
بسم الله الرحمن الرحيم
وَأَنْزَلَ اللهُ
عَلَيْكَ الْكِتَابَ
والْحِكْمَةَ
وَعَلَّمَكَ مَا لَمْ
تَكُنْ تَعْلَمُ
وَكَانَ فَضْلُ اللهِ
عَلَيْكَ عَظِيمًا
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PREVALENCE OF BANANA ALLERGY IN ATOPIC EGYPTIAN CHILDREN

Thesis

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Manar Waheed Ali

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List of Abbreviations

ACE	**:** Angiotensin-converting enzyme
AEC	**:** Absolute eosinophil count
APT	**:** Atopy patch test
BAT	**:** Basophil activation test
CBC	**:** Complete blood count
CD	**:** Cluster of differentiation
DBPCFC	**:** Double blind placebo-controlled food challenge
ELISA	**:** Enzyme linked immunosorbent assay
Fc€RI	**:** Fragment constant Epsilon receptor I
INF-α	**:** Interferon α
Ig	**:** Immunoglobulin
MAO	**:** Mono amine oxidase
OAS	**:** Oral allergy syndrome
O.D	**:** Optical density
OIT	**:** Oral immunotherapy :
PPT	**:** Prick prick test
RAST	**:** Radio allergosorbant test
SPT	**:** Skin prick test
Th	**:** T helper cells:
TNF-α	**:** Tumour necrosis factor α:

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INTRODUCTION

The term "food allergy" refers to adverse immunologic reactions to food. Food allergy is usually mediated by IgE antibody directed to specific food proteins, but other immunologic mechanisms can also play a role ***(Scott and Sicherer, 1999)***. IgE is produced against naturally occurring food components, primarily glycoproteins that usually retain their allergenicity after heating and/or proteolysis ***(Stevens, 2001).***

Food allergy affects between 5% and 7.5% of children and between 1% and 2% of adults. The greater prevalence of food allergy in children reflects both the increased predisposition of children to develop food allergies and the development of immunologic tolerance to certain foods over time ***(Kagan, 2003).***

The symptoms of IgE-mediated reactions typically involve the skin, respiratory system and gastrointestinal tract ***(Geha, 1992 and Bock and Atkins, 1990)***. Clinically, these reactions are characterised by a variety of signs and symptoms that occur within minutes or hours after consumption of the offending food. Reactions may be limited or generalised. In more severe cases, cardiovascular symptoms including hypotension, shock, cardiac dysrhythmias and death can occur ***(Stevens, 2001).***

Both acute reactions (hives and anaphylaxis) and chronic disease (asthma, atopic dermatitis and gastrointestinal disorders) may be caused or exacerbated by food allergy ***(Scott and Sicherer, 1999).***

Different foods affect different age groups. Cow's milk, hen's eggs, peanut, tree nuts, and sesame seeds account for most food-induced allergic rections in young children, and kiwi allergy has been increasingly reported. Wheat and soy allergies, although frequently suspected, are rarely confirmed. Shellfish, fish, peanuts, and tree nuts are the most common causes of food allergies in adults ***(Lucas et al., 2003).***

Banana was recognized as a food allergen about 80 years ago and IgE mediated reactions have been described by several authors since the 1970s. Several cases of anaphylactic reactions to banana have been reported. Severe reactions were recently reported to have occurred as early as 6-month of age when the fruit was eaten by the infant for the first time ***(Tokuyama et al., 1997).***

Evaluation of IgE-mediated food allergy relies on a careful history and physical examination ***(Stevens, 2001).*** Currently, the diagnostic work-up of suspected food allergy includes skin prick tests, the measurement of food specific immunoglobulin E (IgE), the atopy patch test, and double-blind, placebo-controlled food challenges ***(Niggemann and Beyer, 2005).***

Skin-prick and radioallergosorbent tests for particular foods have about an 85% sensitivity and 30% to 60% specificity. Intradermal testing has a higher false-positive rate and greater risk of adverse reactions; therefore, it should not be used for initial evaluations. The double-blind, placebo-controlled food challenge remains the most specific test for confirming diagnosis ***(Kurowski and Boxer, 2008).***

However, all of these methods, even double-blind, placebo-controlled food challenges (DBPCFC), may sometimes be misleading. Hence, there are several pitfalls in the diagnostic work-up of food allergy, which may be misleading for the physician ***(Niggemann and Beyer, 2005).***

Comparative evaluation of sensitivity and specificity of the tests used for diagnosis of food allergy in Egyptian children is needed for accurate diagnosis and better outcome.

AIM OF THE WORK

The aim of this work is to explore the prevalence of banana allergy among a group of Egyptian children and to evaluate the performance of skin prick test, prick-prick test and specific IgE in the diagnosis of banana allergy.

Banana Allergy

Most food allergy is acquired in the first 1 to 2 years of life. The prevalence of food allergy peaks at 6-8% at 1 year of age and then falls progressively until late childhood, after which the prevalence remains stable at 1-2% ***(Robert and Wood, 2003)***. The main foods responsible for food allergy in childhood are egg and milk. In adulthood, seafood, fruits and vegetables are the most common causes ***(Kanny et al., 2001).*** Banana is a frequent cause of food allergy, particularly in latex-sensitized patients ***(Grobe et al., 2002).***

Banana is generally thought to have low allergenic potential and is often appropriately introduced as part of the early infant diet ***(Ricci et al., 2005)***. An early frequent exposure to banana allergens was considered a possibility factor for the development of banana sensitization ***(Alvaro et al., 2004)***. Patient may have been sensitized to banana by ingestion of breast milk, therefore, the allergenic components causing banana allergy and the route of sensitization to banana in infants may differ from those in adults; it seems that oral sensitization to food occurs more easily in infants than adults because gut mucosal defense including immune system is undeveloped in infants ***(Akemiito et al., 2006).***

Banana allergens:-

Class I chitinases with an hevein-like domain are major allergens in banana fruit ***(Monge et al., 2001)***. Beta1,3 glucans are abundant components of the plant cell wall which have been isolated from banana ***(Midoro-Horiuti et al., 2001)*** and were found to be cross-reacting allergens in banana and latex (Hev b 2) ***(Rodriguez et al., 2002)***. Serotonin, which is present in clinically significant amounts in banana, has also been implicated in type I allergy to this fruit ***(Ebner et al., 2001).***

Cross reactivity:-

Banana contains allergens in common with those in latex or pollens. Therefore, banana allergy often occurs in patients sensitized to latex or pollens and it is much less common in patients without latex allergy or pollinosis. However, these conclusions are based mostly on observations on banana allergy in adults, because banana allergy in infants appears to be rare ***(Breiteneder and Ebner, 2000)***.

The class I chitinases allergens are thought to be responsible for the cross-reactivity between the banana and latex in latex-food syndrome and beta 1,3 glucans have been isolated from banana and latex (Hev b 2) are thought to be responsible for the cross-reactivity between banana

and latex in the latex-food syndrome seen in some patients ***(Salcedo et al.,1999) and (Midoro-Horiuti et al., 2001).***

Profilin is a representative pan-allergen. It has an actin-binding property, and every eukaryotic cell contains structurally related profilin. Because of its structural conservatism, profilin can provide common epitopes that are at the root of the extensive cross-reactivity ***(Vieths, 1997)***. It is the sensitizing agent responsible for many forms of plant-derived food allergies, which probably accounts for the fact that banana allergy occurs frequently in patients with pollinosis ***(Breiteneder and Ebner, 2000)***. Ragweed-sensitive patients may experience symptoms when they eat banana or melon ***(Pastorello et al., 2002).***

Pathophysiology:-

IgE mediated reactions to banana have been described by several authors since the 1970s ***(Linaweaver et al., 1976)***. Several cases of anaphylactic reactions to banana have been reported ***(Tokuyama et al., 1997)*** and an adverse response to banana in a 6-month-old boy was elicited via an IgE-mediated pathway, as confirmed by a skin prick test, RAST and immunoblot analysis ***(Akemiito et al., 2006).***

Immediate-type allergies are a result of chemical reactions that follow the interaction of antigenic proteins with IgE antibodies attached to the receptor on the surface