

## IS AGE A RISK FACTOR FOR BANANA ALLERGY IN CHILDREN?

Griselda Korçari <sup>\*1</sup>, Mirela Lika (Çekani)<sup>2</sup>, Artan Trebicka<sup>3</sup>

<sup>1</sup> Aldent University, Department of Technical Medical Laboratory and Imaging, Faculty of Medical Technical Sciences, Tirana, Albania, e-mail [Griselda.zacaj@ual.edu.al](mailto:Griselda.zacaj@ual.edu.al)

<sup>2</sup> University of Tirana, Department of Biology, Faculty of Natural Sciences, [mirela.lik@fshn.edu.al](mailto:mirela.lik@fshn.edu.al)

<sup>3</sup> University of Tirana, Department of Biology, Faculty of Natural Sciences, [atrebicka@yahoo.it](mailto:atrebicka@yahoo.it)

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**Abstract** – Banana is a source of bioactive components (fibers, carbohydrates, vitamins, minerals, antioxidants) which are important for the immune system as well as in the prevention of various diseases. Apart from its benefits, this fruit also causes allergic reactions. Banana fruit allergy results from an abnormal immune response to banana protein immediately after its consumption

**Material and method.** Our study was carried out in the city of Tirana in March-May 2024. This study is random and 93 children aged 0-12 years participated. Each of them underwent a specific IgE test to detect the level of IgE for this allergen. For the quantitative determination of IgE, the indirect ELISA method with Polycheck reagents was used.

### Results of the study

The total number of patients is 93, with the same percentage of women and men: 49.5% and 50.5%. The age group 0-3 years had the highest number of cases with positive IgE for each allergen.

The laboratory results of specific IgE were processed with the SPSS version 21 program from Which resulted: There is a weak but statistically significant negative correlation between age and positive reactions to banana. It was also shown that there is no statistical relationship between gender and positive IgE.

**Conclusions:** this study shows a high prevalence of banana allergy in children. However, in the interpretation of this result, different natural, climatic and environmental factors must be taken into consideration, as well as the cross reactions of this allergen with other food and inhalant allergens.

*Keywords* – banana, children, age, specific IgE

## I. INTRODUCTION

The perennial herb known as the banana (*Musa acuminata/sapientum/paradisiaca*) is primarily found in tropical climates. The countries that produce the most bananas worldwide are Ecuador, Brazil, China, India, and the Philippines. Throughout the world, people often eat bananas because of their great nutritional value. Babies are frequently given bananas at a very young age because they are high in vitamins, minerals, and fiber (1). Bananas, however, have been known to trigger allergic reactions in certain people. Babies who

are exposed to allergens related to bananas at a young age may be susceptible to developing a sensitivity to bananas.

### Allergenic molecules

Banana contains a large number of different potential allergens such as pathogenesis related (PR) proteins: PR5 thaumatin-like, PR2 endo- $\beta$ -1,3-glucanase, PR8 class III chitinase in addition to jacalin-related lectin (2). To date, 6 allergenic proteins from *Musa acuminata* has been listed officially in the database of the World Health Organization/International Union of Immunological Studies (WHO/IUIS) Allergen Nomenclature Sub-Committee (3).

The table below provides detailed information on the allergenic proteins identified by WHO/IUIS:

Allergen	Biochemical Name	Molecular Weight	Allergenicity
Mus a 1	Profilin	15	Sensitive to heat and gastric digestion (4). High cross-reactivity with Bet v 2 (birch profilin) and Hev b 8 (latex profilin) (4, 5).
Mus a 2	Class I chitinase	33	Major banana allergen (4). Two identified isoforms with hevein-like domain (4, 6). The two purified isoforms (32 kDa and 34 kDa) gave a positive SPT in more than 50% of banana allergic patients (4, 6).
Mus a 3	Non-specific lipid transfer protein type 1 (nsLTP1)	9	PR-14 family of proteins (4).
Mus a 4	Thaumatin-like protein	20	Major allergen in pediatric patients (7). PR-5 family of proteins and is non-glycosylated (4).
Mus a 5	Beta-1,3-glucanase	30	
Mus a 6	Ascorbate peroxidase	27	

## II. MATERIALS AND METHOD

This study is retrospective and randomized. The 93 children who were present at the Geniuslab laboratory in Tirana between the ages of 0 and 12 comprise the study population. Of them, 46 are female and 47 are males. Information was gathered on IgE levels, food allergy type, sex, and age

### Analyzing the sample

To perform the specific IgE test, the serum collected from the gel tubes was used as a sample. For each patient, specific IgE was measured with a panel of 30 different allergens. The measurement of specific IgE was performed with the Indirect ELISA method using Policheck LOT 18 REF.WB05 reagents. The analysis of the tests was carried out according to the laboratory protocols related to the pre-analytical, analytical and post-analytical phases. Results were translated into potential IgE levels, using standards and calibration curves defined by the reagent manufacturer.

III. RESULTS

Table 1. The frequencies and percentages of patients in the study by gender can be seen in the table below:

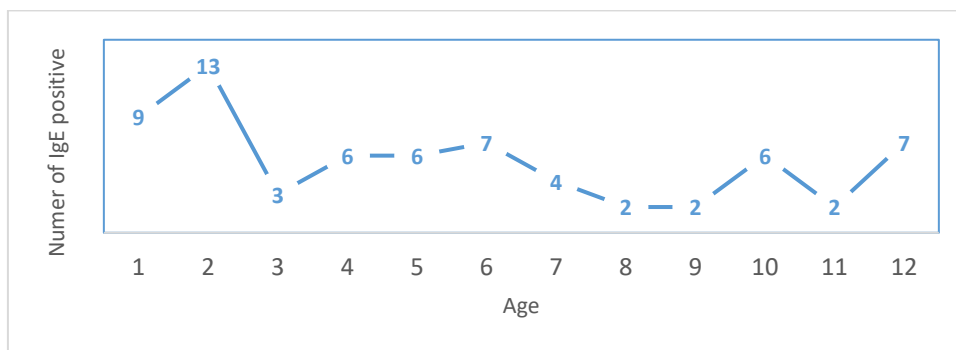
Distribution of patients in the study according to gender			
		Frequency	Percentage
Valid	Female	46	49.5
	Male	47	50.5
	Total	93	100.0

There are ninety-three patients in all; the percentages for males and women are 49.5% and 50.5%, respectively.

Table 2 Shows the number of patients by age group that tested positive for the allergen banana.

Age group of patients	IgE positive for Bananas
0-3 years old	25
3-6 years old	19
6-12 years old	23

Banana sensitivity appears to vary with age and may be influenced by numerous causes, as evidenced by the drop in banana allergy from ages 0–3 to 3–6 and the apparent small rise in the 6–12 age group.



Graph No. 1 shows the distribution of bananas' positive IgE levels with age.

Based on the laboratory data, it can be observed that the age of two years old is associated with the highest number of cases with positive IgE, which is also corresponds with the immune system's maturation phases.

Table No. 3 shows the Pearson's correlation analysis of the age-positive IgE to banana association.

Correlations			
		Age	Banana
Age	Pearson Correlation	1	-.249*
	Sig. (2-tailed)		.016
	N	93	93
Banana	Pearson Correlation	-.249*	1
	Sig. (2-tailed)	.016	
	N	93	93

\*. Correlation is significant at the 0.05 level (2-tailed).

The statistical processing in SPSS version 21 indicates that age and positive IgE from bananas have a weakly negative association. There is a slight tendency for the values of IgE Positive to Bananas to decline with age.

Table no 4: Independent t-test results comparing gender-specific levels of positive IgE to banana

Independent Samples Test										
		Levene's Test for Equality of Variances		t-test for Equality of Means						
		F	Sig.	t	df	Sig. (2-tailed)	Mean Difference	Std. Error Difference	95% Confidence Interval of the Difference	
									Lower	Upper
B a n a s	Equal variances assumed	.401	.528	-.373	91	.710	-1.70566	4.57739	-10.79809	7.38677
	Equal variances not assumed			-.372	89.867	.711	-1.70566	4.58191	-10.80860	7.39728

There is no statistically significant difference in the mean of positive IgE to banana between males and females, as indicated by the p-value of 0.710, which is substantially more than 0.05. This shows that in this child sample, gender had no apparent effect on the prevalence of positive IgE to banana.

#### IV. DISCUSSION

In our study, based on laboratory data of specific IgE values, it was found that the age group of 0-3 years (25 cases) has the largest number of children with positive reactions to bananas. This may suggest that young children are more likely to have allergies to this fruit. The reason may be that their immune system is still developing and may be more sensitive to allergens. It also revealed that the age of 2 years had the highest prevalence in this age group. This result can be related to the time of starting solid food for children.

It was also noticed that in the age group of 3-6 years (19 cases) there was a decrease in the number of children with positive reactions to bananas. This may indicate that some children may have become more tolerant to bananas as their immune systems strengthen and adapt to exposure to different foods. Likewise, we again had an increase in the number of cases in the 6-12 age group (23 cases), although it is not as high as in the 0-3 age group. This change may be related to various factors, including changes in dietary habits and other environmental factors that may affect sensitivity to allergens as well as cross-reactions to this allergen with other inhalant allergens. To understand more about the tendency of this allergy with the change of the patient's age, the laboratory results of specific IgE were processed with the statistical program SPSS version 21 Pearson's correlation to evaluate whether or not there is a significant relationship.

Statistical analysis, using Pearson's correlation coefficient, shows a weak negative but statistically significant association between age and positive IgE to banana ( $r = -0.249$ ,  $p = 0.016$ ). This implies that with increasing age, there is a tendency for banana sensitivity to decrease, although this association is not very strong.

## V. CONCLUSION

In this retrospective study, 93 children of pediatric age (0-12 years) with equal gender distribution (46 females and 47 males) were included. This shows a balanced representation of children by gender, ensuring a reliable analysis of the results according to this factor.

Data show a variation in susceptibility to banana allergy between age groups. Children in the age group of 0-3 years have the highest prevalence of allergy (25 cases), suggesting that this age group is more sensitive to this allergen. While children in the age group of 3-6 years show a decrease in the number of cases (19 cases), suggesting an increase in tolerance to bananas with increasing age. However, in the age group of 6-12 years, the number of cases increases slightly (23 cases), suggesting other influencing factors such as changes in the food diet and cross-reactions between similar allergens.

Also, from this study, it was found that there is no connection between gender and allergic reaction from banana, which means that this reaction manifests equally in both sexes.

The results suggest that susceptibility to banana allergy is higher in younger children, which may have implications for dietary management and prevention of food allergies in this age group. Meanwhile, the decline in sensitivity with age suggests a possible adaptation of the immune system.

While this study provides important data on the prevalence of banana allergy, the weak correlation suggests that other factors may play an important role in the development of food allergies.

## ACKNOWLEDGMENT

The heading of the Acknowledgment section and the References section must not be numbered.

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