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Positive Allergic History as a Determinant the Introduction of Potentially Allergenic Foods into the Diet of Infants

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ABSTRACT

Background: In 2008, several international associations presented the new nutritional recommendations for the prevention of allergic diseases. The changes in the recommendations are concerned the length of breastfeeding, the age of the integration of first weaning food and the introduction of potentially allergenic foods into the infant diet.

Aim: The goal of the research was to assess the effect of family history of allergy to introduce first weaning food and potentially allergenic foods into the infant diet.

Methods: In the period October 2011 to April 2012, we performed the cross-sectional study in 405 Slovak mothers. The children of the respondents were grouped in two categories: children with allergic predisposition and children without allergic predisposition. We used Mann-Whithey test and logistic regression.

Results: The age of the integration the first weaning food was not different with respect to allergic predisposition of children. Citrus fruit, the fish, egg white, yogurt, cheese, cottage cheese, and cow's milk were integrated statistically sooner in children without allergic predisposition, while kefir milk statistically sooner in children with allergic predisposition.

Conclusions: Despite the existence of new preventive recommendations, the mothers introduced of potentially allergenic foods by old recommendations. It is therefore necessary to raise awareness of careers of children about new nutritional preventive procedures.

KEY WORDS

allergic predisposition, weaning food, infant, potentially allergenic foods

INTRODUCTION

Food allergy is often the first manifestation of the atopic disease and its incidence is accumulated in the first three years. With increasing age of the child leads to extinction of food allergy to produce oral tolerance. However, they appear to other allergic diseases as atopic dermatitis, allergic rhinitis or bronchial asthma (1, 2). The genesis of allergic disease depends on genetic predisposition, environmental factors, early allergen exposure and the development of tolerance (3). Therefore, it is assumed that the primary prevention of food allergy (and other allergies indirectly) can be realized by dietary practices in the first years of a child's life, particularly in children of high-risk for the development of allergy.

In 2000, the American Academy of Pediatrics (AAP) recommended to breastfeed six months, the first weaning foods should be integrated after 6 months of age, cow's milk at 12 months, eggs at 24 months, peanuts, nuts and fish/seafood at 36 months of age in preventing the development of allergies (4, 5). Since the results of studies (6, 7, 8) pointed that delaying introduction of this foods in children' diet increased risk of development of allergic diseases, it raised the question whether a earlier introduction of allergenic foods is a preventive strategy.

In connection with that in 2008, major international organizations (AAP, ESPGHAN, ESPACI, SP-EAACI) changed the character of nutritional preventive advices (9, 10, 11). For high-risk children, the recommended introduction of the first weaning food aged 4–6 months (9), respectively between the 17–26 week (10), and it is not necessary to delay the integration of allergenic foods in the infant' diet. Despite these changes in the nutritional preventive advices of international organizations, we assumed that these findings are not sufficiently known by careers of children, and that the character of the children diet predisposed to allergy development is different to compared to children without predisposition.

OBJECTIVES

The aim of the research was to assess whether a family allergic history determines the age of the introduction of the first weaning food and the introduction of potentially allergenic foods into the infant' diet by the mother. At the same time, we analyzed the frequency of consumption of potentially allergenic foods at 12 months of age with respect to the family allergic history.

METHODOLOGY

The research was conducted in the period October 2011 to April 2012. The questionnaires were distributed to paediatricians' offices (practitioners providing care for children and adolescents), maternity/family centers, and pre-school facilities within the territory of the Slovak Republic.

The following criteria were determined for the selection of the respondents:

- *inclusion criteria*: caregivers of an infant 12 months of age (maximum 16 months), whereby for the purpose of this research, a caregiver represents a person taking care of an infant for most of the day during the period of non-milk/complementary feeding,
- *exclusion criteria*: respondents' infants should not have been diagnosed with a chronic disease requiring a specific approach to feeding.

The questionnaire was used in descriptive cross-sectional study. The questionnaire integrating items of our own design assessed:

- age of introduction of the first weaning food (item is indicated in months),
- age of introduction of potentially allergenic foods – citrus fruits, nuts, fish, egg white, cow's milk, milk products (item is indicated in months),
- frequency of consumption of potentially allergenic foods at 12 months of age (possible range: 1–10, „1" – never, „10" – 6+ per day).

Respondents reported data to the questionnaire retrospectively. At the time of completing the questionnaire, the respondents´ youngest infants were 12–15 months of age.

Children of respondents were divided in two categories on the basis of allergic family history:

- children with a positive allergic family history (n – 147, 36.3%) (ie. children with allergic predisposition),
- children without a positive allergic family history (n – 258, 63.7%) (ie. children without allergic predisposition).

This categorization was based on the recommendations of the AAP and SP-EAACI (9, 11) about the high-risk children – children with at least one first-degree relatives with allergic diseases.

For statistical processing of data obtained, SPSS 17.0 software were used. We assessed the normality of data distribution by Skewness test and because of the negative outcome we used nonparametric test – Mann-Whitney test. To identify the odds ratio (OR) we used the method of logistic regression, with 95% confidence interval (CI). To evaluate statistical significance, a significance level of $p < 0.05$ was applied.

Respondents participated in the research voluntarily, research was conducted with ensuring their anonymity and data were treated confidentially.

The research sample consisted of 405 respondents – mothers aged 18 to 44 years (M – 28.45, SD – 4.74). A university degree had 47.9% of mothers and 42.2% had secondary education with GCEs. 90.9% of mothers were married. Respondents were predominantly from Prešov region (56.0%) and Košice region (20.5%) (Table 1). The average birth weight of children respondents was 3331.13 g (SD – 501.82). Among the all the children were 215 (53.1%) girls and 190 (46.9%) boys.

Table 1 Characteristics of mothers

variables of mothers	n (%)
maternal age of mothers	
≤ 24 years	86 (21.2)
25–30 years	192 (47.4)
31–35 years	99 (24.4)
36–40 years	24 (5.9)
≥ 41 years	4 (1.0)
maternal education	
vocational course	20 (4.9)
secondary education without GCEs	20 (4.9)
secondary education with GCEs	171 (42.2)
university	194 (47.9)
marital status	
married	368 (90.9)
divorced	3 (0.7)
widow	0 (0.0)
single	17 (4.2)
cohabiting with partner	17 (4.2)
place of residence	
Banská Bystrica region	5 (1.2)
Bratislava region	19 (4.7)
Košice region	83 (20.5)
Nitra region	0 (0.0)
Prešov region	227 (56.0)
Trenčín region	21 (5.2)
Trnava region	21 (5.2)
Žilina region	29 (7.2)

RESULTS

Among children with allergic predisposition, the average age of introduction the first weaning food was slightly later (M – 5.61, range: 3–10 months) than in children without the risk of developing allergies (M – 5.39, range: 1–10 month) (z: –1.708, p = .088), but the differences are not statistically significant. At the same time, we found that among respondents whose children are at risk for developing allergic disease is almost 2-fold increased risk (OR: 1.926) of early introduction of first weaning food, ie. ≤ 4th month (p = .012) (Table 2). Early introduction of first weaning food was noted in 24.5% of mothers of children at risk of developing allergies and 75.5% of mothers of children without risk of allergy.

In children with allergic predisposition, we found statistically later introduction of citrus fruits, fish and cows' milk protein (egg white, yogurt, cheese, cottage cheese, cow's milk). In this group of children, we also found a significantly earlier introduction of kefir/acidophilic milk. Although nuts was integrated later in the children's diet with predisposition to allergy in comparison with children without predisposition, but it was not a statistically significant difference (Table 3).

All foods integrated in the study, except kefir milk, were also consumed at a lower rate within 12 months of age in children with predisposition to allergy. The significance we identified in fish, egg white, cow's milk and kefir/acidophilic milk (Table 3).

Table 2 Early introduction of first weaning food with respect of children allergic predisposition

	OR (95% CI)	sig.
	Age of introduction of first weaning food: ≤ 4th month	
children with allergic predisposition	1	
children without allergic predisposition	1.926 (1.158–3.202)	.012*

Legend: Reference group: age of introduction of the first weaning food ≥ 5th month

Tabl 3 Age of introduction potentially allergenic foods to infant diet and their consumption in 12 months

variable	introduction of foods into child's diet			frequency of food consumption at 12 months		
	M ■	z	sig.	M ■■	z ■■■	sig.
citrus fruits						
children with allergic predisposition	12.22	–2.762	0.006*	1.90	–1.958	0.050
children without allergic predisposition	11.77			2.09		
fish						
children with allergic predisposition	11.54	–2.415	0.016*	2.12	–2.107	0.035*
children without allergic predisposition	11.14			2.37		
egg white						
children with allergic predisposition	11.86	–3.616	<0.000*	2.16	–4.142	<0.000*
children without allergic predisposition	11.22			2.80		
nuts						
children with allergic predisposition	12.88	–1.106	0.269	1.16	–0.303	0.762
children without allergic predisposition	12.75			1.22		
yoghurt						
children with allergic predisposition	9.06	–2.081	0.037*	5.20	–0.549	0.583
children without allergic predisposition	8.54			5.34		
cheese						
children with allergic predisposition	10.85	–2.800	0.005*	3.69	–0.176	0.861
children without allergic predisposition	10.14			3.77		
cottage cheese						
children with allergic predisposition	11.17	–3.630	<0.000*	2.71	–1.891	0.059
children without allergic predisposition	10.32			3.03		
kefir/acidophilic milk						
children with allergic predisposition	12.38	–2.278	0.023*	1.56	–2.361	0.018*
children without allergic predisposition	12.59			1.36		
cow's milk						
children with allergic predisposition	12.04	–2.662	0.008*	2.62	–2.315	0.021*
children without allergic predisposition	11.67			3.45		

Legend: ■ Average values are indicated in months. ■■ Answers: 1: never, 2: 1 per month, 3: 2–3 per month, 4: 1–2 per week, 5: 3–4 per week, 6: 5–6 per week, 7: once a day, 8: 2–3 per day, 9: 4–5 per day, 10: 6+ per day. ■■■ z-score (Wilcox test)

DISCUSSION

The introduction of weaning foods into infant's diet should take into account several aspects such as the nutritional aspect (12), psycho-social aspect (13) and allergy-aspect (14). Although the data collection from respondents was conducted several years after the presentation of new nutritional recommendations for the prevention of allergies, we assumed that the mothers of children will not be known and will not even practiced these new recommendations, which we validated.

The average age of the introduction of first weaning food in children with allergy predisposition and without allergy predisposition was similar – about 51/2 months. Therefore, age of introduction first weaning food was not differ with respect to allergic history, but the likelihood of early implementation of the first weaning food (ie. ≤ 4th month) is almost twice as high (OR: 1.926, $p < .012$) in children without allergic predisposition. Mothers of children who are at risk for allergy have not a high tendency to early introduction of the first weaning foods. Significantly early introduction of weaning foods into the infant diet is associated with some risks such as replaces breast milk, its lower production, increased risk of gastrointestinal disorders, food allergies and intolerances (15), a higher osmotic load of kidney (16). Turati et al. (2016) demonstrated that the introduction of weaning foods in 5 months of age is associated with a lower risk of atopic dermatitis. This association was demonstrated in children with and without a positive allergic family history (23).

The comparison of age the introduction of first weaning food with respect to allergic history with other studies produced different results. While in the Swedish study, no significant differences was identified in the age of introduction of weaning food with respect to allergic predisposition (risk children: M – 4.6; children without risk: M – 4.7) (17), Rebhan et al. (2009) (18) found that mothers of German children with allergic predisposition introduced the first weaning food statistically later in comparison with children without risk.

The average values of the introduction of potentially allergenic foods indicate relatively late integration these foods in the diet of a child (an average of from 8.5 to 12.5 months of age), regardless of allergic predisposition. Despite the research results, we identified a certain degree of carefulness mothers of children at risk, because they give most potentially allergenic foods (except nuts) to their child significantly later. The later integration of the investigated foods was reflected on lower frequency of their consumption at 12 months of age, where consumption of fish, egg white and cow's milk was statistically lower in children with predisposition. Other studies also have identified the differences in the integration of certain foods (ie. the frequency of their intake) in children with and without the allergy risk. Earlier introduction of the fish was recorded in the Swedish family without the allergy risk ($p < .001$) (19). In another Swedish study, high-risk infants consumed fish (42.7% versus 69.6% in controls, $p < .001$), and eggs (29.4% vs 45.1%, $p < .001$) less likely in the first year of life (20). Nware et al. (2013) among Finnish children (n – 3781) pointed out that the introduction of fish < 6 months and eggs ≤ 11 months resulting in decreased risk of sensitisation to those foods. The results are shown predominantly in high-risk children (24). The prevalence of peanut allergy (0% versus 2.5%, $p = .003$) and allergy to eggs (1.4% versus 5.5%, $p = .009$) was lower in breastfed infants with early introduction weaning foods compared with children who were introduced this foods around 6 months (25). Earlier introduction of potentially allergenic foods, as is illustrated by the recommendations of international associations, as appropriate preventive procedure, but it should be noted that in practical terms it is a practice relatively complicated. Perkin et al. (2016) investigated whether it is possible to introduce more allergenic foods in the diet of children earlier (ie. before 6 months). They found that the integration of a greater number of food is not quite easy (it was 6 potentially allergenic foods in the study), but achievable, and does not affect breast-feeding (26).

Delayed of the integration of potentially allergenic foods into the child's diet, in order to prevent of allergy, may be associated with other negative impacts. It is important to consider the possible consequences of delaying or preventing access to specific foods. E.g. lower intake of omega-3 polyunsaturated fatty acids may have an impact on cognitive development and immune function of the child. Current evidence support a protective role early introduction of omega 3 fatty acids, and therefore raises the question of advantages and disadvantages of introduction of fish as the richest source of these fatty acids (10).

All foods analyzed were integrated into the children's diet predisposed to allergies later, and this group of infants consumed this foods during the 12th month in a lower frequency, with exception the kefir/acidophilic milk. We found that kefir/acidophilic milk was introduced in children with allergic predisposition significantly earlier and frequency of its intake in the 12th month was statistically higher in this group of children. Although the introduction of the lactic acid products have been reported in the small number

of children (17.2%), this data we evaluate positively when taking into account the research results, which show a positive association between intake of prebiotic/probiotic cultures and immunological parameters, which can be seen as a form of prevention of early manifestations of allergy (21, 22).

LIMITATIONS

Limitation of the research: respondents – mothers of children – reported data retrospectively.

CONCLUSIONS

Despite the existence of new prevention procedures, mother's practices are directed by old, earlier recommendations. It can be assumed that the awareness of mothers by health professionals is not sufficient, respectively the mother's fears from allergic disease in their child are so significant that they did not conform to new preventive interventions and did not respected them fully. Therefore it is important that health professionals have modified the attitude of mothers by properly chosen education, and they coordinated them in the diet of infant in terms of prevention of allergic diseases.

ABBREVIATIONS

AAP – American Academy of Pediatrics
ESPACI – European Society for Pediatric Allergology and Clinical Immunology
ESPGHAN – European Society for Pediatric Gastroenterology, Hepatology and Nutrition
SP-EAACI – Section on Pediatrics, European Academy of Allergology and Clinical Immunology

REFERENCES

1. Abaffyová Z, Rennerová Z, Jeseňák M, Kossárová K. Prevencia potravinovej alergie – nové odporúčania odborných spoločností. Pediatria. 2009;4(6):296-301.
2. Fuchs M. Lze alergiím předcházet? Pediatria pre prax. 2009;10(3):122-7.
3. Čierna I. Prevencia potravinovej alergie. Pediatria pre prax. 2009;10(4):184-8.
4. American Academy of Pediatrics: Hypoallergenic Infant Formulas. Pediatrics 2000;106(2):346-9.
5. Zeiger RS. Food Allergen Avoidance in the Prevention of Food Allergy in Infants and Children. Pediatrics. 2003;111(6):1662-71.
6. Alm B, Aberg N, Erdes L, Möllborg P, Pettersson R, Norvenius SG, Goksör E., et al. Early introduction of fish decreases the risk of eczema in infants. Arch Dis Child. 2009;94(1):11-5.
7. Snijders BE, Thijs C, van Ree R, van den Brandt PA. Age at First Introduction of Cow Milk Products and Other Food Products in Relation to Infant Atopic Manifestations in the First 2 Years of Life: The KOALA Birth Cohort Study. Pediatrics. 2008;122(1):115-22.
8. du Toit G, Katz Y, Sasieni P, Mesher D, Maleki SJ, Fisher HR, Fox AT., et al. Early consumption of peanuts in infancy is associated with a low prevalence of peanut allergy. J Allergy Clin Immunol. 2008;122(5):984-91.
9. Greer FR, Sicherer SH, Burks AW. Committee on Nutrition and Section on Allergy and Immunology: Effects of Early Nutritional Interventions on the Development of Atopic Disease in Infants and Children: The Role of Maternal Dietary Restriction, Breastfeeding, Timing of Introduction of Complementary Foods, and Hydrolyzed Formulas. Pediatrics. 2008;121(1):183-91.
10. Agostoni C, Decsi T, Fewtrell M, Goulet O, Kolacek S, Koletzko B, Michaelsen KF., et al. Complementary Feeding: A Commentary by the ESPGHAN Committee on Nutrition. J Pediatr Gastroenterol Nutr. 2008;46(1):99-110.
11. Sicherer SH, Burks AW. Maternal and infant diets for prevention of allergic diseases: Understanding menu changes in 2008. J Allergy Clin Immunol. 2008;122(1):29-33.
12. World Health Organization. Global Strategy for Infant and Young Child Feeding. First Ed. Geneva [Internet]. 2003, 37 p. [cited 2005 may 1]. Available from: http://apps.who.int/iris/bitstream/10665/42590/1/9241562218.pdf?ua=1&ua=1
13. Kudlová E, Mydlilová A. Výživové poradenství u dětí do dvou let. Praha: Grada, 2005; 148 s.
14. Fiocchi A, Assaad A, Bahna S. Food allergy and the introduction of solid foods to infants: a consensus document. Ann Allergy Asthma Imunol. 2006;97(1):10-21.
15. Michaelsen KF, Weaver L, Branca F, Robertson A. Feeding and nutrition of infants and young children. Guidelines for the WHO European Region, with emphasis on the former Soviet countries. WHO [Internet]. 2003, 296 p. [cited 2005 april 21]. Available from: http://www.euro.who.int/__data/assets/pdf_file/0004/98302/WS_115_2000FE.pdf
16. Nevoral J. Výživa v kojeneckém věku. In: Nevoral J. et al. Výživa v dětském věku. Praha: H@H, 2003; s. 105-19.
17. Mikkelsen A, Rinné-Ljunqqvist L, Borres MP, van Odijk J. Do Parents Follow Breastfeeding and Weaning Recommendations Given by Pediatric Nur-

ses? A Study With Emphasis on Introduction of Cow´s Mil Protein in Allergy Risk Families. J Pediatr Health Care. 2007;21(4):238-44.
18. Rebhan B, Kohlhuber M, Schwegler U, Koletzko BV, Fromme H. Infant Feeding Practices and Associated Factors Through the First 9 Months of Life in Bavaria, Germany. J Pediatr Gastroenterol Nutr. 2009;49(4):467-73.
19. van Odijk J, Huthén L, Ahlstedt S, Borres MP. Introduction of food during the infant´s first year: a study with emphasis on introduction of gluten and of egg, fish and peanut in allergy-risk families. Acta Paediatr. 2004;93(4):464-70.
20. Brekke HK, Ludviqsson JF, van Odijk J, Ludviqsson J. Breastfeeding and introduction of solid foods in Swedish infants: the All Babies in Southeast Sweden study. B J Nutr. 2005;94(3):377-82.
21. West CE, Hammarstrõm ML, Hernell O. Probiotics during weaning reduce the incidence of eczema. Pediatr Allergy Immunol. 2009;20(5):430-7.
22. Scholtens PA, Alles MS, Bindels JG. et al. Bifidogenic effects of solid weaning foods with added prebiotic oligosaccharides: a randomised controlled clinical trial. J Pediatr Gastroenterol Nutr. 2006;42(5):553-9.
23. Turati F, Bertuccio P, Galeone C, Pelucchi C, Naldi L, Bach JF, La Vecchia C, Chatenoud L, HYGIENE Study Group. Early weaning is beneficial to prevent atopic dermatitis occurrence in young children. Allergy. 2016 Feb 19. doi: 10.1111/all.12864.
24. Nwaru BI, Takkinen HM, Niemel ä O, Kaila M, Erkkola M, Ahonen S, Tuomi H, Haapala AM, Kenward MG, Pekkanen J, Lahesmaa R, Kere J, Simell O, Veijola R, Ilonen J, Hyöty H, Knip M, Virtanen SM. Introduction of complementary foods in infancy and atopic sensitization at the age of 5 years: timing anf food diversity in a Finnish birth cohort. Alergy. 2013;68(4):507-16.
25. Perkin MR, Logan K, Tseng A, Raji B, Avis S, Peacock J, Brough H, Marrs T, Radulovic S, Craven J, Flohr C, Lack G, EAT Study Team. Randomized Trial of Introduction of Allergenic Foods in Breast-Fed Infants. N Engl J Med. 2016; Mar 4. [Epub ahead of print].
26. Perkin MR, Logan K, Marrs T, Radulovic S, Craven J, Flohr C, Lack G, EAT Stúdy Team. Enquiring About Tolerance (EAT) study: Feasibility of an early allergenic food introduction regimen. J Allergy Clin Immunol. 2016. 2016 Feb 16. pii: S0091-6749(16)00135-4. doi: 10.1016/j.jaci.2015.12.1322. [Epub ahead of print].

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