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Food Diversity but not the Time of Solid Food Introduction Reduces Risk of Childhood Atopic Diseases: Birth Cohort from a Developing Asian Country

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Abstract

RATIONALE: Dietary habits in Asia differ from other world regions. Associations between atopic diseases and infant feeding practices in developing Asian countries remains unclear. We sought to determine relationships between the diversity of solid food introduction at age 6 months, age that allergenic food was introduced, and development of atopic diseases up to age 30 months.
METHODS: A longitudinal birth cohort study was conducted in Bangkok, Thailand. Solid food diversity (0-3,4-7,>7 foods) and allergenic food (0,1-3,4-6 foods) introduction were assessed at age 6 months. Timing of solid food introduction (<4,4-6,>6months) was assessed. Multivariate logistic regression was used for analysis.
RESULTS: We enrolled 268 children. Cumulative incidence of atopic diseases at 30 months was 46.6% including atopic dermatitis (AD) 13.1%, food allergy (FA) 6.3%, wheeze (WZ) 24.6% and chronic rhinitis (CR) 20.1%. Increased solid food diversity at age 6 months decreased risk of atopic diseases(AD+FA+WZ) in a dose-dependent manner; adjusted odds ratio[aOR] (95%CI) 0.52(0.27-0.99, 4-7 foods), and 0.11(0.01-0.90, >7 foods), respectively. Increased allergenic food diversity also significantly reduced atopic diseases risk (aOR 0.42(0.20-0.88, 1-3 foods), and 0.18(0.03-0.91, 4-6 foods)). Reduced risk of FA related to increasing diversity of solid food, aOR 0.24(0.06-1.06, 4-7 vs 0-3 foods) and allergenic food introduction with aOR of 0.15(0.03-0.65, 1-3 vs no allergenic foods) respectively. Timing of allergenic food introduction was not associated with atopic outcomes.
CONCLUSIONS: Diversity of solid food introduction including allergenic food was consistently associated with a reduction in childhood allergy, especially food allergy. Early or delayed introduction of allergenic food did not affect atopic diseases developing in our population.

Rationale

- Dietary habits in Asia differ from other world regions. Associations between atopic diseases and infant feeding practices in developing Asian countries remains unclear.
- To determine relationships between the diversity of solid food introduction at age 6 months, age that allergenic food was introduced, and development of atopic diseases up to age 30 months.

Methods

- A longitudinal birth cohort study was conducted in Bangkok, Thailand.
- Solid food diversity (0-3,4-7,>7 foods) and allergenic food (0,1-3,4-6 foods) introduction were assessed at age 6 months.
- Timing of solid food introduction (<4,4-6,>6months) was assessed.
- Multivariate logistic regression was used for analysis

Results

- Cumulative incidence of atopic diseases at 30 months was 46.6% including atopic dermatitis (AD) 13.1%, food allergy (FA) 6.3%, wheeze (WZ) 24.6% and chronic rhinitis (CR) 20.1%

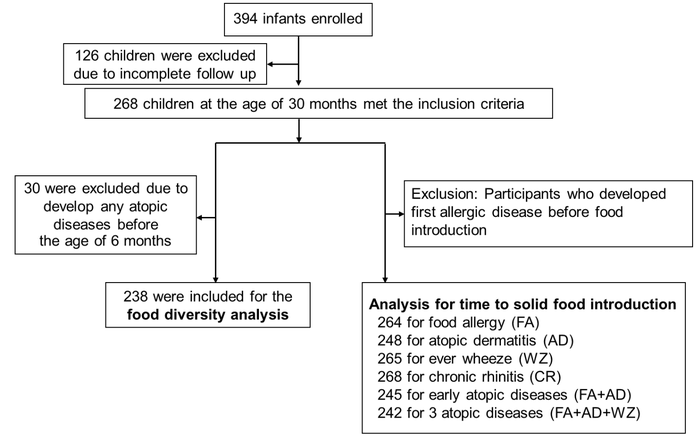

Figure 1 Study flow chart

Table 1 Association between food diversity at 6 months of age and allergic diseases

Number of foods	(Total n = 238) No. (%)	Three diseases* (n = 67), OR (95% CI)		Food allergy (n = 9) , OR (95% CI)	
		Unadjusted	Adjusted†	Unadjusted	Adjusted††
Solid food[1]					
0-3	67 (28)	1	1	1	1
4-7	157 (66)	**0.54 (0.29-0.99) P= 0.047****	**0.52 (0.27-0.99) P= 0.046****	**0.19 (0.05-0.82) P= 0.025****	0.24 (0.06-1.06) P= 0.059
8-10	14 (6)	**0.12 (0.02-0.98) P= 0.048****	**0.11 (0.01-0.90) P=0.040****	0 P=0.99	0 P=0.99
Allergenic food[2]					
0	48 (20)	1	1	1	1
1-3	175 (74)	**0.43 (0.22-0.84) P= 0.013****	**0.42 (0.20-0.88) P= 0.022****	**0.12 (0.03-0.51) P= 0.004****	**0.15 (0.03-0.65) P= 0.012****
4-6	15 (6)	**0.19 (0.04-0.97) P= 0.046****	**0.18 (0.03-0.91) P= 0.038****	0 P=0.99	0 P= 0.99

OR, Odd ratio, *Three diseases defined as having one or more of these following diseases: atopic dermatitis, food allergy or ever-wheeze
[1]Solid food comprised of rice, cow's milk, hen's egg (egg yolk and egg white), wheat, chicken, pork, seawater fish, freshwater fish, shellfish, peanut, soy and green vegetable
[2]Allergenic food comprised of egg, wheat, fish, shellfish, soy, peanut and cow's milk
**Values in boldface indicated statistical significance P<0.05; multivariate logistic regression.
†Adjusted for family socioeconomic status, antibiotics use within first 30 months of life, parental or sibling history of allergic diseases and breastfeeding duration
††Adjusted for breastfeeding duration

Table 2 Subgroup analysis of association between food diversity at 6 months of age and allergic diseases in children without family history of allergic diseases

Number of foods	(Total n = 183) No. (%)	Three diseases* (n = 49), OR (95% CI)		Ever wheeze (n = 40) , OR (95% CI)	
		Unadjusted	Adjusted†	Unadjusted	Adjusted†
Allergenic food[1]					
0	36 (20)	1	1	1	1
1-3	136 (74)	**0.33 (0.15-0.71) P= 0.005****	**0.28 (0.12-0.62) P= 0.002****	**0.30 (0.14-0.67) P= 0.003****	**0.25 (0.11-0.59) P= 0.001****
4-6	11 (6)	**0.11 (0.01-0.97) P= 0.046****	**0.09 (0.01-0.79) P= 0.03****	0.14 (0.02-1.21) P=0.07	**0.11 (0.01-0.98) P= 0.048****

OR, Odd ratio, *Three diseases defined as having one or more of these following diseases: atopic dermatitis, food allergy or ever-wheeze
[1]Allergenic food comprised of egg, wheat, fish, shellfish, soy, peanut and cow's milk
**Values in boldface indicated statistical significance P<0.05; multivariate logistic regression.
†Adjusted for antibiotics use within first 30 months of life and breastfeeding duration

Of these 268 infants, majority of them were introduced both complementary (92.9%) and allergenic food (88.8%) between age 4 and 6 months. Twelve infants (4.5%) were introduced to solid food before age 4 months and 10 (3.7%) infants were introduced to allergenic food before age 4 months.

Time to solid food introduction including allergenic food was not associated with atopic outcomes.

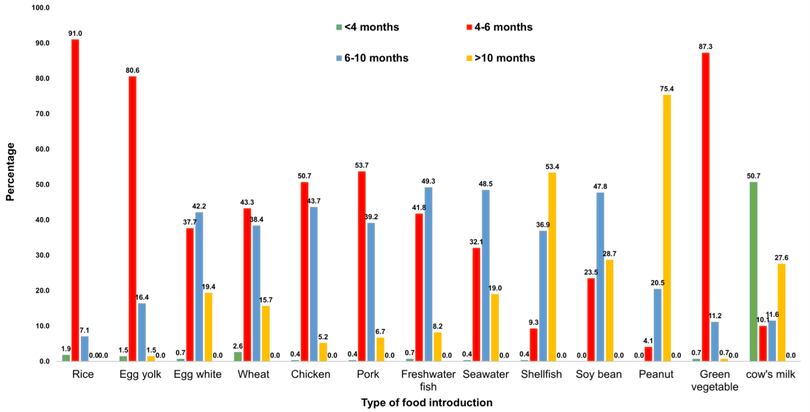

Figure 2 Timing introduction of complementary foods

However, we found the decreased risk of developing food allergy (0.13(0.02-1.00), early atopic diseases (FA+AD) (0.26(0.08-0.83)) and 3 diseases (FA+AD+WZ) (0.46(0.25-0.84)) in children who had early introduction of wheat (4-6 months) compared to children whom wheat was introduced at age >6 months. The same association with other foods was not shown **(Figure 3)**.

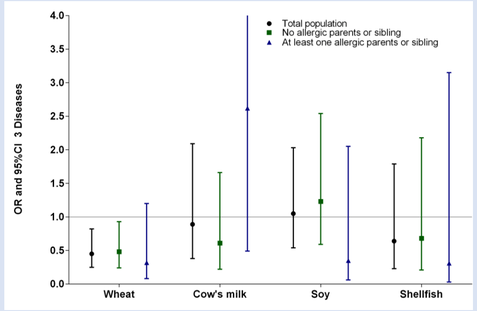

Figure 3 Association between food item introduction in the first 6 months of life and 3 atopic diseases*
*Three atopic diseases defined as having one or more of these following diseases: atopic dermatitis, food allergy and ever-wheeze
**Adjusted for family socioeconomic status, parental or sibling history of allergic diseases and breastfeeding duration in total population.

Conclusions

Diversity of solid food introduction including allergenic food was consistently associated with a reduction in childhood allergy, especially food allergy. Early or delayed introduction of allergenic food did not affect atopic diseases developing in our population.

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