

Association Between Food Allergy and Microbiome Status in 1-Year-Old Infants in STRONG Kids 2 Cohort

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INTRODUCTION

- Up to 8% of infants and young children in the world are diagnosed with food allergy (FA).
- Many studies have focused on the relationship between FA and environmental factors that modify the gut microbiome.
- However, studies on a direct link between FA and gut microbiome in infants are limited.

AIM

The research aimed to determine the association between suspected FA in 12-month-old infants enrolled in the STRONG kids 2 cohort and the composition of their fecal microbiome at five points in the first year of life.

METHODS

Data Collection

- STRONG Kids Program 2 parent survey completed at 1 year old

“Has your baby ever had problems caused by food, such as an allergic reaction, sensitivity, or intolerance?”

“Does your child have an allergy or sensitivity to any of the following foods?”

- Yes → infants with suspected (FA)
- No → matched control (CON)

- Parents collected fecal samples from their infants at 1 week, 6 weeks, 3 months, 5-7 months (1 month after the introduction to solid food, ITS) and 12 months of age.

RESULTS

Infant General Characteristics

	Control (CON) (n=49)	Food Allergy (FA) (n=38)	P Value
Female Gender	24 (49.0%)	18 (47.4%)	0.881
Race/Ethnicity			
Non-Hispanic/Latino White	42 (91.3%)	26 (76.5%)	0.066 (trend)
Non-Hispanic/Latino Non-White	4 (8.7%)	8 (23.5%)	
Hispanic/Latino	0 (0%)	1 (2.9%)	
Delivery Method			
Vaginal	37 (75.5%)	29 (76.3%)	0.931
C-Section	12 (24.5%)	9 (23.7%)	
Birth Weight (kg)	3.40±0.56	3.45±0.44	0.658
Birth Length (cm)	51.23±2.42	50.88±2.68	0.518
Birth Weight-for-Length Z-score	-0.85±1.16	-0.40±1.20	0.083 (trend)
Feeding Method			
1wk			
BF	35 (71.4%)	29 (76.3%)	0.829
FF	4 (8.2%)	2 (5.3%)	
Both	10 (20.4%)	7 (18.4%)	
6wk			
BF	33 (67.3%)	26 (68.4%)	0.970
FF	6 (12.2%)	5 (13.2%)	
Both	10 (20.4%)	7 (18.4%)	
3mo			
BF	32 (63.3%)	23 (60.5%)	0.725
FF	8 (16.3%)	8 (21.1%)	
Both	9 (18.4%)	5 (13.2%)	
Antibiotic Usage			
6wk (Yes)	1 (2.2%)	0 (0%)	0.375
3mo (Yes)	0 (0%)	0 (0%)	
ITS (Yes)	2 (4.9%)	4 (12.1%)	0.368
12mo (Yes)	3 (7.3%)	5 (13.5%)	

Data Analysis

- Population Characteristics Gender
- Race/ethnicity
- Delivery method
- Birth weight (kg), length (cm) and Weight-for-Length Z-score
- Feeding Method (1wk, 6wk and 3mo)
- Antibiotic Usage (6wk, 3mo, ITS, 12mo)

Fecal Microbiota Profile Analysis

- DNA were extracted from fecal samples by QIAamp Fast DNA Stool Mini Kit
- Real-time quantitative PCR (RT-qPCR) to specify specific bacteria genera associated with increased risk of FA (*Bifidobacterium spp.*, *Lactobacillus spp.*, *Clostridium perfringens*)

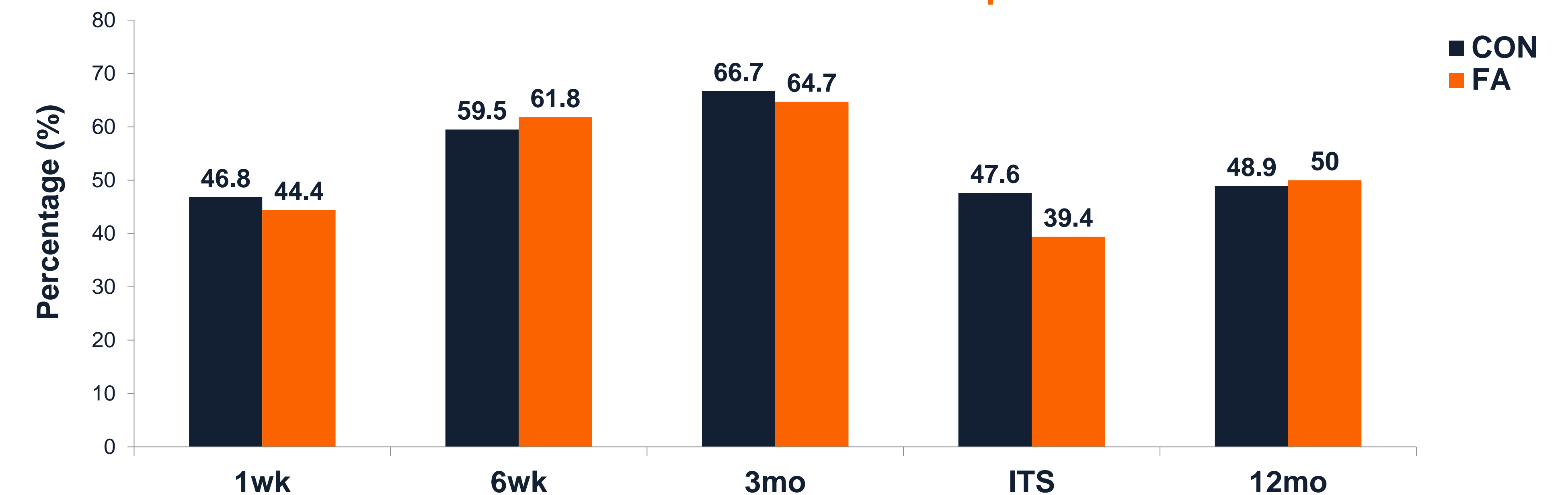
Median *Bifidobacterium spp.* in 1wk, 6wk, 3mo, ITS and 12mo Infant Fecal Samples

	Control (CON) (n=49)	Food Allergy (FA) (n=38)	P-Value
	Log ₁₀ 16S rRNA gene copies/g		
1wk (25th, 75th)	6.59 (5.99, 9.47)	9.68 (6.71, 10.03)	0.010*
6wk (25th, 75th)	9.46 (8.17, 9.94)	9.65 (9.17, 10.17)	0.324
3mo (25th, 75th)	9.31 (7.04, 9.90)	9.89 (9.34, 10.37)	0.080 (trend)
ITS (25th, 75th)	9.78 (7.64, 10.23)	9.84 (9.20, 10.22)	0.759
12mo (25th, 75th)	9.86 (9.35, 10.20)	9.50 (8.93, 10.07)	0.184

Median *Lactobacillus* in 1wk, 6wk, 3mo, ITS and 12mo Infant Fecal Samples

	Control (CON) (n=49)	Food Allergy (FA) (n=38)	P-Value
	Log ₁₀ 16S rRNA gene copies/g		
1wk (25th, 75th)	5.74 (4.92, 7.08)	5.51 (4.92, 7.94)	0.870
6wk (25th, 75th)	6.34 (4.92, 7.94)	5.94 (4.92, 7.66)	0.722
3mo (25th, 75th)	6.97 (5.50, 7.99)	5.88 (4.92, 8.01)	0.282
ITS (25th, 75th)	6.93 (5.09, 8.61)	7.10 (5.45, 8.66)	0.917
12mo (25th, 75th)	7.38 (6.17, 8.30)	6.33 (5.08, 8.55)	0.319

Percentage of Infants with Detectable *C. perfringens* in 1wk, 6wk, 3mo, ITS and 12mo Infant Fecal Samples



RESULTS & CONCLUSIONS

- There were no differences in population characteristics between FA and CON, there tended ($p=0.066$) to be a higher number of non-white children in the FA group and their weight-for-length z-score tended ($p=0.083$) to be greater at birth.
- Bifidobacterium spp.* abundance was higher in FA than CON infants at 1 wk of age ($p=0.010$) and tended ($p=0.080$) to be higher at 3 mo of age. Thus, higher *Bifidobacterium spp.* in early postnatal life may be a risk factor in the development of FA.
- No significant differences in *Bifidobacterium spp.* between FA and CON were observed at 6 wk, 3 mo, ITS or and 12 mo of age
- No significant differences in *Lactobacillus spp.* abundance or the presence of *Clostridium perfringens* were observed between FA and CON at any time point.

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