show a prevalence in the Spanish general population of 21.5% [4].

In the *Alergológica-1992* study [5], rhinitis was considered the disease most frequently treated in Allergology services.

This high and increasing prevalence of AR has considerable social repercussions, which together with the impact that it has on patients' quality of life, leads to a high medical cost, both for individuals and society in general.

The Spanish Society of Allergy and Clinical Immunology (SEAIC), with the objective of obtaining information on allergy patients treated in Allergology services designed an epidemiologic study (*Alergológica-2005*) which was completed in 2005 throughout Spain and in which 4991 subjects were evaluated. The aim of this article is to present the data obtained on patients diagnosed with AR in this study.

Methods

An observational, descriptive, cross-sectional study was performed in 2005 on a sample of allergic patients treated by 340 allergy specialists in both private and public consultations in the Spanish health system. Clinical, epidemiologic,

diagnostic, therapeutic and social and healthcare data were collected from 4991 allergic patients treated for the first time in the practices of the researchers involved in the study. The description of the methodology of the study is given in the article by Caballero [6] in this same issue. To determine the repercussions of AR on quality of life, a form of the SF-12 questionnaire [7, 8] was used in a sample of 569 patients over the age of 18 years.

Statistical Analysis

Prevalences were estimated and the remaining qualitative variables are described by calculating relative frequencies (%) and 95% confidence intervals. Quantitative variables are described using means, standard deviations, medians and other indicators of distribution. Differences in the percentages of distribution of qualitative variables are compared using the 95% confidence interval of the differences between percentages and/or the chi-square test.

Results

A diagnosis of AR was made in 2771 of the 4991 patients seen (55.5%). Of these, 65% had rhinoconjunctivitis and 35% rhinitis. 37% of patients suffered from asthma. The average age of the patients was 30 ± 15 years (95% CI; 29.5-30.5). The age distribution of the patients is shown in figure 1.

The sample included 418 patients under the age of 14 years. There were slightly more females (55%) than males (45%) in the rhinoconjunctivitis subsample.

The average period of time which passed before referral to an allergist was 2 years, although in 30% of cases this period was greater than 10 years. Eighty-seven percent reported having had an exacerbation of rhinoconjunctivitis in the previous year with 50% of patients reporting 2 exacerbations per year.

Environmental Factors

In the overall sample, the majority of patients were from urban areas (65%), with 19% from rural areas and 16% from semi-urban areas. The prevalence of rhinoconjunctivitis in

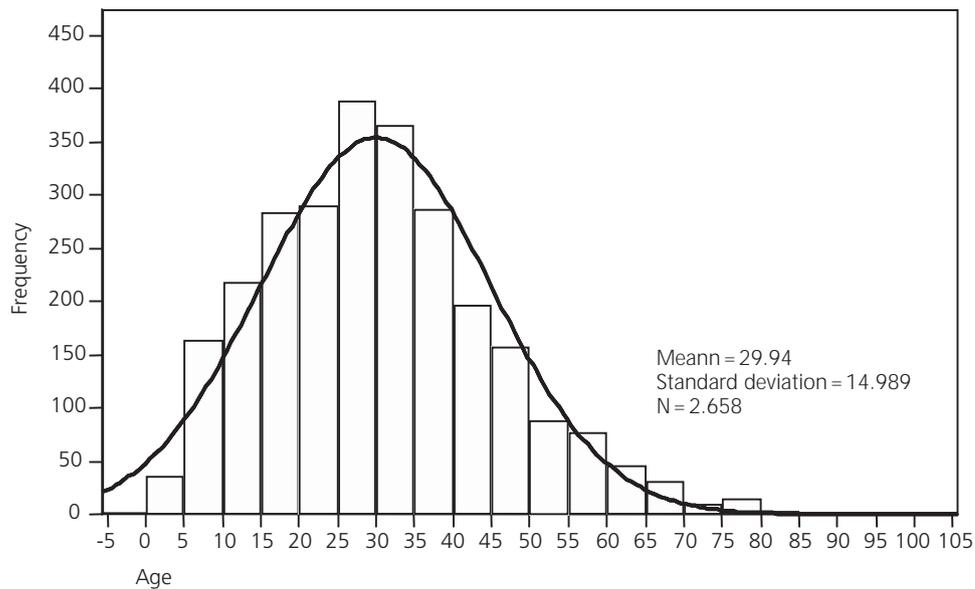


Figure 1. Age Distribution in Patients Diagnosed With Allergic Rhinitis.

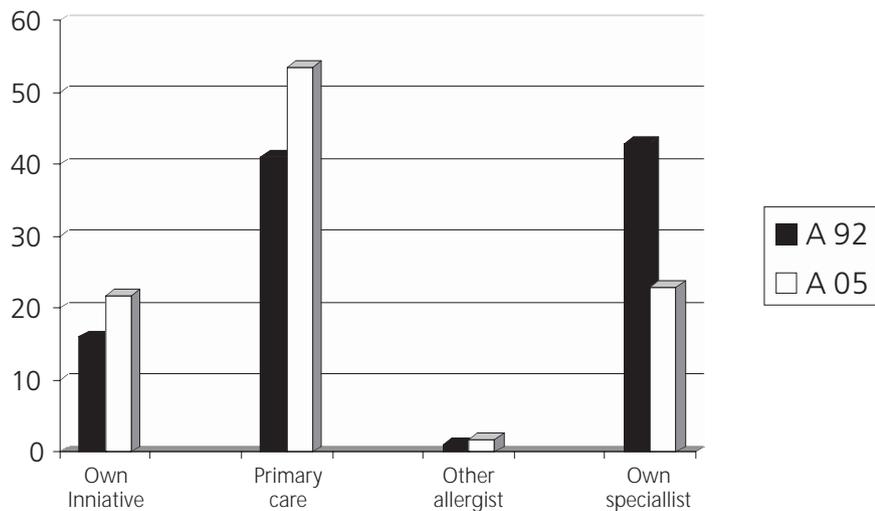


Figure 2. Origin of Patients Diagnosed With Allergic Rhinitis in *Alergológica*-2005 (A 05) and *Alergológica*-1992 (A92).

patients from rural areas was 51%, 60% in those from semi-urban areas and 55% in those from urban areas.

The prevalence of rhinoconjunctivitis was greater in those patients living in damp dwellings (60% vs. 54% in dry dwellings $P < .05$) and in those with air-conditioning (58% vs. 53.6% of patients living in dwellings with no air-conditioning, $P < .01$).

Origin of Patients

Fifty-three percent of patients were referred from primary care, 2% from another allergist, 23% from other specialists and 22% of patients presented under their own initiative (Figure 2). The other referring specialists were: ENT specialists (53%), pediatricians (37%) and pneumologists (9%).

Use of Healthcare Services

Sixty-one percent of patients paid their family physician an average of 2.1 visits in the preceding 4 months. Twenty-nine percent of patients were treated by another specialist in the preceding year, with an average of 1.7 visits. Twenty-two percent of patients were treated in emergency departments, with an average of 1.9 visits per year. Hospital admission was necessary in 1.2% of patients.

Impact on School, Work and Quality of Life

Rhinitis/conjunctivitis was the reason for days off work in 6% of patients, with days off being taken on only one occasion in 66% of these cases with an average duration of 15.6 days. From a sample of 337 students, the average number of days off in the previous year was 8. Fifteen percent of parents were forced to take days off for this reason in a sample of 513 children, with an average of 4 days per year.

In general, school performance was considered good in 79% of children and there were no significant differences with the overall sample.

As for quality of life, as evaluated by the general SF-12 questionnaire, the average total for the physical component (PCS-12) was 46.7 and 44 for the mental component (MCS-12).

Presenting Complaint

In 85% of cases the patients consulted due to worsening of symptoms and in 15% as a result of a first episode of the disease. In 53% of cases the worsening of symptoms were of perennial rhinitis/conjunctivitis and in 38% of seasonal rhinitis/conjunctivitis.

Sixty-four percent of patients reported their symptoms lasting an average of 80 days (median 30 days) per year.

Diagnosis

The diagnosis of AR was principally made on the basis of the clinical history, physical examination and skin prick tests (Table 1).

The average time used to reach a diagnosis was 15 ± 26 days. Fifty percent of patients were diagnosed in a single day. Fifty-one percent of cases presented with allergy to pollens, 42% to dust mites, 20% to epithelia and 6% to fungi. Thirty-one percent of patients presented with polysensitization.

Although pollens were the allergens most frequently involved, *D. pteronyssinus* was the single allergen with greatest prevalence in the study (39%), with a prevalence of other dust mites of 32% for *D. farinae* and 7% for *L. destructor*. As for pollens, 35% of patients were allergic to the pollen from gramineae, 30% to olive, 10% to chenopodium, 9% to cypress, 8% to hybrid plane, 7% to pollens from salsola, artemisia and parietaria. Epithelia occupied the third place as triggering agents and the most frequent was cat

Table 1. Diagnostic Tests Used in *Alergológica*-2005 and *Alergológica*-1992*

Diagnostic Test	2005	1992
Skin prick tests	100	100
Specific IgE	45	49
Total IgE	42	66
Spirometry	34	–
Bronchodilator test	13	–
Chest X-ray	11	–
Nasal/conjunctival challenge	4	10
Bronchial challenge	2	–
Breast X-ray	–	45
Nasal cytology	–	24
Rhinomanometry	–	3

* All figures represent percentages. IgE indicates immunoglobulin E.

epithelium (14.6%) in spite of the fact that of the patients included in the study 26% lived with dogs and 14% with cats. The fungus most frequently involved was *Alternaria alternata* (6%). The number of work-related cases of AR was very small. Latex was the allergen most frequently involved (8 cases), which corresponds to 0.3% of the patients with AR.

Treatment

Seventy-seven percent of patients had already followed some type of treatment in the year prior to the consultation, especially with antihistamines (82%) and topical corticoids (24%). Compliance was rated as “good” in 57% of cases, “normal” in 24% and “poor” in 3%. Fifteen percent had not received treatment for their symptoms.

Some differences were apparent between the drugs used in *Alergológica*-2005 and *Alergológica*-92 (Table 2), although the antihistamines continue to be the drugs most widely used (86%), mainly second generation antihistamines, followed by nasal topical corticoids (67%). As can be seen, a considerable number of patients are treated with a combination of both these drugs.

Immunotherapy was prescribed in 38% of patients with AR.

Table 2. Treatment Prescribed for Patients with Allergic Rhinitis in *Alergológica*-2005 as Compared to *Alergológica*-1992*

Treatment	2005	1992
Antihistamines	86	80
Allergen avoidance	68	71
Nasal steroids	68	58
Specific immunotherapy	31	58
Antileukotrienes	4	–
Antihistamines + decongestants	4	–
Decongestants	2	–
Mast cell stabilizers	2	20
Ipratropium bromide	1	–
Systemic steroids	–	2

* All figures represent percentages.

Discussion

In *Alergológica*-2005, AR was the main presenting complaint, as was the case in *Alergológica*-92 (52%) [5]. This means that for one of every two patients who are treated for the first time in Allergy services the reason for the visit is AR. These data underline the importance of this disorder in allergology, as has also been shown in other studies [9].

In the patients with rhinoconjunctivitis there was an association with asthma in 37% of cases. According to different studies published [10-14], asthma may affect 20%-50% of patients with AR. AR itself constitutes a risk factor for the development of asthma [15] and this diagnosis may even be found in more than 30% of patients with AR with no history of bronchial obstructive disorders [16]. Sixty-five percent also suffered from conjunctivitis associated with the AR, a situation which, given the high frequency of the association, is undervalued and leads to inadequate control of the allergic disorder [17, 18].

Most patients were referred to Allergy services from primary care (53%), which represents an important increase in comparison with *Alergológica*-92 [5]. Indeed, AR has been identified as one of the 10 main reasons for medical visits in primary care [19], as a result of which one basic objective would be to improve communication with such physicians. A considerable number of patients (22%) came to consultation on their own initiative, which can be explained because part of the consultations were made through private insurance schemes where the patient may visit the specialist directly. In comparison with *Alergológica*-92, there has been a striking decrease (43% to 23%) in the number of patients referred by other specialists. Although ENT was the specialty from which most patients were referred (38%), this figure has fallen significantly when compared to the corresponding data from *Alergológica*-92 (53%). It is worth pointing out the low number of referrals from pneumology (9%), although this figure has remained similar to that from *Alergológica*-92 (11%).

The average age of the patients in the rhinoconjunctivitis group (29.9 ± 15 years) has increased by 5 years since *Alergológica*-92, but was significantly lower than that of the overall current sample (32.1 ± 18.4 years). Pediatric patients (those aged under 14 years) represented 15.3% of the sample (418 patients), half what was found in the 1992 study.

According to the SF-12 data, which evaluates the repercussion on quality of life related to health, the values of the patients with AR were between the 25th percentile (for the physical component) and the 20th percentile (for the mental component) as compared with the general Spanish population, which means that the quality of life perceived by patients with AR was lower than 75% of the general Spanish population. As was seen in *Alergológica*-92, there was an important repercussion on the health-related quality of life in patients with rhinoconjunctivitis, as has also been shown by different studies which have used both general and specific questionnaires [20].

The great majority of patients (87%) reported having experienced an episode of rhinitis in the previous year as a result of which, in some cases, some days were taken off work or school. The study also provides data on the use of

healthcare resources by patients with AR. Firstly, 2 out of 3 patients with AR consulted their primary health care physician in the previous 4 months. Secondly, one third were seen by another specialist in the preceding year (with an average of 1.7 visits per year) and finally, one out of every 5 patients with AR required emergency department treatment (with an average of 2 visits per year).

Although few studies exist on the cost of the disease [21], the economic burden and the repercussions on work productivity are more than proven in the case of AR [22, 23]. In some studies [24], three quarters of patients considered that their symptoms had an impact on their daily work or school activities. In a prospective cross-sectional study carried out in primary and specialized care in 5 European countries, including Spain, to assess the perceptions of physicians and patients of quality of life [25], a poor correlation was found to exist between the perceptions of patients and those of physicians. As a result, it would be advisable to include questionnaires specific to rhinitis and adapted to our cultural context which could help us in our daily practice to better evaluate patients [26].

Bearing in mind the duration of symptoms, the majority of patients with rhinitis could be classified according to the new ARIA classification as persistent. This figure is greater than that found by Canonica [25] (42.5%) although in this study no division was made between patients seen in primary or specialist care. Generally speaking, it may be because patients with persistent rhinitis usually have more severe symptoms and thus more frequently demand allergological care [27].

Most patients can be diagnosed on the basis of a well taken clinical history, physical examination and a limited allergological study using skin tests with the pertinent allergens [28]. In this way in up to 50% of cases it is possible to reach a diagnosis of AR in just one consultation. This represents an important resource and saving in clinical management. It is worth pointing out the scarce use of techniques to examine nasal obstruction, which is an important symptom of rhinitis, even though objective techniques are available for this purpose [29, 30].

Allergy to pollen was the most frequent diagnosis (51%), followed by dust mites (42%) with polysensitization in 31% of cases. These figures are very similar to those found in other studies [10].

Prior to the consultation with the allergist, most patients had already received treatment for their symptoms in the preceding year (77%). This is logical given the average disease progression of 2 years and in over 50% of cases patient compliance was considered to have been good.

Although nasal corticoids are considered the most effective treatment for AR [31], once again antihistamines were the drugs most frequently prescribed (86%), followed by topical nasal corticoids. In 50% of cases both treatments were used in spite of the fact that no evidence exists, at least for seasonal AR, for an added benefit to adding an antihistamine to a nasal corticoid [32, 33] and that in treatment guidelines the combination is only recommended for moderate to severe persistent rhinitis when nasal corticoids do not produce the desired effect [1, 30].

It is noteworthy that after consultation with the allergist, the prescription of topical nasal corticoids increased markedly, which indicates that when the symptoms are not controlled

nasal topical corticoids are prescribed, which are, with a Grade A recommendation, the treatment of choice for moderate to severe AR [1, 30].

Specific immunotherapy, a safe and efficient treatment for AR [34], was indicated in 38% of patients with AR. This figure is much lower than that from *Alergológica-92* where it was prescribed in 58% of these patients and highlights just how important a decrease there has been in the use of this type of treatment.

In conclusion, AR is the leading cause of consultations (55%) in patients treated for the first time in Allergy services. The frequent association with other disorders, especially with conjunctivitis (65%) and asthma (37%) is noteworthy. AR leads to an important use of healthcare resources and significantly affects the quality of life of those who suffer from it.

Acknowledgments

I would like to thank Schering-Plough Laboratories for financing this epidemiologic study and especially the Medical Manager M. José Rosales for the time he has dedicated to it. I am also grateful to the Clinical and Epidemiologic Research Unit of the Luzán 5 Group for undertaking the study and the statistical analyses and to all my fellow allergists involved in the project (Scientific Committee, Coordinators and Researchers) and finally to the Governing Board of SEAIC for promoting the project.

References

- Bousquet J, Van Cauwenberge P, Khaltaev N, ARIA Workshop Group; World Health Organization. Allergic Rhinitis and Its Impact on Asthma. *J Allergy Clin Immunol*. 2001;108 (5 suppl): S147-334.
- Strachan D, Sibbald B, Weiland S, Ait-Khaled N, Anabwani G, Anderson HR, Asher MI, Beasley R, Björkstén B, Burr M, Clayton T, Crane J, Ellwood P, Keil U, Lai C, Mallol J, Martinez F, Mitchell E, Montefort S, Pearce N, Robertson C, Shah J, Steward A, von Mutius E, Williams H. Worldwide variations in prevalence of symptoms of allergic rhinoconjunctivitis in children: the International Study of Asthma and Allergies in Childhood (ISAAC). *Pediatr Allergy Immunol*. 1997;8:161-76.
- Variations in the prevalence of respiratory symptoms, self-reported asthma attacks, and use of asthma medication in the European Community Respiratory Health Survey (ECRHS). *Eur Respir J*. 1996;9:687-95.
- Bauchau V, Durham SR. Prevalence and rate of diagnosis of allergic rhinitis in Europe. *Eur Respir J*. 2004;24:758-64.
- Alergológica Factores Epidemiológicos Clínicos y Socioeconómicos de las enfermedades alérgicas en España*. Sociedad Española de Alergología e Inmunología Clínica y Alergia e Inmunología Abelló SA (Eds). Madrid, NILO Industria Gráfica, 1995.
- Caballero Martínez F. *Alergológica 2005. Methodological Aspects and Sample Characteristics of the Study*. *J Investig Allergol Clin Immunol*. 2009;Vol19,suppl 2:????
- Vilagut G, Ferrer M, Rajmil L, Rebollo P, Permanyer-Miralda G, Quintana JM, Santed R, Valderas JM, Ribera A, Domingo-Salvany A, Alonso J. The Spanish version of the Short Form 36 Health Survey: a decade of experience and new developments. *Gac Sanit*. 2005;19:135-50.
- Espinosa De Los Monteros MJ, Alonso J, Ancochea J, González A. Calidad de vida en asma: fiabilidad y validez del cuestionario genérico SF-36 aplicado a la población asmática de un área sanitaria. *Arch Bronconeumol*. 2002;38:4-9.
- Navarro A, Valero A, Juliá B, Quirce S. Coexistence of asthma and allergic rhinitis in adult patients attending allergy clinics: ONEAIR Study. *J Investig Allergol Clin Immunol*. 2008;18: 233-8.
- Pereira C, Valero A, Loureiro C, Davila I, Martínez-Cóccera, C. Murio C, Rico P, Palomino R. Iberian study of aeroallergens sensitization in allergic rhinitis. *Eur Ann Allergy Clin Immunol*. 2006;38:186-194.
- Annesi-Maesano I. Epidemiological evidence of the occurrence of rhinitis and sinusitis in asthma. *Allergy*. 1999;54 (suppl 57):7-13.
- Marogna M, Faliagani P, Bruno M, Massolo A, Riva G. The allergic march in pollinosis: Natural history and therapeutic implications. *Int Arch Allergy Immunol*. 2004;135:336-42.
- Cirillo I, Vizzacaro A, Tosca MA, Milanese M, Ciprandi G. Prevalence and treatment of allergic rhinitis in Italian conscripts subjects. *Eur Ann Allergy Clin Immunol*. 2003;35:204-7.
- Leynaert B, Bousquet J, Neukirch C, Liard R, Neukirch CF. Perennial rhinitis: an independent risk factor for asthma in nonatopic subjects. Results from the European Community Respiratory Health Survey. *J Allergy Clin Immunol*. 1999;104:301-4.
- Guerra S, Sherrill DL, Martinez FD, Barbee RA. Rhinitis as an independent risk factor for adult-onset asthma. *J Allergy Clin Immunol*. 2002;109:419-25.
- Demoly P, Bozonnet MC, Dacosta P, Daures JP. The diagnosis of asthma using a self-questionnaire in those suffering from allergic rhinitis: a pharmaco-epidemiological survey in everyday practice in France. *Allergy*. 2006;61:699-704.
- Bielory L, Katelaris CH, Lightman S, Naclerio RM. Treating the ocular component of allergic rhinoconjunctivitis and related eye disorders. *Med Gen Med*. 2007;9:35.
- Blaiss MS. Allergic rhinoconjunctivitis: burden of disease. *Allergy Asthma Proc*. 2007;28:393-7.
- Gregory C, Cifaldi M, Tanner LA. Targeted intervention programs: creating a customized practice model to improve the treatment of allergic rhinitis in a managed care population. *Am J Manag Care*. 1999; 5:485-96.
- Petersen KD, Kronborg C, Gyrd-Hansen D, Dahl R, Larsen JN, Lowenstein H. Quality of life in rhinoconjunctivitis assessed with generic and disease-specific questionnaires. *Allergy*. 2008;63:284-91.
- Bachert C, Bousquet J, Canonica GW, Durham SR, Klimek L, Mullol J, Van Cauwenberge PB, Van Hammée G; XPERT Study Group. Levocetirizine improves quality of life and reduces costs in long-term management of persistent allergic rhinitis. *J Allergy Clin Immunol*. 2004;114:838-44.
- Schramm B, Ehlken B, Smala A, Quednau K, Berger K, Nowak D. Cost of illness of atopic asthma and seasonal allergic rhinitis in Germany: 1-yr retrospective study. *Eur Respir J*. 2003;21:116-122.

23. Halpern MT, Schmier JK, Richner R, Guo C, Togias A. Allergic rhinitis: a potential cause of increased asthma medication use, costs, and morbidity. *J Asthma*. 2004;41:117-126.
24. Schatz M. A survey of the burden of allergic rhinitis in the USA. *Allergy*. 2007;62 (suppl85):9-16.
25. Canonica GW, Bousquet J, Mullol J, Scadding GK, Virchow JC. A survey of the burden of allergic rhinitis in Europe. *Allergy*. 2007;62(suppl 85):17-25.
26. Valero A, Alonso J, Antépara I, Baró E, Colás C, del Cuvillo A, Ferrer M, Herdman M, Marti-Guadaño E, Monclús L, Navarro-Pulido AM, Sastre J, Izquierdo I, Mullol J. Health-related quality of life in allergic rhinitis: comparing the short form ESPRINT-15 and MiniRQLQ questionnaires. *Allergy*. 2007;62:1372-8.
27. Bauchau V, Durham SR. Epidemiological characterization of the intermittent and persistent types of allergic rhinitis. *Allergy*. 2005;60:350-3.
28. Van Cauwenberge P, Bachert C, Passalacqua G, Bousquet J, Canonica GW, Durham SR, Fokkens WJ, Howarth PH, Lund V, Maeling HJ, Mygind N, Passali D, Scadding GK, Wang DY. Consensus statement on the treatment of allergic rhinitis. *Allergy*. 2000;55:116-34.
29. Uzzaman A, Metcalfe DD, Komarov HD. Acoustic rhinometry in the practice of allergy. *Ann Allergy Asthma Immunol*. 2006;97:745-51.
30. Scadding GK, Durham SR, Mirakian R, Jones NS, Leech SC, Farooque S, Ryan D, Walker SM, Clark AT, Dixon TA, Jolles SR, Siddique N, Cullinan P, Howarth PH, Nasser SM; British Society for Allergy and Clinical Immunology . BSACI guidelines for the management of allergic and non-allergic rhinitis. *Clin Exp Allergy*. 2008;38:19-42.
31. Weiner J, Abramson M, Puy R. Intranasal corticosteroids versus oral H1 receptor antagonists in allergic rhinitis: systematic review of randomised controlled trials. *BMJ*. 1998; 317:1624-9.
32. Ratner PH, van Bavel JH, Martin BG, Hampel FC Jr, Howland WC 3rd, Rogenes PR, Westlund RE, Bowers BW, Cook CK. A comparison of the efficacy of fluticasone propionate aqueous nasal spray and loratadine, alone and in combination, for the treatment of seasonal allergic rhinitis. *J Fam Pract*. 1998;47:118-25.
33. Di Lorenzo G, Pacor ML, Pellitteri ME, Morici G, Di Gregoli A, Lo Bianco C, Ditta V, Martinelli N, Candore G, Mansueto P, Rini GB, Corrocher R, Caruso C. Randomized placebo-controlled trial comparing fluticasone aqueous nasal spray in mono-therapy, fluticasone plus cetirizine, fluticasone plus montelukast and cetirizine plus montelukast seasonal allergic rhinitis. *Clin Exp Allergy*. 2004;34:259-67.
34. Wilson DR, Lima MT, Durham SR. Sublingual immunotherapy for allergic rhinitis: systematic review and meta-analysis. *Allergy*. 2005; 60:4-12.

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