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SKIN REACTIVITY TO ALLERGENS IN RABIGH AREA, KINGDOM OF SAUDI ARABIA

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Abstract

This study determined the pattern of skin prick test reactivity to allergens in patients with airway allergy residing in Rabigh Area, based on data analysis of skin prick test results. Skin prick tests of 160 Saudi attended Al Nakheel Polyclinic between July, 2012 and April, 2013. Allergen extracts set was used to test them.

Out 160 patients, 114 (71%) reacted to one or more allergens, who were 73 (64%) adults and 41(36 %) children. The majority of adults (17.8%) reacted to six allergens and children (19.5%) reacted to five ones. The most frequently reacting allergen was house dust mites followed by *Candida albicans* then *Cladosporium* spp. The maximum number of positive tests per patients was 13 in adults, compared to 10 in children. A significantly higher proportion of adults were reacting to house dust mites, *Aspergillus* and *Penicillium*. Sensitivity to allergens was common in patients with airway allergy residing in Rabigh area

Keywords: Saudi Arabia, House dust mite, Airway allergy, Skin prick test

Introduction

Exposure to allergens has long been associated with allergic disorders. Many authors worldwide have argued that aeroallergens exposure is the major primary cause of asthma (Sporik *et al*, 1990; Platts-Mills *et al*, 1997; El-Sherbiny *et al*, 2010), and the global increases in asthma prevalence resulted of increases in aeroallergens exposure (Maloney and Nowak-Wegrzyn 2007; Almogren, 2009). The allergen exposure produces sensitization and continued exposure leads to the development of bronchial hyperactivity and inflammation ending in the clinical asthma (Scheibe *et al*, 2001). In a sensitized individual, bronchial provocation with a relevant allergen is a way for recruiting eosinophils in lungs and increases bronchial hyperactivity (El-Ghitany and Abd El-Salam, 2012).

Asthma associated allergens are primarily perennial indoor allergens such as house dust mite (HDM), animal dander, and cockroaches (El-Sherbini and Gneidy, 2012). Removing asthmatics from their homes not only decreases the symptoms but a marked reduction in bronchial hyper-reactivity has also

been observed among these patients (Mazyad *et al*, 2006). In addition, education of parents and a simple preventive measure to reduce mite allergen exposure has been shown to reduce sensitization to mite allergens in children. Impact of food allergy on the quality of life depends on how easy it is to avoid the related food. Avoidance can prevent the disease but it can be a difficult job.

Skin prick test (SPT) is a major tool in the diagnosis of IgE mediated-allergy. Skin tests are easily carried out, without absolute contraindications and may also be applied to assess predisposition to asthma. Increased exposure to both indoor and outdoor aeroallergens has been implicated in the sharp rise in the prevalence of allergic diseases such as asthma and rhinitis observed in the Kingdom of Saudi Arabia (KSA) between 1986 and 1995. This is further supported by the fact that a report from Riyadh region has shown that 63.3% children with asthma react to both indoor and outdoor aeroallergen extracts (Urisu *et al*, 1999).

This study aimed at evaluation of the status of allergen sensitization in patients with clinical allergy in Rabigh area of KSA.

Subjects, Materials and Methods

The study group was selected from pediatric and adult patients referred because of allergic disorders with the suspicion of allergy to Al-Nakheel Polyclinic and Laboratory in Rabigh city between July, 2012 and April, 2013. A total of 160 patients from the Rabigh area were assessed in this study. On the basis of history and clinical presentation, 95adults (mean age 27 ±15 years) and 55 children (mean 11±2 years) were clinically diagnosed as having airway allergy (asthma, rhinitis or both). Fifty (54%) of adults recruited were females and 45 (46%) were males, whereas 22 children (40%) were males and 33 (60%) were females. These patients were referred for skin prick test (SPT) to the clinical laboratory of Al-Nakheel polyclinic in Rabigh city. Patients on anti-histamine medication or on long term steroids as well as pregnant women were excluded. The informed consent was obtained from each adult or parents in case of children, after approval of the experimental protocol by the local human ethical committee in Rabigh and Research Ethics Committee at Faculty of Medicine, King Abdul-Aziz University.

A combination of allergen extracts from tree, weed, grass pollens, house dust mites, cockroach, cat and fungal spores was used for SPT. Table 1 shows the details of the set of allergen extracts used in this study. A positive and a negative control were included for each assessment. A drop of each allergen extract was placed on the skin of forearm and the underlying skin was nicked using a fine lancet. The results were recorded after 20 minutes and the test was considered positive if the wheal diameter was equal to or more than 3 millimeters (Almogren, 2009).

Statistical analysis: Chi-square (χ^2) test was used to analyze correlation between skin test results in adults and children. $P<0.05$ was considered significant. The analysis was performed for

paired data using two-tailed Student's *t* test. $P < 0.05$ was considered significant.

Results

Out of 160 patients, 114 (71 %) reacted to one or more allergens. This group included 73(64 %) adults and 41(36 %) children (Tab. 1). Three (4.1%) adults and 5(12.2%) children reacted to single allergen whereas the rest of the patients in both groups reacted to multiple allergens. The majority of adults (17.8%) reacted to 6 allergens and children (19.5%) reacted to 5 allergens. The maximum number of positive test per patients was 13 in adults, compared to 10 in children.

Table 1: Allergen extracts used for SPT (Nelco-Laboratory, USA)

Allergen	UNIT
Dermato . farinae .	10000 IU/ML
D.pteronyssinus .	10000 IU/ML
Blomia .	1000 IU/ML
Blatte germane	1000 IU/ML
Plumes mélanges	100 IU/ML
Areplex	1000 IU/ML
Cat	100 IU/ML
Date palm	1000 IU/ML
Alternaria	100 IU/ML
Candida albicans	1000 IU/ML
Cladosporium	1000 IU/ML
Aspergillus mix	100 IU/ML
Penicillium	1000 IU/ML
Amarante	1000 IU/ML
Salsola kali	1000 IU/ML
Chenopode	100 IU/ML
Armoise	100 IU/ML
Mesquite	100 IU/ML

Table 2: Numbers of SPT reactions in adults and children

Allergen number	Adults positive reactions (n=73)	Children positive reactions (n=41)
1	3 (4.1%)	5 (12.2%)
2	6 (8.2%)	4 (9.8%)
3	6 (8.2%)	5 (12.2%)
4	10 (14%)	6 (14.6%)
5	7 (9.6%)	8 (19.5%)
6	13 (17.8%)	5 (12.2%)
7	8 (11%)	3 (7.3%)
8	6 (8.2%)	2 (4.9%)
9	6 (8.2%	2 (4.9%)
10	4 (5.5%)	1 (2.4%)
11	2 (2.8%)	-
12	1 (1.4%)	-
13	1 (1.4%)	-
14	-	-
15	-	-
16	-	-
17	-	-
18	-	-

Table 3 No. of positive cases in response to allergens

Allergen	Positive cases (n= 114)
Dermato . farinae	41
D.pteronyssinus	23
Total Dust mites	64
Blomia	19
Blatte germane	11
Plumes mélanges	23
Areplex	24
Cat	21
Date palm	27
Alternaria	7
Candida albicans	38
Cladosporium	33
Aspergillus mix	18
Penicillium	15
Amarante	3
Salsola kali	2
Chenopode	4
Armoise	5
Mesquite	26

Table 4: Comparison of skin test in adults (n=73) and children (n=41)

Allergen	Adults positive reactions	Children positive reactions	P value
D. farinae	32	9	
D. pteronyssinus	19	4	
Total Dust mites	51 (69.9%)	13 (31.7%)	p> 0.05
Blomia.	11 (15.1%)	8 (19.5%)	n. s.
Blatte germani	7 (9.9%)	4 (9.8%)	n. s.
Plumes melangees	14 (19.2%)	9 (22%)	n. s.
Areplex	13 (17.8%)	11 (15.1%)	n. s.
Cat	21 (28.8%)	11 (15.1%)	n. s.
Date palm	19 (26%)	8 (19.5%)	n. s.
Alternaria	5 (6.8%)	2 (4.9%)	n. s.
Candida albicans	22 (30.1%)	16 (29%)	n. s.
Cladosporium	19 (26%)	14 (19.2%)	n. s.
Aspergillus mix	16 (21.9%)	2 (4.9%)	p> 0.05
Penicillium	14 (19.2%)	1 (2.4%)	p> 0.05
Amarante	3 (4.1%)	0	
Salsola kali	2 (2.8%)	0	
Chenopode	3 (4.1%)	1 (2.4%)	n. s.
Armoise	5 (6.8%)	0	
Mesquite	22 (30.1%)	14 (19.2%)	n. s.

n. s.: non-significant.

The most frequently reacting allergen was HDM followed by *Candida albicans* and *Cladosporium* (Tab. 3). Skin pick tests among adults and children (Tab. 4) showed that a significantly higher proportion of adults reacting to HDM, *Aspergillus* mix and *Penicillium*.

Discussion

Allergy is the general non-medical term for a hypersensitivity reaction. It is a reaction of the body's immune system in response to stimuli or a trigger factor (Morsy, 2012). These trigger factors are termed allergens. The aller-

gen can be anything, as some types of food, pollen, medicines, dust mites, pet dander…etc. (Oh *et al*, 2004), or even chironomid potent (Morsy *et al*, 2000). Asthma is one of the common allergic conditions that is a significant public health problem, with alarming trends in prevalence, morbidity, and mortality (Kim *et al,* 2005). In the present study showed the spectrum of allergen sensitization in patients with airway allergy in Rabigh area. The most common allergen was HDM in children and adults with airway allergy.

A total of 71% of patients reacted to one or more allergens. Maloney and Nowak-Wegrzyn (2007) found that allergens reactions varied from 24 to 81%. A study examining the allergen spectrum in Chinese population reported HDM allergen to be the most common among patients with airway allergy (Schoenwetter *et al*, 2004). Yu *et al*, (2006) showed that the most commonly reacting allergens detected were grass, mountain cedar and dust mites. The varying spectra of allergen sensitization and the diversity of reactions could be due to different populations and regional variations (Wang, 2013).

The skin reactivity to allergen extract is mediated by elevated serum IgE specific to allergens has been associated with asthma in several studies (Calabria *et al*, 2007; Dottorini *et al,* 2007). Both genetic and environmental factors are believed to contribute to this relationship between the presence of specific IgE to allergens and manifestations of airway allergy.

In genetically predisposed individuals, environmental factors appear to play an important role in sensitization to allergens (Kidon *et al*, 2004; Bousquet *et al*, 2005; Rowe *et al*, 2007).

The amount of allergen exposure necessary for sensitization to occur and the amount necessary to result in symptoms in sensitized individual is however not clearly defined although provisional values have been suggested (Arbes *et al*, 2005; Bavbek *et al*, 2006).

Thus, in the present study, the level of sensitization to allergens may therefore reflect the degree of exposure in the environment of these patients. Aerobiological survey is probably the best method of estimating the allergen load affecting the HDM patients (Yassin, 2011).

In Saudi Arabia, allergen sensitization in different regions on focused on asthmatic children with asthma, using different sets of allergens than that used in the present study (Al-Nahdi and Al-Quorain 1987; Al-Frayh *et al,* 1992). It is difficult to draw conclusions on the basis of comparison of these studies since they were carried out in different regions and environmental conditions, but it may reflect difference in environmental allergens.

While residing in an area where both the adults and children were exposed to similar allergen load some interesting observations were made when allergen reactivity was compared. Cross reactivity between *D. pterronyssinus* and *D. farina* was common in adults compared to children. Pollen reactivity was high for both the groups; however children appear to be more sensitive (Yu *et al,* 2012).

A higher number of children reacted to *Blomia* allergen compared to adults.

On the contrary, the adults were reacting to moulds more often than the children (Ronmark *et al,* 2003). It was difficult to explain this discrepancy on the basis of existing data but these findings suggested that the maturation of airways with the advancing age may influence the allergen sensitization status of the atopic individuals and may have a bearing on the manifestations of the allergic diseases in children and adults (Cohn *et al,* 2006).

Conclusion

House dust mites (HDM) contain a large number of components that react with IgE in individuals with allergies and induced sensitization and allergic diseases. The outcome results showed that the sensitivity to allergens was common in patients with airway allergy residing in Rabigh area.

No doubt, the extensive aerobiological survey of Saudi Arabia and simultaneous assessment of aeroallergen sensitization by SPT and detection of specific IgE in the respective allergic population would help to access the impact of environmental aeroallergen load on airway allergy.

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