

Systemic reactions to the Samsun ant: An IgE-mediated hypersensitivity

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Background: In the United Arab Emirates the sting of the *Pachycondyla sennaarensis* ant (PSA) causes allergic reactions in certain persons. It is a common problem and is becoming a public health hazard. Up to now the diagnosis has been based only on the history, because the mechanism of the reaction was not yet established.

Objective: The aim of our study was to prepare an allergenic extract that would be used for skin tests and to prepare a reagent for specific IgE titration. Results of both skin tests and specific IgE were to be compared with the clinical history.

Methods: We studied 31 patients with anaphylactic reactions and performed clinical examinations, skin tests, and specific IgE antibody titrations. A control group of 22 subjects were also studied.

Results: In 30 of 31 patients (97%) findings of PSA skin tests and/or specific IgE were positive. In the control groups PSA skin test results were negative in 86% and negative for specific IgE in 68%.

Conclusion: The study shows that the mechanism of the reaction to the sting of the PSA is a type I IgE-mediated hypersensitivity and that the diagnosis can now be confirmed by skin tests and specific IgE determination. (*J ALLERGY CLIN IMMUNOL* 1995;96:465-72.)

Key words: *Pachycondyla sennaarensis*, Samsun ant, ant allergy, anaphylaxis to ant, Hymenoptera allergy

Allergic reactions to stings of ants have been almost exclusively studied with regard to the imported fire ant, *Solenopsis invicta* (spp.) (SIA), in the United States, where it is considered a health hazard in the southern states.¹⁻⁵ However, a few investigators reported systemic allergic reactions provoked by other ants, such as *Myrmecia* spp. and *Myrmecia pilosula* in Australia.^{6,7} More recently in Korea *Ectomomyrmex*, an ant of the subfamily

Abbreviations used

cpm:	Counts per minute
PBS:	Phosphate-buffered saline solution
PSA:	<i>Pachycondyla sennaarensis</i> (Samsun ant)
RU:	RAST units
SDS-PAGE:	Sodium dodecylsulfate-polyacrylamide gel electrophoresis
SIA:	<i>Solenopsis invicta</i> (imported fire ant)
UAE:	United Arab Emirates
WBE:	Whole body extract

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Ponerinae, was reported to have caused severe allergic reactions in a patient.⁸ The subfamilies of Formicidae, showing alignment of species referenced in this study, appear in Fig. 1.

Another ant, also of the subfamily Ponerinae, *Pachycondyla sennaarensis* spp. (PSA) (Mayr) called the Samsun ant, whose sting may also result in sometimes fatal anaphylaxis, has lately been

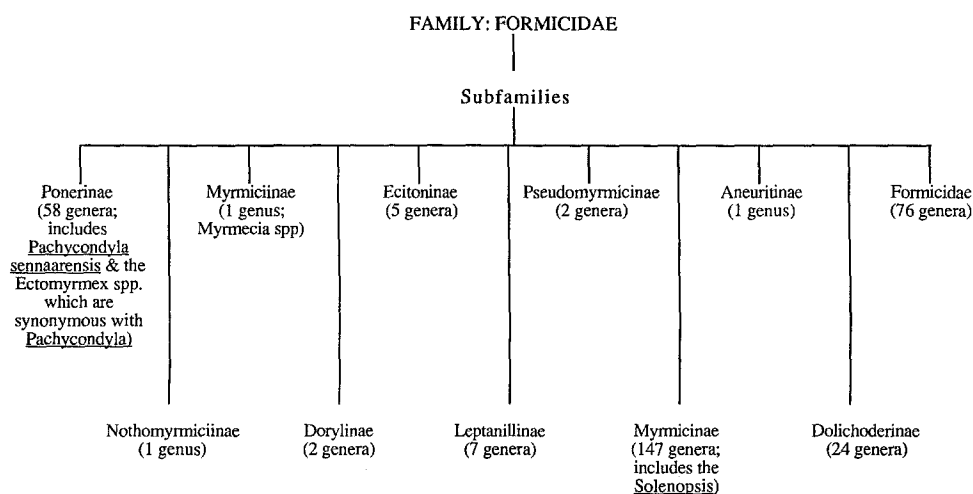


FIG. 1. Subfamilies of Formicidae. PSA is of subfamily Ponerinae; SIA is of subfamily Myrmecinae.

detected in the United Arab Emirates (UAE), where it has become a recognized public health hazard. Four deaths caused by anaphylactic shock after the sting of this ant have been recorded in the past 4 years (unpublished data).

A preliminary communication alerting to this problem was published by Dib et al.⁹ Up to now the diagnosis of PSA hypersensitivity was based only on the history and the reports of the involved physicians. The mechanism of the reaction to this ant's sting was not established, although it was supposed to be similar to that of the fire ant.

METHODS

Patients

One of us (G. D.) selected 31 patients who had systemic reactions after the sting by the PSA (group A) (Table I). The criteria of selection were the certainty that the culprit was a PSA; a reaction beginning less than 90 minutes after the sting; symptoms involving either the respiratory tract (e.g., laryngeal edema, bronchospasm) or the skin (e.g., angioedema, urticaria), or both; at least one general reaction during the past 12 months; and urgent medical treatment sought for anaphylactic reactions. An informed consent form, approved by the Tawam Hospital Ethics Committee, was submitted and signed by all patients and control subjects before starting the allergy evaluation.

Control subjects

The control subjects, recruited among the population of the UAE, were divided into two groups (Table I). Group B included 12 volunteers stung by the Samsum ant, who had only a local reaction less than 15 mm of diameter at the site of the sting. Group C included 10

volunteers who asserted that they have never been stung by the Samsum ant.

Allergens used

One of us (W. A. B.) collected in frozen-specimen collection tubes the Samsum ants, which were then immediately frozen alive at -70°C . The specimen tubes were then kept frozen at that temperature until use for the preparation of the allergenic whole body extract (WBE) by Allerbio Laboratory, Varennes en Argonne, France.

Twenty grams of PSA were extracted with a 1:5 (wt/vol) solution of coca by shaking for 12 hours at 4°C . The extract was purified by centrifugation, and the supernatant was then filtered with a series of filters of decreasing porosity. Sterility was obtained by filtration on Millipore filter membranes (pore size, 0.2 μm) and then verified (confirmed) in a microbiology laboratory. The extract was then concentrated to half volume and mixed with phenolated glycerin to a final extract concentration of 1:5 (wt/vol), to be used for skin testing. The protein concentration was 2.4 mg/ml. Part of this extract was then frozen and lyophilized for further preparation of RAST disks, rabbit sensitization, and electrophoretic assays. The patients and control subjects underwent also skin tests to the commercialized extract of SIA (1:10 wt/vol, Hollister-Stier Laboratories, Spokane, Wash.), 9% codeine phosphate solution in 50% glycerol as a positive control, and 50% glycerosaline solution as a negative control. Both control solutions were provided by Allerbio Laboratory.

Skin tests

Skin tests were performed in the Allergy Clinic, Tawam Hospital, under the direct supervision of the allergologist, director of the study (G. D.). They were performed by pricking a Stallerpoint needle (Staller-

genes Laboratories, Fresnes, France) through a drop of extract placed on the forearm. The PSA extract used for skin testing was diluted to the concentrations of 2.4 µg/ml (1:1000), 24 µg/ml (1:100), and 240 µg/ml (1:10). For group A 1:1000 concentration was first used, and if results were negative, a 1:100 concentration was then used; finally, a 1:10 concentration was used if 1:100 yielded a negative result.

For groups B and C, only the 1:10 concentration was used. The greatest diameters of the wheal and flare were measured 20 minutes after the pricking. Skin test results were considered positive if wheal or flare were at least $\geq 5/10$ mm.¹⁰

Forty milliliters of venous blood was taken in dry tube and centrifuged 1 hour later. The sera were frozen at -70°C in specimen tubes until their use for titration of specific and total IgE antibodies.

Specific and total IgE titration

Titration of specific IgE to PSA was performed on the same day with the RAST technique with Allerbio disks activated with cyanogen bromide and used as a support for coupling the allergen. RAST was performed according to the technique described by Grassi et al.¹¹ with the PSA extract (2.4 mg/ml of protein) on activated cellulose disks. For detection iodine 125-labeled anti-IgE monoclonal antibody (Immunotech, Marseille, France) was used. The results are expressed in RAST units (RU), the value of which is very close to the international unit, because the same anti-IgE antibody was used for the titration of the specific and total IgE, and because it was calibrated by reference to the second World Health Organization international standardization of IgE. Results of RAST were expressed in five classes as follows: class 0, less than 0.35 RU; class 1, 0.35 to 0.70 RU; class 2, 0.70 to 3.50 RU; class 3, 3.50 to 17.5 RU; class 4, more than 17.5 RU. Gel electrophoresis was performed according to the method of Laemmli,¹² with 8% to 18% gradient polyacrylamide gels to separate the proteins according to their molecular weight (SDS-PAGE) and an agarose gel to separate the proteins according to their isofocusing pH, in a Multiphor LKB 2001 device (LKB Instruments, Les Ullis, France). To realize the SDS-PAGE, 50 µl of ant extract was added to 50 µl of equilibrated buffer (tris(hydroxymethyl)aminomethane HCl, 38 mmol/L; pH 8; 2% sodium dodecyl sulfate; with drops of 2% bromophenol blue). The wells were loaded with 20 µl of extract solution containing 24 µg protein. After electrophoresis for 90 minutes at 600 V, 50 mA, and 30 W, the gels were stained by silver salts. To perform the isoelectrofocusing, 50 µl of ant extract was added to 50 µl of distilled water. The wells were loaded with 20 µl extract solution containing 24 µg proteins. After isoelectrofocusing for 10 minutes at 300 V, then for 50 minutes at 500 V, 50 mA, and 30 W, the gels were stained by Coomassie blue. The immunoblots from SDS-PAGE were carried out by nitrocellulose transfer at 1500 V, 150 mA, and 100 W for 60 minutes. The

TABLE I. Comparison of age, sex, and results of positive-control skin tests among groups A, B, and C

	Group A	Group B	Group C
Age (yr)	36 ± 1.6	35.8 ± 2.6	37.8 ± 2.8
Sex ratio (M/F)	6/25	5/7	2/8
Positive-control wheal diameter (mm)	7.4 ± 0.5	7.9 ± 0.1	8.1 ± 1
Positive-control flare diameter (mm)	21.4 ± 1.9	26.9 ± 3.9	24.7 ± 1.9

Values expressed as mean ± SEM.

transfer buffer was made of tris(hydroxymethyl)aminomethane, 20 mmol/L 150 mmol/L glycine, and 20% ethanol. The immunoblots from isoelectrofocusing were realized by nitrocellulose transfer for 15 minutes by pressing the nitrocellulose sheet on the agarose gel. The immunoprints were performed in the same manner for isoelectrofocusing and SDS-PAGE blots. After the transfers, the nitrocellulose sheets were incubated for 120 minutes in a saturation solution of phosphate-buffered saline solution (PBS)-polysorbate 20 (1:1000)-1% bromosulphophalein. The nitrocellulose sheets were washed four times for 5 minutes in 1:1000 PBS-polysorbate 20 solution, then incubated with the different sera diluted 10-fold with saturation solution for 120 minutes or overnight. After four washings for 5 minutes in 1:1000 PBS-polysorbate 20, the ¹²⁵I-labeled anti-IgE solution was diluted to obtain 20,000 counts per minute (cpm) and incubated with the nitrocellulose sheets for 120 minutes, or was diluted to obtain 10,000 cpm and incubated overnight. After this incubation the nitrocellulose sheets were dried and applied on the photographic film in a blind room. The photoboxes were stored at -20°C for a week. The films were developed with LX 24 developer solution (Eastman Kodak Co., Rochester, N.Y.) and AI4 fixer solution (Eastman Kodak).

Bidimensional electrophoresis was carried out according to the method of Axelsen et al.¹³ 10 µl of PSA extract were applied to a well on a 1% agarose M gel plate (LKB).

The first migration was performed at 10 V/cm for 1 hour at room temperature. The second migration of proteins was run, perpendicular to the first, on a gel layered on Gelbond film containing antibodies from rabbits hypersensitized against the PSA extract (Allerbio Laboratory) and diluted according to the immunodiffusions results. This was carried out at 2 V/cm during 18 hours at 4°C . Gels were then stained with Coomassie blue to visualize the precipitin bed corresponding to the antigens recognized by the rabbit serum.

Crossed radioimmunoelectrophoresis was performed according to the method of Axelsen et al.¹³ with the first phase identical to the crossed immunoelectrophoresis

TABLE II. Comparison of results of PSA and SIA skin tests, PSA-specific IgE, and total IgE among groups A, B, and C

	Group			<i>p</i> Values*		
	A	B	C	A vs B	A vs C	B vs C
PSA test						
Wheal diameter (mm)	8.7 ± 0.8	1.7 ± 0.9	1.1 ± 0.6	<0.001	<0.03	
Flare diameter (mm)	26.2 ± 2	4.2 ± 2.9	1.7 ± 1.2	<0.001	<0.03	
SIA test						
Wheal diameter (mm)	3.6 ± 0.6	1.4 ± 0.6	1 ± 0.7	<0.05	<0.05	
Flare diameter (mm)	11.7 ± 1.9	4.8 ± 2.3	1.8 ± 1.2	<0.026	<0.026	
PSA-specific IgE (RU)	12.8 ± 1.5	1 ± 0.9	0.8 ± 0.5	<0.004	<0.004	
Total IgE (kIU/L)	247.2 ± 35.8	168.8 ± 25.4	93.9 ± 17.5	NS	<0.007	<0.023

*Wilcoxon test.

but without staining. The dried gels were incubated in a chamber for 18 hours at room temperature with patient sera diluted 1:7 in a 0.05 mol/L phosphate buffer, pH 8.0. After three washings the gels were covered for 18 hours at room temperature, with 10 ml of a ¹²⁵I-labeled anti-IgE monoclonal antibody (Immunotech) diluted in a buffer containing 0.1 mol/L phosphate, 9:1000 sodium chloride, and 1:1000 polysorbate to obtain 8000 cpm/plate. Finally, after subsequent washing with the same buffer, the dried plates were put in contact with a Kodak X O-mat film for 5 days at -70° C. They were then colored while the film was being developed. The plates without visible bands were reexposed for 5 more days for confirmation. Quantification of radioactivity of the bands was not performed.

Titration of total IgE was performed at Allerbio Laboratory with the CAP-Pharmacia system and by the MAST-CLA: Mast system (Dome Hollister Stier Laboratories, Epernon, France).

Statistical analysis

The nonparametric Wilcoxon signed-rank and the Spearman correlation tests were used.

RESULTS

Table I shows no significant difference between the three groups regarding age, sex, and diameters of positive control skin test reactions. The negative control skin test reactions were all negative. It shows also a female predominance in patients and control subjects.

The onset of reaction after testing symptoms was 10 minutes or less in 77.4% of patients, between 10 and 30 minutes in 19.3%, and 90 minutes in 3.25% (one case). The most frequently involved systems were the respiratory tract, 90% of group A patients, with symptoms ranging from attacks of wheezing, laryngeal edema, and dyspnea, to spasmodic cough, voice alteration, and congestive rhinitis. Skin manifestations affected 27 (87%) of our

patients. Twenty-four patients had generalized urticaria (or erythema) and/or angioedema, and one of them had also associated bullous lesions. The three other patients had isolated generalized pruritus. All patients in group A had either respiratory or skin manifestations, or both. Neurologic signs or symptoms were present in 15 (48%) of our patients. Four had syncope; the other symptoms were headache, dizziness, and blurred vision. Gastrointestinal tract manifestations such as nausea, abdominal pain, and diarrhea were present in eight patients. Finally, certain patients had other manifestations such as conjunctivitis, fatigue, malaise, and feeling of impending death, and one had burning on urination and associated dysuria, which lasted several days.

Table II shows the mean ± SEM diameters of skin reactions and of specific and total IgE. In group A PSA skin test reactions were positive in 29 of 31 patients (93.5%) and positive in 3 of 22 (14%) of control groups B and C. SIA skin test results in group A were positive in 17 of 31 patients (55%) and in 3 of 22 (14%) in control groups B and C.

In group A the number of positive skin test reactions to PSA was higher (93.5%) than to SIA (55%). The mean diameters of positive skin reactions (wheal and flare) were significantly higher in response to PSA than to SIA. In patients with positive skin test reactions to both PSA and SIA a significant correlation was found between wheals ($r = 0.6$, $p < 0.0001$) and between flares ($r = 0.5$, $p < 0.005$).

PSA RAST results were positive in 29 of 31 patients (93.5%) in group A and in seven of 22 (32%) in groups B and C. In group A all positive RAST results were class 3 or 4. In groups B and C two were in class 3, two in class 2, and three in class

TABLE III. Results of skin prick tests with positive control, commercial SIA extract and PSA extracts, and total IgE and specific IgE levels in 31 patients with allergy (group A)

Subject No./Age (yr)	Wheal (mm)/Flare (mm)			Total IgE (kIU/L)	PSA-specific IgE (RU)
	Positive control	PSA	SIA		
1/38	8/20	12/45	7/25	225	31
2/38	11/20	15/30	12/35	130	14.2
3/27	11/30	12/40	6/25	570	47
4/42	11/25	11/35	3/10	150	12.5
5/40	5/12	5/12	0/0	270	11.5
6/29	7/20	8/25	8/25	210	14.9
7/33	9/35	8/35	5/15	280	14
8/67	8/15	4/8	0/0	72	0
9/34	9/35	7/30	0/0	170	9.8
10/38	9/35	9/40	8/35	148	13.8
11/38	7/10	7/10	0/0	230	14.4
12/37	9/30	6/20	5/10	300	13
13/41	9/30	22/45	5/15	1200	15
14/27	8/10	10/18	5/10	295	10
15/37	10/25	5/18	4/12	130	10.2
16/31	5/15	10/30	5/15	243	11.9
17/40	9/25	13/35	6/20	170	13
18/18	5/15	8/15	7/15	260	15.2
19/41	8/10	12/20	5/20	290	11.2
20/33	3/15	8/30	3/15	215	15.2
21/39	10/30	12/40	5/15	219	7.4
22/32	7/10	9/35	0/0	160	8.2
23/40	0/0	5/25	0/0	158	12.4
24/47	13/35	10/25	0/0	250	14.1
25/31	4/10	5/18	0/0	340	8.8
26/36	9/40	9/30	3/10	114	5.7
27/18	3/10	13/30	3/10	225	12
28/36	6/20	0/0	0/0	149	10.1
29/43	3/15	4/12	3/15	131	11.8
30/29	6/20	5/25	3/12	207	7.4
31/36	8/40	5/30	0/0	151	0

SIA and PSA extracts were tested at concentrations of 240 µg/ml except in patient 1 (2.4 µg/ml) and in patients 2, 7, 14, and 21 (24 µg/ml).

1. In group A we found a significant correlation between PSA-specific IgE levels and diameters of the wheal ($r = 0.4, p < 0.02$) and the flare ($r = 0.5, p < 0.001$).

Table II shows no significant difference of total IgE levels between groups A and B. IgE levels were significantly higher in groups A ($p < 0.007$) and B ($p < 0.03$) than in group C. In group A 18 of 31 patients (58%) were considered to have atopic disease (at least one positive skin test to house dust mites or pollens), 8 of 12 (66.6%) in group B, and only 3 of 10 (30%) in group C.

Results of skin tests to PSA and SIA with total and specific IgE levels for all patients and control subjects are shown in Tables III (group A), IV (group B), and V (group C).

The SDS-PAGE data showed five bands at molecular weights 100, 45, 25, 15, and 14 kd. The immunoblottings realized with two class 3 sera (15.2 and 15 RU) determined by RAST showed four bands corresponding to the 100, 45, 25, and 15 kd proteins. In parallel, other sera of class 2 and class 1 tested revealed no band. The isoelectrofocusing data showed many bands at isofocusing pH 4, 4.5, 5, 8, and 10. The immunoblottings realized with two class 4 sera (20 and 35 RU) revealed only one band corresponding to proteins of isofocusing pH 10.

DISCUSSION

PSA, commonly referred to in UAE as the Samsum ant, is a member of family Formicidae,

TABLE IV. Results of skin prick tests with positive control, commercial SIA and PSA extracts (240 μ g/ml), and total IgE and specific IgE levels in 12 stung subjects (group B)

Subject No./Age (yr)	Wheal (mm)/Flare (mm)			Total IgE (kIU/L)	PSA-specific IgE (RU)
	Positive control	PSA	SIA		
1/42	5/20	0/0	0/0	135	0
2/33	12/40	5/0	0/0	150	0
3/42	9/20	0/0	0/0	68	0
4/20	17/45	10/30	4/20	150	8.8
5/33	8/18	0/0	5/7	150	0.4
6/38	8/40	0/0	0/0	145	0
7/41	5/30	0/0	0/0	180	0.42
8/53	6/0	0/0	0/0	110	0
9/28	8/45	5/20	5/20	360	0.42
10/23	7/25	0/0	3/10	240	0.45
11/41	5/20	0/0	0/0		
12/35	5/20	0/0	0/0		

TABLE V. Results of skin prick tests with positive control, commercial SIA extract and PSA extract (240 μ g/ml), and total IgE and specific IgE levels in 10 subjects who have never been stung (group C)

Subject No./Age (yr)	Wheal (mm)/Flare (mm)			Total IgE (kIU/L)	PSA-specific IgE (RU)
	Positive control	PSA	SIA		
1/34	4/20	0/0	0/0	82	0
2/33	8/30	0/0	0/0	160	4.5
3/33	8/25	0/0	0/0	58	0
4/40	6/25	0/0	0/0	6	0
5/33	10/30	4/0	5/0	155	0.35
6/49	8/30	5/12	5/12	180	3.5
7/57	11/20	0/0	0/0	62	0
8/35	6/25	2/5	0/0	75	0
9/28	15/30	0/0	0/0	105	0
10/36	5/12	0/0	0/0	56	0

subfamily Ponerinae, tribe Ponerini. The species is widely distributed throughout the African tropics, ranging from the Sahelian zone in the north to a level about even with the southern tip of Madagascar. It is absent from the most southerly African states and is apparently absent north of the Sahara. It is widely distributed throughout the Arabian peninsula, which is apparently its northern limit, because it has not been reported in any of the countries of the Middle East.^{14, 15} It is common in all urban areas of the UAE and has a strong presence in gardens and buildings. The ant is black with a relatively slender body, 4 to 5 mm long. PSA nests in the ground, often in open sunny areas. Crateriform mounds of fine earth, 1 to 2 cm high, surround the entrance hole to the nest. The nests may be very extensive, covering several square

meters and containing several hundred workers with only a single queen (B. Bolton, personal communication). This ant has a reputation for aggressiveness, although we did not find this to be the case. The sting nevertheless is extremely painful, with the pain persisting for up to 4 hours after the encounter. The welt itches intensely for about the first 2 to 3 days. It then gradually disappears after 5 to 7 days, leaving no scar. One of us (W. A. B.) who has worked with both the PSA and the SIA finds the sting of the former to be more painful. Stings of the PSA, however, lack the pustule development and subsequent scarring that occurs after the SIA sting.

The clinical manifestations of the reactions our study patients had after the PSA sting were anaphylactic, consisting mainly of respiratory, skin,

neurologic, and gastrointestinal manifestations, findings already reported by Dib et al.⁹ in their preliminary study. They can be compared to the reactions caused by the SIA sting.²

As pointed out by Stafford et al.,¹⁶ our study showed that skin tests¹⁰ with PSA WBE is a sensitive method for the diagnosis of PSA allergy, because results were positive in 93.5% of patients in group A. One of the two patients with a negative skin test result was a 67-year-old man whose PSA RAST result was also negative. The second patient was a 36-year-old man whose RAST result was positive (class 3). The first patient's reactions were relatively moderate. They consisted of facial edema, mild wheezing, and congestive rhinitis, which necessitated the oral administration of prednisolone and terfenadine, with successful results. The second patient had a generalized but intensely pruritic erythema with no other associated manifestations.

The titration of PSA-specific IgE was also found to be a sensitive method because results were positive (class 3 or 4) in 93.5% of patients. One of the two patients with a negative RAST result was discussed previously. The second patient had a total IgE level within normal limits. However, this was the only patient who had had only one anaphylactic reaction to PSA sting (generalized urticaria and mild dyspnea), whereas the other 30 patients had had at least two anaphylactic reactions. On the whole, 30 of 31 patients in group A (97%) had either a positive PSA skin test reaction or a positive RAST result, or both.

In control groups B and C, PSA WBE skin test results were negative in 86%. RAST results were negative in 68%, and if the equivocal RAST class 1 result is considered negative, the RAST results were negative in 82%. On the whole, seven control subjects had a positive PSA skin test reaction and/or a positive specific IgE finding without a history of PSA allergy. It would be desirable to follow up these control patients to see whether they had anaphylaxis after possible PSA stings.

Our findings can be compared to results of studies on SIA allergy.¹⁶⁻¹⁸ For instance, Stafford et al.¹⁸ found 100% of their 18 patients with SIA allergy had a positive skin test reaction to SIA WBE; 29% control subjects also had positive results. Findings of a commercial SIA WBE RAST were positive in 56% of their patients and in 10% of the control subjects.

Because a significant proportion of our patients had a positive SIA WBE skin test result (55%) and a significant correlation was found

between the two skin reaction diameters, we may assume that at least one allergenic component may be common to the two venoms. However, 45% of our patients had a negative SIA skin test result, suggesting differences between the two venoms' constituents.

In SIA venom four protein allergens have been identified: Sol i 1, 2, 3, and 4.¹⁹ In the *M. pilosula* venom Ford et al.²⁰ identified three allergenic polypeptides. More recently, Street et al.²¹ found four to six IgE-binding components in venom of six species of *Myrmecia*. In our preliminary study we found five allergenic components in PSA venom. Their identification and comparison with SIA extract are under investigation.

In addition our study showed a female predominance in study subjects. It is not possible to determine whether there was a sex predilection for anaphylaxis to PSA because the exposure rate is predominantly in the female group. In the UAE the overwhelming majority of the women are housewives who stay at home while the men work outside the home. The Samsum ant is much more common in homes than in offices. The female population would then be at greater risk of being stung by the ant. Sex predilection for SIA was not mentioned in a recent general review of SIA allergy.⁵ Finally, we found atopy in 58% of our patients, findings already reported by Dib et al.⁹ This aspect was also not mentioned in this general review.⁵

PSA hypersensitivity is a public health hazard in the UAE, where its prevalence should be investigated. The mechanism of the reaction is a type I IgE-mediated hypersensitivity. Skin tests and RAST with PSA WBE are reliable methods to confirm the diagnosis of hypersensitivity to this ant. Identification of the venom allergenic components is under investigation.

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