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CORRELATION OF RAST RESULT AND SERUM IGE LEVELS WITH THE ALLERGIC SYMPTOMS OF SOME CLINICALLY DEFINED MALAYSIAN CASES

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Summary

In a nine month study at the General Hospital, Kuala Lumpur, 214 patients with atopic allergy symptoms were analysed for antibodies to a panel of 15 allergens by radio-allergo-sorbent-test (RAST). IgE levels were also determined by radio-immuno-sorbent-test. Controls consisted of clinically nonallergic children and healthy adult blood donors, volunteers and college students. 55% of allergies were positive to house dust mite (HDM). Very few patients who were positive to HDM were positive to house dust and generally the RAST classes for HDM were higher than for house dust. Thus the most prominant causative agent for Type I allergy amongst Malaysians appear to be HDM. Generally, individuals with. high serum IgE levels and clinical symptoms of atopy have positive RAST to one or more allergens.

Key words: Allergy, IgE, radioallergosorbent test, radioimmunosorbent test.

INTRODUCTION

An allergy is simply described as an individual's abnormal bodily reaction to certain substances which are usually harmless to others. The allergic reaction may manifest itself as an ache, a rash, hives, purging, a running nose, wheezing and sneezing. In severe cases it may cause a person to go into shock which, if not treated properly, could prove fatal.

About 4% of the total number of patients seeking treatment at the Paediatric, Medical and Skin Clinics of the General Hospital, Kuala Lumpur, are diagnosed clinically as suffering from allergic disorders. About one-third of these patients are atopic. Very often allergic reactions are mistakenly interpreted as symptoms for other illnesses. It was with this problem in mind that this study was initiated and completed in 1983 to provide some laboratory correlation with clinical diagnosis.

The laboratory indicators used in this study are: measurement of total IgE level in serum by Radio-Immuno-Sorbent Test (RIST) and the detection of antibodies to common causative allergens by Radio-Allergo-Sorbent Test (RAST). Skin tests were not done because of difficulties in standardizing the readings due to the varied skin pigmentation and texture of Malaysians.

There is strong evidence that acute allergic symptoms such as asthma or rhinitis are often due to specific IgE antibodies to environmental allergens.[1,2] Less clear-cut evidence exist for the role of specific IgE antibodies in food intolerance and various dermatoses, although a causal relationship have been established in certain cases.[3]

MATERIALS AND METHODS

Population Studied

Subjects selected for the establishment of reference ("normal") values were healthy individuals with no family history of known atopic symptoms. Sera from nonallergic children were obtained from the Paediatric Unit, General Hospital, Kuala Lumpur. Sera from healthy adults were obtained from blood donors, volunteers and college students.

Sera from allergic patients were obtained in the inpatient and outpatient services of the General Hospital, Kuala Lumpur. Patients were classified according to their symptom complex: asthma, rhinitis, eczema and urticaria. Of the 214 patients in this study, 60 were with undefined symptoms.

Parasitic infections also show an elevated IgE level. In this study, 233 serum samples from a field survey of a rural community where over 50% of the individuals were positive for ova on stool examination were included.

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IgE Measurements

IgE determinations were only carried out when all the serum samples were collected. Serum samples were deep-frozen at −20°C until analysis. All measurements were done in duplicates with the Phadebas IgE PRIST radioimmunoassay kits. Allergen-specific IgE antibody measurements were performed with the Phadebas RAST kits. (All the PRIST and RAST kits were supplied gratis by Pharmacia Diagnostic AB International, Uppsala, Sweden)

RESULTS

Total IgE levels

The mean level for non-allergic children (⩽ 10 yrs.) was 69 ± 42 KU/L, and non-allergic adults was 201 ± 145 KU/L (Table 1). About 95% of the normal sera tested had total IgE levels of less than 250 KU/L. In this study the total IgE level cut-off point was taken as 250 KU/L. Values higher than 250 KU/L were considered high and the person was most likely to suffer from allergic disorders.

The allergen panel used

Each of the sera (from allergic and. non-allergic individuals) were screened for RAST using a standard panel of 15 allergens (Tables 2 and 3). The panel included extracts from grass, wheat, food, animal dander, moulds, insects, mites, house-dust and worm. The list was chosen after a preliminary survey through oral questionaire from patients who suffer from allergy.

In this study the most prominent causative agent of allergies amongst Malaysian population appeared to be house-dust mites, though there were also significant numbers of responders to insect and food extracts. Figure 1 shows that of all the responders to RAST, 55% were positive for mites

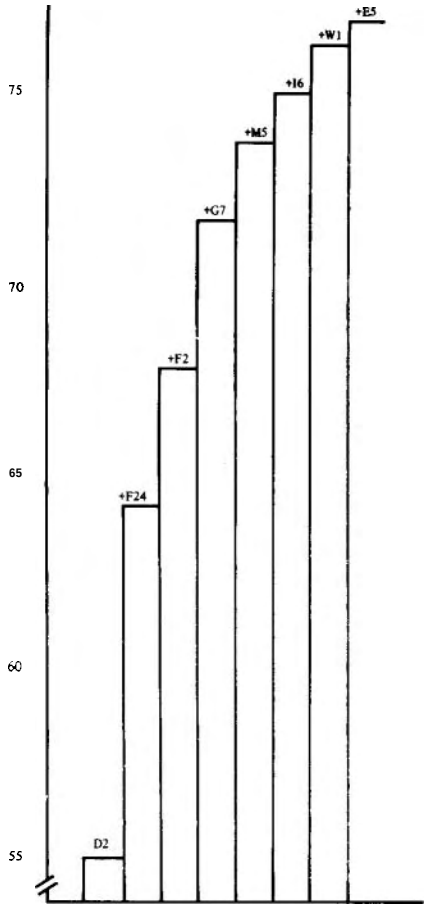

FIG. 1: Efficiency of different allergen panels in a Malaysian population. Percentage reflects positivity rate with each successive addition of stated allergen to the screening panel.

TABLE 1
MEAN TOTAL IGE LEVELS (± 2 SD) IN ALLERGIC AND NON-ALLERGIC INDIVIDUALS.

Sample characteristics	Sample size	Mean IgE levels in KU/L
Normal adults	355	201 ± 145
Normal children (<10 yrs)	140	69 ± 42
Adults with allergic symptoms	214	351 ± 284
A rural community (with more than 50% having a positive ova count)	233	620 ± 317

TABLE 2

DISTRIBUTION OF POSITIVE RAST FOR EACH OF THE FIFTEEN SELECTED ALLERGENS TESTED

Allergen code	Allergen	RAST result Class I	Class II	Class III	Class IV	Total
g7	Phragmites communis	25	5	3	3	36
g17	Paspalam notatum	25	7	2	2	36
w1	Ambrosia elator	22	12	7	1	37
f1	Egg white	30	2	0	1	33
f2	Milk	29	8	0	0	37
f24	Shrimp	41	18	1	0	59
e5	Dog dander	15	0	2	2	19
m1	Penicillium notatum	24	5	0	0	29
m2	Aspergillus fumigatus	11	7	1	0	19
m4	Mucor racemosus	13	7	2	0	22
m5	Candida albicans	26	7	2	0	35
h2	Hollister-Stier Labs.	20	18	16	5	49
d2	Dermatophagoides farinae	17	17	22	33	89
i6	Blatella germanica	26	12	3	0	41
p1	Ascaris	29	25	1	2	57

Note: The response for each tested allergen are reported in RAST classes 0, I, 11. III and IV. Relative to the Phadebas RAST standards: Class 0 = < 0.35 PRU/ml; Class I = 0.35 – 0.70 PRU/ml; Class II = 0.70 – 3.50 PRU/ml; Class III = 3.50 – 17.50 PRU/ml; and Class IV = > 17.50 PRU/ml. (PRU: Phadebas RAST Unit). Class 0 is taken as negative for KAST.

RAST

About 82% of individuals with total IgE higher than 250 KU/L were positive for RAST to one or more allergens (Table 4). About 60% of individuals with total IgE levels less than 250 KU/L were negative for RAST. Table 5 shows that individuals with high serum IgE levels and have clinical symptoms of atopy have positive RAST to one or more allergens. About 30% of the individuals with allergy symptoms were totally negative to the allergen panel. This could be because of the inclusion of some non-allergic individuals with symptoms mistaken for allergy or because certain allergens have been excluded from the panel.

DISCUSSION

The value of measuring specific IgE antibodies in the diagnosis and practical management of allergic disease is controversial. Some workers advocate a limited role[4] and others have given little emphasis to routine clinical laboratory services.[5,6] However there has been data to show that a high total IgE level may be associated with atopy and that RAST was useful in the detection of specific IgE antibodies.

The normal range for serum IgE level is wider than for any other class of immunoglobulins. The objective of this study is to determine the usefulness of RAST results and serum IgE levels in the discrimination of atopic from non-atopic symptoms. It also serves to evaluate the usefulness of Commercially available RAST kits for testing the Malaysian population.

55% of allergies were positive to house dust mite (d2). Very few cases who were negative to d2 were positive to house dust (h2) and generally the RAST classes for d2 were higher than that for h2. Thus the house dust mite seems to be an important allergen.

TABLE 3

DISTRIBUTION OF POSITIVE RAST ACCORDING TO ALLERGIC SYMPTOMS

Allergic symptoms toms	Allergen code g7	g17	w1	f1	f2	f24	e5	m1	m3	m4	m5	h2	d2	i6	p1
Asthma: (n=34)															
No. with class I & II	6	6	6	6	1	0	6	4	6	3	4	5	1	0	1	4	1	1
No. with class III & IV	0	0	0	0	0	0	1	1	1	0	0	8	1	8	1	2
Total No. with positive RAST	6	6	6	6	10	6	5	7	4	4	5	18	19	5	13
Eczema: (n=65)															
No. with class I & II	15	11	16	11	12	25	14	13	10	8	13	19	11	18	21
No. with class III & N	3	2	1	1	0	1	3	0	0	2	2	9	2	4	1	1
Total No. with positive RAST	18	13	17	12	12	26	17	13	10	10	15	28	35	19	22
Rhinitis: (n=31)															
No. with class I & II	4	4	5	4	5	1	0	3	4	3	7	9	4	6	8	1	0
No. with class III & IV	1	1	1	0	0	0	1	0	0	0	0	6	1	4	0	0
Total No. with positive RAST	5	5	6	4	5	10	4	4	3	7	9	10	20	8	10
Urticaria. (n=24)															
No. with class I & II	0	0	0	4	3	3	1	2	0	0	1	6	3	4	1
No. with class III & IV	1	1	1	0	0	0	0	0	0	0	0	0	3	1	0
Total No. with positive RAST	1	1	1	4	3	3	1	2	1	0	1	6	6	5	1

TABLE 4

CORRELATION BETWEEN TOTAL IGE LEVELS AND RAST RESULTS

Serum Ig h (KU/L)	RAST results: All negative	Positive to 1 or 2 allergens	Positive to 3 or more allergens	Total
High 250 <	20 (17.7%) (25.0%)	38 (33.6%) (56.7%)	55 (48.7%) (82.1%)	113 (100%) (58.8%)
Normal or low 250 >	60 (59.4%) (75.0%)	29 (28.7%) (43.3%)	12 (11.9%) (17.9%)	101 (100%) (47.2%)
All cases	80 (37.4%) (100%)	67 (31.3%) (100%)	67 (31.3%) (100%)	214 (100%) (100%)

Most cases (around 72%) were positive to both g7 and g17. 23 of 28 (82%) of g17 positives were also g7 positive and 13 of 21 (62%) of g7 positives were also g17 positive. Around 25% of the allergic cases were allergic to grass pollen. This is most interesting as the grass pollen used were European species. It appears that there is antigenic similarity between Malaysian and European grass. Over 90% (34/37) of the wl (wheat) positive cases were also positive to g7 or g17.

However the allergen panel was totally negative in about 30% of the cases. Amongst the 214 cases in this study, 154 have clearly defmed clinical symptom complexes and 60 cases with undefmed symptoms. 24% of the cases with defmed symptoms were totally negative to the allergen panel as compared to 45% of the cases with undefmed symptoms

TABLE 5

CORRELATION BETWEEN ALLERGY SYMPTOM COMPLEX AND RAST RESULTS

Symptom complex	All patients		Patients with 1 or more positive RAST		Patients with all RAST negative	
	No. of subjects	Mean ± S.D. (KU/L)	No. of subjects	Mean ± S.D. (KU/L)	No. of subjects	Mean ± S.D. (KU/L)
Asthma	34 (100%)	512 ± 437	30 (88%)	520 ± 462	4 (12%)	241 ± 82
Eczema	65 (100%)	328 ± 420	52 (80%)	372 ± 470	13 (20%)	213 ± 191
Urticaria	24 (100%)	312 ± 272	12 (50%)	393 ± 290	12 (50%)	232 ± 280
Rhinitis	31 (100%)	363 ± 246	23 (74%)	408 ± 279	8 (26%)	195 ± 125
Others and undefined symptoms	60 (100%)	239 ± 244	33 (55%)	314 ± 288	27 (45%)	172 ± 171
Total	214 (100%)		150 (70%)		64 (30%)	

(Table 5). Perhaps there were other important allergens which have been left out of the test panel. This is to be expected as the causative agents can be so numerous and varied. Selection of a suitable allergen panel for testing is understandably difficult.

A combination of house dust mite, shrimp, milk and common weed would be able to pick out 72% of the allergic cases (Fig. 1). When screening. the inclusion of additional allergens is unlikely to improve the positivity rate. Also, some allergens such as g17 and h2 are not useful because allergy to these allergens does not seem to occur singly. The patient will almost always be allergic to something else as well.

From this study it appears that high serum IgE levels and positive RAST correlate well with the clinical symptoms (Tables 4 & 5). We consider serum IgE levels together with RAST results to d2 + f24 + f2 + g7 as useful in the discrimination of allergic from non-allergic symptoms.

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