

## Sensitization to Common Food Allergens in Makkah City

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### Abstract

Sensitization to food allergens at Makkah city is not documented. In this study, a retrospective evaluation of a specific IgE (sIgE) test results to common food allergens of 80 patients with suspected food allergy (FA) was conducted. Of these, 51 (63.75%) were female, 29 (36.25%) male, 48 (60.6 %) adult and 31 (39.4 %) pediatric patients. Their ages ranged between 1 month of age and 75 years (mean 27 years and median 30 years). Their common diagnoses were 52 (65 %) atopic dermatitis, 24 (30%) urticaria/angioedema and 4 (5 %) bronchial asthma. Atopic history in the first and second-degree relatives was positive in 35 (43.75 %). The top five food allergens were cocoa 22 (27.5 %), peanuts 14 (17.5%), egg white 12 (15%), milk 10 (12.5%) and strawberry 9 (11.3%). In conclusion, sensitization to common food allergens in Makkah was compatible with worldwide literature except for cocoa and strawberries, which are an unexpected finding that needs further evaluation.

### Introduction

The actual prevalence in adults confirmed by double blind placebo controlled food challenge (DBPCFC) has been estimated to be 1.4% (Bindslev-Jensen C 1998). FA is more common in children than adults (Bock SA 1982, 1987). Impact of FA 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 and impinge on the individual's social activities as well as nutrition. FA is more common in patients with other atopic diseases. For example, in children, 10% of asthmatics have (FA) and 30% with atopic dermatitis have had an adverse reaction to food (Sampson HA 1999a, 1999b). In this study, the aim was to describe the prevalence of sensitisation to common food allergens and their related allergic disorders.

The prevalence of allergic disease has increased markedly over the last 50 years (Meyer R 2008). Although our knowledge about pathogenesis, risk factors and treatment strategies, the increase of prevalence of the allergic diseases could not be prevented (ISAAC 1998). The term allergen denotes a protein or glycoprotein that can induce (sIgE) response and react with the resulting antibody molecules (Durham SR 2001). Food Allergy (FA) appears to be strongly influenced by genetics but the basis of the genetic predisposition has not explained the prevalence of FA satisfactorily. This fact opens the possibility of the influence of the environmental factors on FA like (external, maternal, and gastrointestinal environment) (Dreskin SC 2006). FA prevalence is perceived to be very common; however, its prevalence is low.

### Material and Methods

The study group was selected from all pediatric and adult patients referred because of allergic disorders with the suspicion of food allergy to AL BORG laboratory in Makkah city between October 2005 and July 2007. SIgE in-vitro tests to common food allergens of 80 patients were evaluated retrospectively. The common food panel included: nuts mix (hazelnut, peanuts, walnut, almond, pecan nut, pistachionut and cashew), milk and dairy products like (cheese mix, casein), fruits (orange, peach, cherry, bananas, strawberries, mango, apple and fruits mix), vegetables (potato, celery, carrot, tomato, onion and vegetable mix), egg (yolk, white), sea food (cod fish, crab, fish/shellfish/muluscous and shrimp), grains (gluten, green beans, wheat flour, rye flour, sesame seed, soya beans and maize), meat (lamb, chicken), plant (cocoa, yeast and mustard) and others (bovine serum albumin, ammeltesc, honey and meals mix). Blood was extracted and tested with RIDA® Allergy Screen of R-Biopharm. This screen is an efficient and highly economic system for the diagnostic confirmation of allergies. It offers test methods for the antibody detection by an immunoblot with four different panels (panel 1 - 4) with 20 allergens each. The evaluation was done automatically by digital pictures in RIDA® X-Screen or RIDA® maXi-Screen. SIgE results were evaluated between zero and six classes according to the severity of allergic reaction to each food.

### Results

SIgE food tests of 80 patients were evaluated retrospectively. Of these patients, 51 (63.75%) were female, 29 (36.25%) male, 48 (60.6 %) adult and 31 (39.4 %) pediatric patient. Patients were aged between 1 month of age and 75 years (mean 27 years and median 30 years). SIgE food test were evaluated as negative in 8 (10%) patients. The common allergy diagnoses were 52 (65 %) atopic dermatitis, 24 (30%) urticaria and angioedema, 4 (5 %) bronchial asthma. Thirty-five patients (43.75 %) had atopy history in their first and second-degree relatives. In this study, 27.5 % of the patients were allergic to cocoa, 17.5 % to peanuts. Egg white sensitivity was found at a rate of 15 %, milk sensitivity was 12.5 % and strawberries sensitivity was 11.25 %. 8.75 % of patients were sensitive to onion and 7.5 % to orange and mango. Carrot, wheat flour and tomato sensitivity was found at a rate of 6.25 % and nut, bananas, egg yolk, cod fish and soya beans sensitivity was 5 % and hazelnut, pistachionut, casein, fish/shellfish/muluscou s, green beans, chicken and yeast sensitivity was 3.75 % and cashew, cheese mix, potato, shrimp, seasame seed and lamb sensitivity was found at a rate of 2.5 %. 1.25 % of the patients were sensitive to almond, peach, cherry, apple, celery, bovine serum albumin, honey, ammeltesc, mustard and meals mix and zero % to walnut, pecan nut, fruits mix, vegetable mix, crab, gluten, rye flour and maize (table 1).

**Table-1**  
**Results of sIgE to common food allergens**

Food Allergens	Negative	Positive				Total	%
		Low	increased	high	Very high		
Cocoa	8	19	3			22	27.5
Peanuts	55	8	3	1	2	14	17.5
Egg white	58	9	2	1		12	15
Milk	60	6	3	1		10	12.5
Strawberries	32	6	3			9	11.3
Onion	22	5	2			7	8.8
Orange	55	4	1		1	6	7.5
Mango	30	4	2			6	7.5
Carrot	48	3	2			5	6.3
Wheat flour	55	1	2	2		5	6.3
Tomato	63	1	3	1		5	6.3
Nut	21	2	1	1		4	5
Bananas	26	3		1		4	5
Egg yolk	65	4				4	5
Cod fish	40	4				4	5
Soya beans	54	1	2		1	4	5
Hazelnut	34		1	1	1	3	3.8
PistachioNut	5	2	1			3	3.8
Casein	41	1	1	1		3	3.8
Fish/shellfish/muluscous	17		2	1		3	3.8
Green beans	1	1	1		1	3	3.8
Chicken	26	1	2			3	3.8
Yeast	25	3				3	3.8
Cashew	5	1	1			2	2.5
Cheese mix	5		2			2	2.5
Potato	35			1	1	2	2.5
Shrimp	25	1	1			2	2.5
Sesame seed	39	1	1			2	2.5
Lamb	13	1	1			2	2.5
Almond	36	1				1	1.3
Peach	5		1			1	1.3
Cherry	5			1		1	1.3
Apple	44		1			1	1.3
Celery	39		1			1	1.3
Bovine serum albumin	1	1				1	1.3
Honey	5	1				1	1.3
Ammeltesc		1				1	1.3
Mustard	12		1			1	1.3
Meals mix	6	1				1	1.3
Walnut	37						0
Pecan nut	5						0
Fruits mix	5						0
Vegetable mix	5						0
Crab	27						0
Gluten	5						0
Rye flour	31						0
Maize	4						0

### Discussion

We evaluated the prevalence of FA and family history of atopy and its relation to atopic dermatitis, urticaria, angioedema and asthma in Saudi population living in and around Makkah city. In this study, the top five food allergens were cocoa, peanuts, egg white, milk and strawberry. FA usually manifests in early childhood as part the atopic march and is more prevalent in children due to the immature gastrointestinal epithelial membrane barrier allowing more proteins through the barrier and into circulation (Suzuki K *et al* 2002, Meyer R 2008). Except possible allergy to cocoa and strawberry, this retrospective study results to some extent resemble most of the worldwide results. One study showed that the most common food allergies in adults are shellfish, peanuts, tree nuts, fish, and eggs while the most common food allergies in children are milk, eggs, peanuts, and tree nuts (National Institute of Allergy and Infectious Diseases July 2004). In another study, the top five allergens in caucasian and non-caucasian children were egg, peanut, tree nut, milk and fish (Dias RP *et al* 2008). In contrast Indian food triggers differ from Makkah ones which are mainly apples and hazelnuts (Somani VK 2008). We are not yet convinced that cocoa is the commonest food causing allergy in Makkah because allergies to cacao (the bean that is the main ingredient in chocolate) are possible but so rare as to be virtually nonexistent in recent medical literature (cederberg 2004). Allergy to chocolate happen mainly because it contains a trace amounts of allergens which can trigger allergy like milk, peanuts, treenuts, wheat, soy, corn, fruits, caffeine and due to drug interactions like itchiness in people on Prozac (flouxetine®) (cederberg 2004). Chocolates contain undeclared allergens, which triggers allergy like hazelnut and peanut traces (Pele M 2007). Immunoblot technique allowed the detection of less than 0.5 milligram of hazelnut or almond proteins per 100 gram of chocolate (Scheibe B 2001). Peanut allergy (e PA) is associated with greater risk of anaphylaxis

(Khodoun M *et al* 2009). (PA) patients have to avoid other nuts also because of the cross reactivity. Cashew and pistachio nuts do cross with each others so allergy reactions for both should be examined (Hasegawa M 2009). The major peanut allergen (Ara h 2) shares common IgE-binding epitopes with almond and brazil nut allergens, which may contribute to the high incidence of tree nut sensitization in peanut allergic individuals (de Leon MP 2006). Egg white (EW) allergy is mainly due to its protein contents. High sIgE to EW proteins like (ovomucoid, ovalbumin, ovotransferrin and lysozyme) and its components in the blood isn't necessarily efficient for the diagnosis or the prediction of the outcome of egg allergy in children (Urisu A *et al* 1999). Cow's milk allergy (CMA) is the main cause of (FA) in infants and young children. It can be mediated through IgE or non-IgE mechanisms. It is estimated that up to 50% of pediatric (CMA) is non-IgE-mediated. IgE-mediated (CMA) children are usually atopic (Maloney J 2007). Breast-feeding have been shown to be protective in preventing food allergy. Infants who are breast-fed have lower serum IgE levels (Buonocore *et al*, 1992) and have less allergic illness in early childhood (Burr *et al*, 1993) and possibly through to adolescence (Saarinen and Kajosaari, 1995). Breast-fed infants have also been found to have less sensitization to house dust mites at the age of one year (Kramer 1988). Complete elimination the offending allergen is the mainstay of management of patients with FA (Edlich RF 2008). Patients with FA education involved teaching the mother to avoid high risk situations, encouraging the child to wear a medic alert bracelet, and teaching the family and child to recognize early symptoms of allergic reactions and to manage an anaphylactic reaction, including the use of self injectable epinephrine, as well as activating emergency services (Clark AT 2009). The only proven treatment for cow's milk allergy (CAM) is the complete elimination of cows' milk proteins (CMPs) from the diet by means of hypoallergenic formulas

and ensuring that essential dietary requirements are met (Curciarello R 2008, Yu JW 2006, Crittenden RG 2005). Soy formula is recommended as first alternative for infants over 6 months of age with immediate food reactions (Kemp AS *et al* 2008). Regular consumption of fruits has a positive influence on human health by disease prevention. However, IgE-mediated fruit allergies have been shown to be an increasing health risk for children and adults. Strawberry and fruit proteins can result in a production of similar epitopes to IgEs and consequently in cross-reactivity (Marzban G 2005). In conclusion, (sIgE) antibodies tests to common food were evaluated retrospectively in patients who have allergic disease in Makkah city and around. Our data indicate that the top food allergens in Makkah were cocoa, peanuts, egg white, milk and strawberry. Sensitization to common food allergens in Makkah was compatible with world wide literature except for cocoa and strawberries which is an unexpected finding that needs further evaluation.

### Acknowledgments

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## حساسية الطعام بمكة

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إن الحساسية الغذائية في مدينة مكة المكرمة ليست موثقة. في هذه الدراسة، تم بأثر رجعي تقييم نتائج اختبارات الأجسام المضادة (للغلوبولين المناعي المحدد من نوع إي) للأنواع الشائعة من الغذاء من 80 مريضاً يشتبه فيهم الحساسية الغذائية. من بين هؤلاء المرضى، 51 إنثاء (63.8 ٪)، 29 ذكور (36.3 ٪)، 48 بالغين (60.6 ٪) و 31 أطفال (39.4 ٪). كما تراوحت أعمارهم بين سن 1 شهر و 75 سنة (متوسط 27 سنة ووسط 30 سنة). وكان التشخيص الأكثر شيوعاً 52 أكزيما (65 ٪)، 24 شرى/وذمة وعائية (30 ٪)، و 4 ربو شعبي (5 ٪). وكان التاريخ التحسسي (التأتب) في القرابة ذو الدرجة الأولى والثانية كان إيجابياً في 35 مريضاً (43.8 ٪). وكانت الخمسة الأوائل لمحسسات الغذاء هي الكاكاو 22 (27.5 ٪)، الفول السوداني 14 (17.5 ٪)، بياض البيض 12 (15 ٪)، الحليب 10 (12.5 ٪) والفراولة 9 (11.3 ٪). الخلاصة: إن التوعية للحساسية الغذائية في مكة المكرمة كانت متوافقة مع الدراسات العلمية في جميع أنحاء العالم ما عدا الكاكاو والفراولة، والتي لم تكن متوقعة وتحتاج إلى مزيد من التقييم.