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# Allergist referrals for systemic reactions to imported fire ants: a community survey in an endemic area

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**Background:** Systemic reactions to imported fire ants (IFAs) are known to be the most common cause of anaphylaxis in the southeastern United States, including Texas. Despite this reaction prevalence, referrals to allergists for evaluation and treatment of IFA reactions seem to be infrequent.

**Objective:** To evaluate the frequency of referrals for systemic reactions to IFAs in an IFA-endemic area of the Dallas/Fort Worth metroplex.

**Methods:** A list of all practicing allergists in the Dallas/Fort Worth metroplex was generated through allergy society membership directories and local telephone book listings. Practices that performed testing and administered immunotherapy for IFA allergy were surveyed using a written questionnaire assessing new referrals for IFA systemic reactions and perceptions of referral patterns.

**Results:** Of 78 “allergists” initially screened, 51 indicated that they test and currently perform immunotherapy for IFA allergy. Of these 51 allergists, 35 (69%) returned completed surveys. Based on these responses, an estimated 0.6% of new patient referrals were for IFA reactions. Sixty-eight percent of respondents indicated that none to very few of all patients in their area with systemic reactions to IFA were being referred to their office for evaluation.

**Conclusions:** Only 0.6% of new referrals to allergists’ offices in an IFA-endemic area are for IFA systemic reactions. This is even lower than the estimated 2% prevalence of systemic reactions to IFA in the general population of an endemic area. Efforts to improve awareness of treatment for IFA systemic reactions for referring physicians and the public are needed.

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## INTRODUCTION

Imported fire ants (IFAs) are common in the southeastern United States and are responsible for significant economic and health ramifications in endemic areas. In Texas alone, the estimated economic impact is \$1.2 billion annually.<sup>1</sup> *Solenopsis richteri* (black IFA) and *Solenopsis invicta* (red IFA) are the 2 primary species with medical and economic ramifications in the United States.<sup>2</sup> In endemic areas, the annual attack rates of IFAs are likely greater than 30%.<sup>3</sup> The severity of reactions to IFA stings can vary from local pustule formation to as severe as anaphylactic shock. Although the actual incidence of anaphylaxis after IFA sting has not been clearly determined, anaphylaxis has been reported to occur in up to 1% of stings.<sup>4</sup>

The prevalence of sensitization to IFAs in endemic areas of the United States varies by study. In a study<sup>5</sup> from Augusta, Georgia, the prevalence of IFA specific IgE in random blood donors from the area was found to be 17%. This was significantly higher than the prevalence of specific IgE to yellow jacket venom (10%) and peanut (7.5%) in these same blood donors. Rhoades et al<sup>6</sup> reported that 23% of patients referred

for evaluation of allergic disorders other than insect allergy had positive intradermal skin test results with IFA whole-body extract. Patients evaluated in Texas had the highest reactivity to IFA skin tests, with positive reactions in 31% of patients with no history of IFA allergy. In the only prospective study assessing IFA attack rates and sensitization, Tracy et al<sup>7</sup> followed up medical students new to an IFA-endemic area and found a sting rate of 51% and a positive skin test conversion rate of 13% in their 3-week study. In more recent studies<sup>8,9</sup> of children in endemic areas, the prevalence of IFA specific IgE has been greater than 60% in particular age groups (ages 6–10 years). The prognostic significance of having detectable specific IgE to IFA is unknown, and prospective studies are clearly needed.

Systemic reactions to IFA are known to be a common and growing cause of anaphylaxis in the southeastern United States, including Texas.<sup>10</sup> The true prevalence of IFA systemic reactions in the United States is unknown. Nevertheless, in IFA-endemic areas, the most common cause of Hymenoptera sensitivity is the IFA.<sup>11</sup> Although the associated morbidity and potential mortality has been studied and published for other IFA-endemic states, the true health impact in Texas, and, more specifically, the Dallas/Fort Worth metroplex (DFW), is largely unknown.<sup>4,12</sup> However, a previous study<sup>13</sup> of fatal reactions to IFA stings showed that Texas had the highest number of fatalities reported from IFA anaphylaxis in the United States.

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Table 1. Survey Questions and the Categories Used to Record the Responses

| Question                                                                                                                                              | Survey response, % <sup>a</sup> |
|-------------------------------------------------------------------------------------------------------------------------------------------------------|---------------------------------|
| 1. How many new patient referrals has your clinic seen in the past 12 mo?                                                                             |                                 |
| 0–100                                                                                                                                                 | 16                              |
| 101–500                                                                                                                                               | 18                              |
| 501–1,000                                                                                                                                             | 29                              |
| 1,001–1,500                                                                                                                                           | 26                              |
| >1,500                                                                                                                                                | 11                              |
| 2. Do you routinely ask your new patients about allergies to fire ants regardless of the primary reason for evaluation?                               |                                 |
| Yes                                                                                                                                                   | 66                              |
| No                                                                                                                                                    | 34                              |
| 3. How many new patients have you seen, in the past 12 mo with systemic reactions to fire ant stings?                                                 |                                 |
| 0                                                                                                                                                     | 5                               |
| 1–5                                                                                                                                                   | 45                              |
| 6–10                                                                                                                                                  | 37                              |
| 11–20                                                                                                                                                 | 13                              |
| >20                                                                                                                                                   | 0                               |
| 4. What percentage of patients who you have seen with systemic reactions to fire ants have you recommended immunotherapy to fire ants?                |                                 |
| 0                                                                                                                                                     | 8                               |
| 1–25                                                                                                                                                  | 10                              |
| 26–50                                                                                                                                                 | 3                               |
| 51–75                                                                                                                                                 | 3                               |
| 76–100                                                                                                                                                | 76                              |
| 5. What percentage of patients have started immunotherapy for fire ant allergy based on your recommendation?                                          |                                 |
| 0                                                                                                                                                     | 8                               |
| 1–25                                                                                                                                                  | 10                              |
| 26–50                                                                                                                                                 | 16                              |
| 51–75                                                                                                                                                 | 21                              |
| 76–100                                                                                                                                                | 45                              |
| 6. What is the total number of patients who you have given fire ant immunotherapy in the past 12 mo? (fill in number)                                 | 3.8                             |
| 7. Based on your perception, how many patients with systemic reactions to fire ant stings in your area do you feel are being referred to your clinic? |                                 |
| None                                                                                                                                                  | 10                              |
| Very few                                                                                                                                              | 61                              |
| Most                                                                                                                                                  | 29                              |
| All                                                                                                                                                   | 0                               |

<sup>a</sup> All data are presented as percentage of survey responses except for question 6, which is mean number of patients.

Despite the lack of placebo-controlled studies, immunotherapy with whole-body extracts of IFAs is a successful method for decreasing systemic reactions to subsequent stings.<sup>14</sup> Although IFAs are the most common cause of Hymenoptera sensitivity in endemic areas and effective immu-

notherapy is available, referrals to allergists for the evaluation and management of IFA-allergic patients seem to be infrequent. Based on our own observations that only a limited number of IFA-allergic patients have been evaluated in the allergy clinics of the University of Texas Southwestern Medical Center, we decided to more formally evaluate the frequency of referrals for systemic reactions to IFA in the DFW. We hypothesized that the frequency of referrals in this community was low.

## METHODS

This study was a retrospective analysis of referrals for IFA allergy in the DFW. The survey was conducted in the spring of 2005. First, a list of all practicing allergists in the DFW was generated through membership directories from the American College of Asthma, Allergy and Immunology and the American Academy of Asthma, Allergy and Immunology. To identify other allergy practitioners who are not members of the aforementioned societies (eg, otolaryngic allergists), local telephone book listings were also used. Through an initial telephone screen, we then identified allergists who perform testing and immunotherapy for IFA allergy. Only practices that performed testing and administered immunotherapy for IFA allergy were formally surveyed. A written questionnaire was faxed to the allergists identified as treating IFA allergies in the telephone screen. Follow-up telephone calls were made 1 week after the initial fax to physicians from whom we had not received returned questionnaires. This questionnaire addressed several topics, such as the total number of new patients, the number of new patients with IFA allergy, IFA allergy historic screening, IFA immunotherapy recommendations, adherence with initiation of IFA immunotherapy, total number of patients initiating IFA immunotherapy, and overall perception of referral capture for IFA immunotherapy. Table 1 displays the questions asked and the categories used to record the responses. In the questionnaire, we asked the allergists to provide an estimate of the total number of new patients evaluated and treated (regardless of diagnosis) in the previous 12 months. To determine the prevalence of new patient referrals for IFA allergy, we divided the estimated number of new IFA-allergic patients by the estimated total number of new patients.

## RESULTS

A total of 78 “allergists” in the DFW were identified using membership registries and local telephone book listings. These 78 physicians were then screened to identify those who used IFA immunotherapy as a treatment. Fifty-one of 78 screened allergists indicated that they test and currently perform immunotherapy for IFA allergy. All 51 allergists were identified through American Academy of Asthma, Allergy and Immunology and American College of Asthma, Allergy and Immunology membership directories, and none were otolaryngic allergists. Thirty-eight allergists returned completed written questionnaires, yielding a 74.5% response rate for the survey. Responses to the survey are displayed in Table

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1. More than 50% of the allergists reported that they evaluated more than 500 new patients in the past year. Sixty-six percent of respondents indicated that they routinely screen all new patients for IFA allergy regardless of the primary reason for evaluation. Five percent of allergists reported seeing no new patients with IFA allergy in the previous 12 months, and 45% saw an estimated 1 to 5 new patients for IFA allergy in the past year. Thirteen percent of allergists estimated seeing more than 10 new IFA-allergic patients in the past year, and none reported seeing more than 20. In addition, an estimated 0.6% of all new patients evaluated by surveyed allergists in the past year initiated immunotherapy for IFA. Most surveyed allergists (76%) in the DFW indicated that they recommend immunotherapy for patients with systemic IFA reactions. Despite this, 61% of surveyed allergists responded that very few patients with systemic reactions to IFA were being referred to their clinics, and 10% perceived that none of these patients were being referred.

Using the estimated mean number of new IFA-allergic patients and mean estimated total number of new patients, 1.1% of new patients seen in the past year by the surveyed allergists were evaluated for IFA systemic reactions. Given the wide range of responses on the survey, the use of mean data may underestimate the actual prevalence of new IFA referrals. Therefore, we calculated referrals using more conservative estimates (ie, by using the highest number in the ranges of patients evaluated for IFA systemic reactions and dividing by the lowest number of the ranges of estimated total new patients). Using this more conservative calculation, the prevalence rises to 2.1%.

## DISCUSSION

Although IFA allergy is a principle concern for allergists in the South, it may have an impact on allergy practices elsewhere when these allergic patients move out of endemic areas. It is estimated that IFAs currently infest 310 million acres in the United States. In addition, IFAs continue to expand their territory, and, ultimately, it is believed that they may inhabit up to 25% of the continental United States.<sup>15</sup>

To our knowledge, this is the first study to examine patient referrals for IFA allergy to allergy specialists. Although we expected there to be a general paucity of referrals of IFA-allergic patients to allergists, we were surprised to see just how few patients were actually being evaluated for this potentially life-threatening issue. Another interesting finding from this survey is that only approximately two-thirds of "allergists" in an IFA-endemic area performed testing and treated patients with IFA allergy.

In this survey of an IFA-endemic area, an estimated 1.1% of new patients in allergists' offices were evaluated for IFA systemic reactions. It is estimated that the prevalence of systemic reactions to IFA in the general population of an endemic area is 2%. In addition, studies<sup>16</sup> have found that 30% to 60% of the population living in urban IFA-endemic areas are stung by IFAs annually. One would expect that patients being evaluated in an allergist's office would be

more likely to have a history of IFA systemic reactions than the general population. As a correlate, in the allergy clinics of the University of Texas Southwestern Medical Center, 38% of patients evaluated in the past 12 months were seen for allergic rhinitis. This is nearly double the 20% incidence of allergic rhinitis that is reported in the United States.<sup>17</sup> However, based on the results of this survey, the prevalence of systemic reactions to IFA in new allergy patients is even less than that in the general population. This is in keeping with the perceptions among most allergists surveyed in the DFW that "none" to "very few" patients with systemic reactions to IFA were being referred to their offices. Another telling fact is that despite evaluating patients in a large county hospital that treated more than 250,000 patients last year, we currently have no patients undergoing IFA immunotherapy at the county hospital. We had a very high survey response rate (74.5%) compared with other surveys of allergists regarding management of penicillin allergy (18% response rate) and allergen skin testing methods (16%).<sup>18,19</sup> This high rate of survey return strengthens the findings by reducing survey response bias and should provide a more accurate evaluation of the community's experience.

Limitations of this study include the fact that the survey results are based solely on the recall of the allergists who responded. Because there is no unique *International Classification of Diseases, Ninth Revision*, code for IFA hypersensitivity, it is impossible to corroborate these survey results with billing records in a retrospective study such as this. Because the survey relied solely on recall by the allergist, we designed the study in semiquantitative terms to try to minimize error, but clearly some of the data generated are approximations. Nonetheless, this type of information can be helpful to gauge trends. Another limitation is that this study was conducted in 1 metropolitan area. Thus, the results may not necessarily be generalized to other IFA-endemic areas. Furthermore, the survey was designed to collect data in a unidimensional scaling manner, and, therefore, precise calculations are difficult. Although IFA exposure rates may not reach the level in rural settings in the surveyed allergists' urban/suburban practices, we did not observe any trend toward higher referrals in practices in outlying suburbs, whose capture areas have more patients from rural areas. Furthermore, a high sting attack rate has been found in San Antonio, another major metropolitan area in Texas. Although the DFW is clearly urban, IFAs are ubiquitous in the region, and fire ant mounds are readily found at the University of Texas Southwestern Medical Center in central Dallas. We routinely procure fire ants from mounds found on the medical center grounds for intentional IFA sting challenges and have never had difficulty finding IFA mounds.

Based on the general sentiment among allergists in Texas of a lack of patient referrals for IFA allergy, the Texas Allergy, Asthma, and Immunology Society developed a committee to raise awareness of IFA allergy. The society subsequently developed pamphlets and posters to increase awareness of the prevalence of IFA allergy and the availability of

effective treatments in the general community along with referring providers. In addition, the society created a toll-free hotline to provide a list of allergists to IFA-allergic patients for treatment. Further studies will be required to determine whether these efforts have had an impact. Involvement of national, regional, and state allergy societies, potentially in cooperation with emergency medicine societies, will likely be required to improve awareness of this serious allergic health threat.

In conclusion, the results of this survey of allergists in an IFA-endemic area illustrate that despite the prevalence of this potentially fatal condition, these patients are not being directed to the appropriate specialists for evaluation and treatment. Efforts to improve awareness of evaluation and treatment for IFA systemic reactions for referring physicians and the public are needed.

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