

# Systemic reactions to wasp sting: Is the clinical pattern related to age, sex and atopy?

A.J. Pérez Pimiento<sup>a</sup>, L. Prieto Lastra<sup>a</sup>, M.I. Rodríguez Cabrer<sup>a</sup>, A.A. Vázquez Bautista<sup>a</sup>, A. García Cubero<sup>a</sup> and E. Calvo Manuel<sup>b</sup>

<sup>a</sup>Allergy Department. Hospital Universitario Puerta de Hierro. Madrid (Spain).

<sup>b</sup>Internal Medicine I. Hospital Clínico San Carlos. Madrid (Spain).

## ABSTRACT

**Background:** The aim of this study was to analyze the frequency of clinical features and the severity of systemic reactions to wasp stings, and to establish their relationship with mean age, sex, and atopy.

**Methods:** We studied 115 patients who suffered an anaphylactic reaction to wasp sting and showed specific IgE to venoms from *Vespula* and/or *Polistes*. In all patients, age, sex and personal history of atopy were registered. Cutaneous, respiratory, cardiovascular and gastrointestinal involvement during the course of the reaction was investigated. Each patient was assigned a severity grade according to a simple two-grade classification based on Müller's criteria. Bivariable analysis was performed to analyze the associations among mean age, sex and atopy and the symptoms and severity of the reaction.

**Results:** The mean age was 40.2 years. There were 60 males (52.2 %) and 55 females (47.8 %). Twenty-six patients (22.6 %) were atopic. The percentages of involved systems were as follows: skin 90.4 %, respiratory 54.8 %, cardiovascular 33.9 %, and gastrointestinal 21.7 %.

Reactions were mild in 40.8 %, and severe in 59.1 %. The mean age was higher in patients without cutaneous symptoms ( $p < 0.05$ ). Cardiovascular involvement was more frequent in males ( $p < 0.05$ ). No other significant differences were found.

**Conclusion:** The symptoms of systemic reactions to wasp venom most frequently involved the skin, while reactions without cutaneous involvement were more frequent in older patients. Cardiovascular involvement was more common in males. The clinical pattern was not determined by atopy and the variables studied were not related to severity.

**Key words:** Anaphylaxis. Hymenoptera venom. Hypersensitivity. Venom allergy.

## INTRODUCTION

Wasps, apart from bees and ants, are stinging insects belonging to the order *Hymenoptera*. Anaphylactic reactions to hymenoptera venoms may occur in subjects with an IgE-mediated sensitisation to constituent parts of the venom. These reactions are classified in different ways according to their clinical spectrum and severity<sup>1-5</sup>, although only the Müller's classification is exclusively proposed for systemic reactions to hymenoptera stings<sup>2</sup>. Clinical studies on anaphylaxis to wasp stings, excluding bee venom allergy, have not been reported so far. We present a study on systemic reactions to wasp sting, based on an analysis of the clinical features in connection with the age, the sex and the personal history of atopy.

### Correspondence:

A.J. Pérez Pimiento  
Servicio de Alergia  
Hospital Universitario Puerta de Hierro  
San Martín de Porres, 4  
28035 Madrid (Spain)  
Tel. (0034) 913445844  
Fax. (0034) 913730535  
E-mail: aperezpimiento@yahoo.es

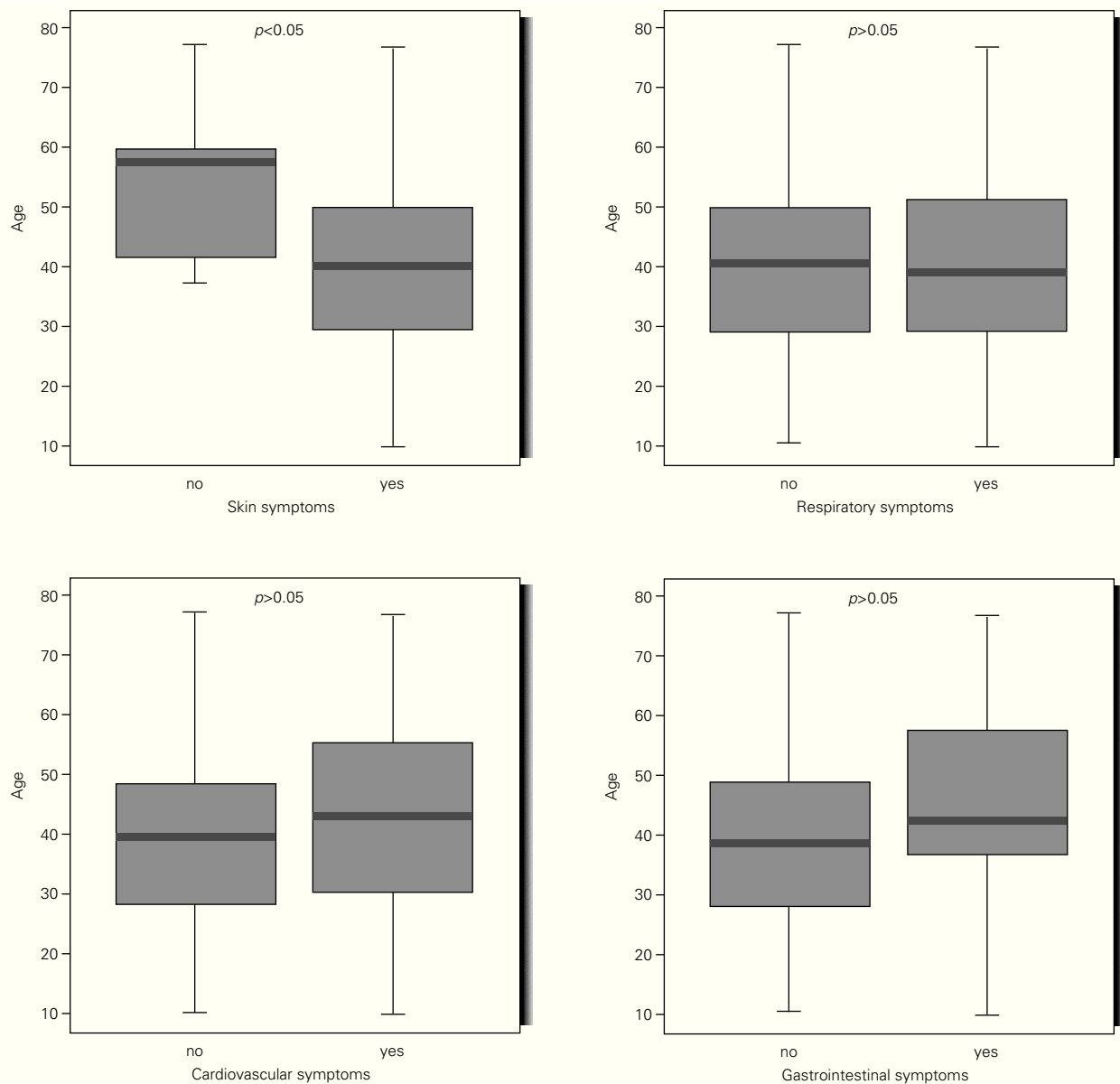


Figure 1.—Boxplots summarizing age and symptoms. Each chart shows the extreme values, the quartiles (upper and lower limits of the box) and the median age (horizontal line into the box).

## MATERIAL AND METHODS

We studied 115 patients who suffered an anaphylactic reaction after wasp sting and showed specific IgE to venoms from *Vespula* (common wasp, yellow jacket) and/or *Polistes* (paper wasp), measured by the Pharmacia CAP System method (Uppsala, Sweden). Age, sex and personal history of atopy were registered for every case. Atopy was defined by IgE-mediated disorders, apart from venom and drug allergy, and proved by a positive skin prick test to airborne and/or food allergens.

All the cases were investigated about cutaneous, respiratory, cardiovascular and gastrointestinal in-

volvement in the course of the reaction. A positive value was given to each item when at least one suggesting symptom was present. Skin symptoms included itching, generalized erythema, urticaria and angioedema. Respiratory symptoms included dyspnoea, throat swelling, hoarseness, chest constriction, stridor and wheeze. Cardiovascular involvement was supposed in case of dizziness, confusion, loss of consciousness or tachycardia were present. Gastrointestinal symptoms included dysphagia, abdominal pain, nausea, vomiting and diarrhoea.

Finally, every case was assigned a severity grade according a simple classification into two levels from

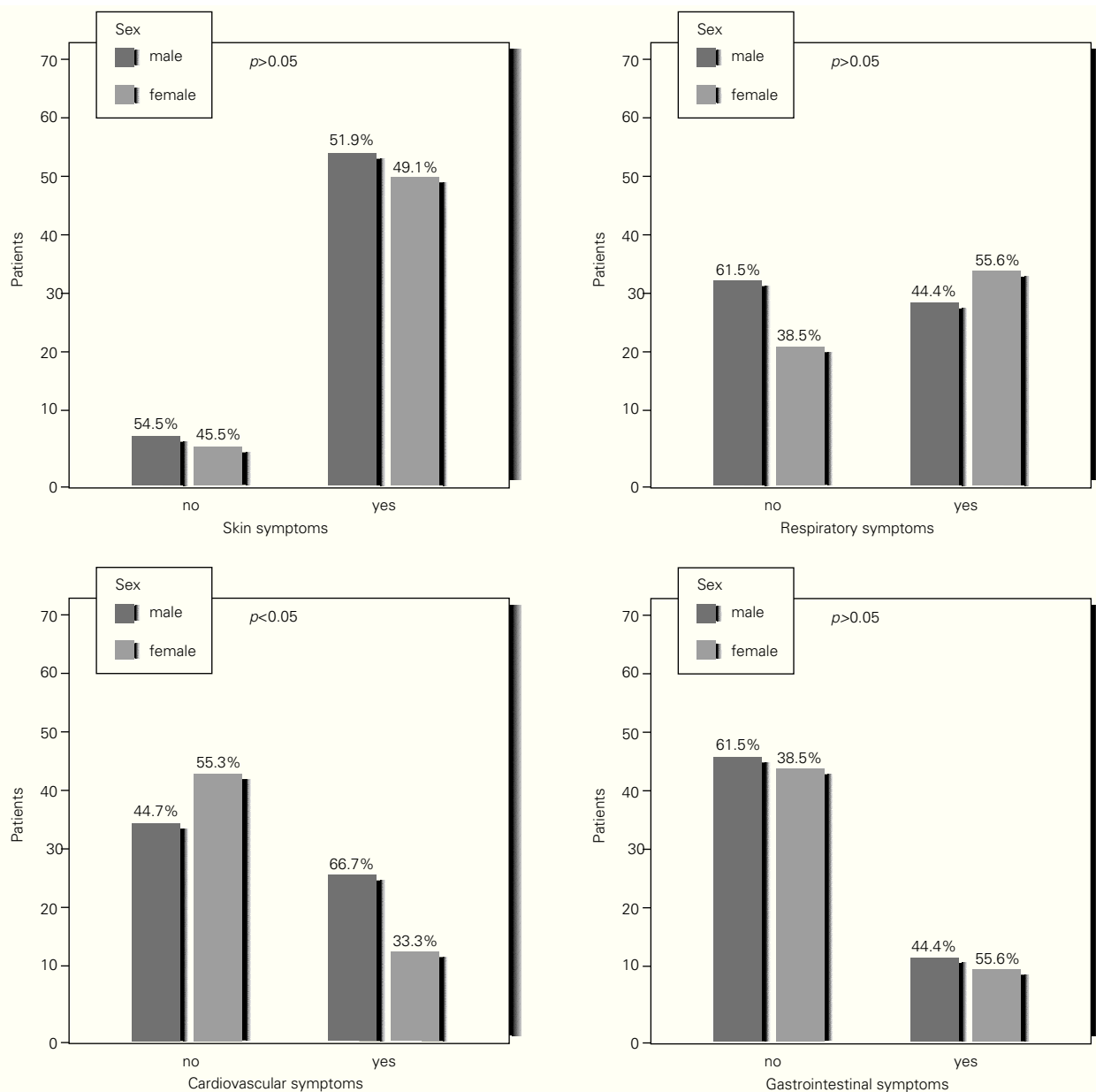


Figure 2.—Clustered bar charts for sex and symptoms.

the Müller's criteria. Thus, the reaction was considered mild if it was limited to grades I and II. On the other hand, the illness was considered to be severe if there were respiratory and/or cardiovascular involvement (grades III and IV of Mueller) (table I).

The statistical analysis was performed with the software SPSS for Windows (version 12). The relationships between age and symptoms, and age and severity, were assessed by the *t*-test. Sex and atopy were assessed for their correlation with symptoms and severity by using the *chi-square* test. Differences were considered statistically significant at *p* values of less than 0.05.

## RESULTS

The mean age was 40.2 years (standard deviation: 15.9), with a range of 10 to 80 years, and a median age of 40 years. Male subjects accounted for 60 (52.2 %), and female subjects 55 (47.8 %). Twenty six patients (22.6 %) were atopic individuals. The most frequent symptoms involved the skin (*n* = 104; 90.4 %), followed, in order of frequency, by respiratory (*n* = 63; 54.8 %), cardiovascular (*n* = 39; 33.9 %) and gastrointestinal symptoms (*n* = 25; 21.7 %). Severity grading of Müller's criteria resulted in the following: 12 (10.4 %), grade 1; 34 (29.6 %), grade 2; 57

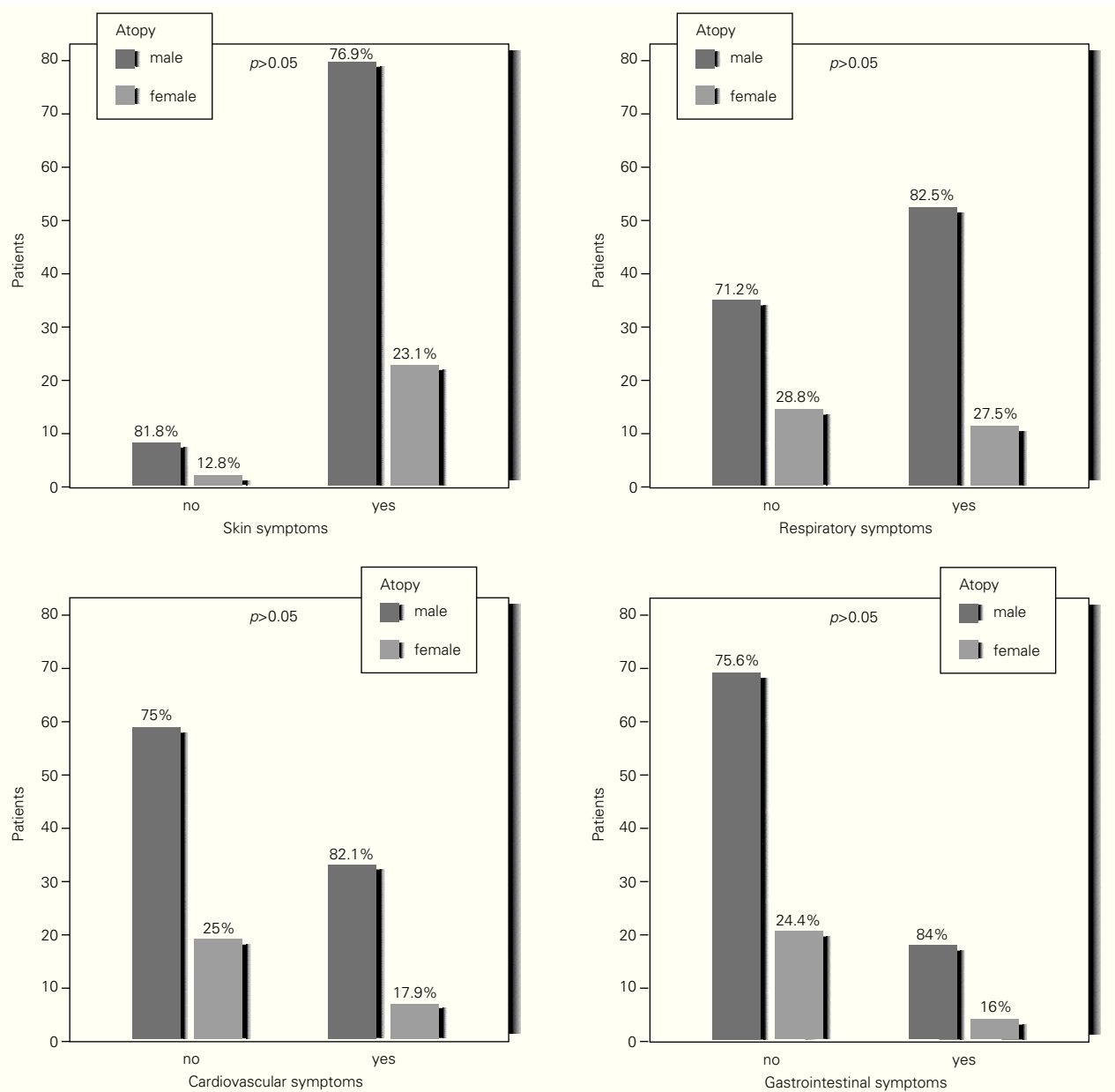


Figure 3.—Clustered bar charts for atopy and symptoms.

**Table I**  
**Severity grading applied to the reactions, from Mueller's criteria**

Grade	Müller	Symptoms
Mild	I	Generalized urticaria, itching, malaise, anxiety
	II	Any of the above, plus two or more of the following: angioedema, constriction in chest, nausea, vomiting, diarrhoea, abdominal pain, dizziness Or: Angioedema alone
Severe	III	Any of the above, plus two or more of the following: dyspnoea, wheezing, stridor, dysphagia, dysarthria, hoarseness, weakness, confusion, feeling of impending disaster Or: Dyspnoea, wheezing or stridor alone
	IV	Any of the above, plus two or more of the following: fall in blood pressure, collapse, loss of consciousness, incontinence, cyanosis

(49.6 %), grade 3; and 12 (10.4 %), grade 4. From this distribution we obtained 40.8 % of mild reactions and 59.1 % of severe reactions.

The mean age was significantly higher in the group without skin involvement (51.91 years), compared with the group with cutaneous symptoms (38.6 years), with a  $p$  value lower than 0.05. On the other hand, there were no significant differences between the mean age and the reactions with and without respiratory, cardiovascular and gastrointestinal symptoms (fig. 1). Both males and females had a similar frequency of cutaneous and gastrointestinal symptoms, whereas respiratory symptoms were more frequent in women ( $p > 0.05$ ), and respiratory symptoms were more frequent in men ( $p < 0.05$ ) (fig. 2). Cutaneous and gastrointestinal involvement showed a similar frequency in atopic and non-atopic individuals. Atopy was more frequent in subjects with respiratory and cardiovascular symptoms compared to non atopic subjects. Nevertheless, these results did not show and statistically significant difference (fig. 3).

As for the severity, the mean age was 39.8 years in the mild reactions, and 40.76 years in the severe reactions. The illness was mild in 41.7 % of men and 40 % of women, whereas it was severe in 58.3 % of men and 60 % of women. The reaction was mild in 39.3 % of non-atopics and 46.2 % of atopics, while it was severe in 60.7 % of non-atopics and 53.8 % of atopics. These results did not show and statistically significant difference.

## DISCUSSION

In our study, systemic reactions to wasp sting occurred in middle-aged individuals with a slight predominance of males, as it is described in most series of hymenoptera venom allergy<sup>6-9</sup>. The frequency of atopic individuals was comparable to the general population. Previous studies indicate that atopy is not a risk factor for systemic reactions to Hymenoptera stings<sup>10-12</sup>. However, the sensitisation to Hymenoptera venoms has been associated with atopy-related IgE hyperresponsiveness<sup>13,14</sup>.

The results show that the symptoms of systemic reactions to wasp venom involved the skin with a higher frequency, as it has been described for anaphylactic reactions regardless of the causal agent<sup>5</sup>. The few reactions without skin involvement are significantly more frequent in aged subjects. This find has not been described before, and it may be of interest in further reports. The respiratory system was affected in the second place, with a higher (but not significant) frequency in females. The importance of this fact is relative, because the difference between up-

per and lower airways involvement was not established. Although males presented with most cases of cardiovascular symptoms, the study about cardiovascular involvement could not provide accurate results, owing to the difficulty to establish symptoms such as disorders of consciousness that may be due to a fall in the blood pressure, but also to non-specific neurological reactions. Nevertheless, they accounted for nearly 40 % of the reactions. Apart from anything else, the history of atopy does not determine differences in the frequency of system involvement. Finally, we conclude that the severity of the sting reaction is not correlated to age, sex and personal history of atopy, in accordance with previous reports<sup>15,16</sup>.

## REFERENCES

1. Ring J, Messmer K. Incidence and severity of anaphylactoid reactions to colloid volume substitutes. *Lancet*. 1977;26: 466-9.
2. Müller UR. Insect sting allergy: Clinical picture, diagnosis and treatment. New York: Gustav-Fisher; 1990.
3. Pumphrey RS, Stanworth SJ. The clinical spectrum of anaphylaxis in north-west England. *Clin Exp Allergy*. 1996;26:1364-70.
4. Peng MM, Jick H. A population-based study of the incidence, cause, and severity of anaphylaxis in the United Kingdom. *Arch Intern Med*. 2004;164:317-9.
5. Brown SGA. Clinical features and severity grading of anaphylaxis. *J Allergy Clin Immunol*. 2004;114:371-6.
6. Brown H, Bernston HS. Allergy to the Hymenoptera. V. Clinical study of 400 patients. *Arch Intern Med*. 1970;125:665-9.
7. Lockey RF, Turkeltaub PC, Baird-Warren IA, Olive CA, Olive ES, Peppe BC, Burkantz SC. The Hymenoptera venom study I, 1979-1982: Demographics and history-sting data. *J Allergy Clin Immunol*. 1988;82:370-81.
8. Armisen M, Vidal C, López-Carballo C, Purriños MJ, Fernández-Ovide E, Piñeiro J. Alergia a veneno de himenópteros: epidemiología del área sanitaria de Santiago de Compostela. *Alergol Inmunol Clin*. 2001;16:213-6.
9. Mingomataj E, Ohri D, Dhimitri V, Privtanji A, Qirko E, Pani L, et al. Hymenoptera sting anaphylactic reactions in the Mediterranean population of Albania. *J Invest Allergol Clin Immunol*. 2003;13:272-7.
10. Birnbaum J, Vervloet D, Charpin D. Atopy and systemic reactions to hymenoptera stings. *Allergy Proc*. 1994;15:49-52.
11. Fernández J, Blanca M, Soriano J, Sánchez J, Juárez C. Epidemiological study of the prevalence of allergic reactions to hymenoptera in a rural population in the mediterranean area. *Clin Exp Allergy*. 1999;29:1069-74.
12. Navarro LA, Peláez A, de la Torre F, Tenias Burillo JM, Megías J, Martínez I. Epidemiological factors on Hymenoptera venom allergy in a Spanish adult population. *J Invest Allergol Clin Immunol*. 2004;14:134-41.
13. Björnsson E, Janson C, Plaschke P, Norman E, Sjöberg O. Venom allergy in adult Swedes: a population study. *Allergy*. 1995;50:800-5.
14. Schäffer T, Przybilla B. IgE antibodies to Hymenoptera venoms in the serum are common in the general population and are related to indicators of atopy. *Allergy*. 1996;51:372-7.
15. Mosbech H. Insect allergy. A comparative study including case histories and immunological parameters. *Allergy*. 1984;39:543-9.
16. Kalyoncu AF, Demir AU, Ozcan U, Ozkuyumcu C, Sahin AA, Baris YI. Bee and wasp venom allergy in Turkey. *Ann Allergy Asthma Immunol*. 1997;78:408-12.