Nutritional Deficiencies and Their Effect on Early Childhood Caries

Trisha Desai, Rua Milaeh, Christine Chiao, and Keri Discepolo
Department of Pediatric Dentistry, Boston University Henry M. Goldman School of Dental Medicine, Boston, MA

Boston University Henry M. Goldman School of Dental Medicine

Background

- Early childhood caries (ECC) is the most common infectious disease in children. The etiology of ECC is multifactorial, including microbiological, behavioral, and socioeconomic factors, with dietary habits and overall nutritional status playing a significant role in ECC prevalence. Inadequate nutrient intake can alter the balance of the oral microbiome and impair the integrity of cells essential for tooth development, increasing susceptibility to caries (1, 2)
- Failure to thrive (FTT), now referred to as growth faltering, has both systemic and developmental etiologies. Nutrition and oral health have a bidirectional relationship as poor oral health can lead to discomfort resulting in inadequate caloric intake and avoidance of nutrient-dense foods which leads to decreased weight gain (3,4)
- **Purpose**: To evaluate the association between nutritional deficiencies, specifically iron deficiency (ID) and failure to thrive (FTT), with early childhood caries (ECC) among pediatric patients (5)

Materials & Methods

- **Retrospective chart review** with the Boston Medical Center (BMC) Grow Clinic and Pediatric Dentistry Department
- Patient population: patients aged **0 to 5 years** diagnosed with FTT seen between January 2018 and December 2022
- Controls matched 3:1 by age, gender, language spoken, and insurance
- Total sample: **217 subjects** (54 patients with FTT and 163 controls)
- Statistics: Chi-square and multivariate logistic regression

Results

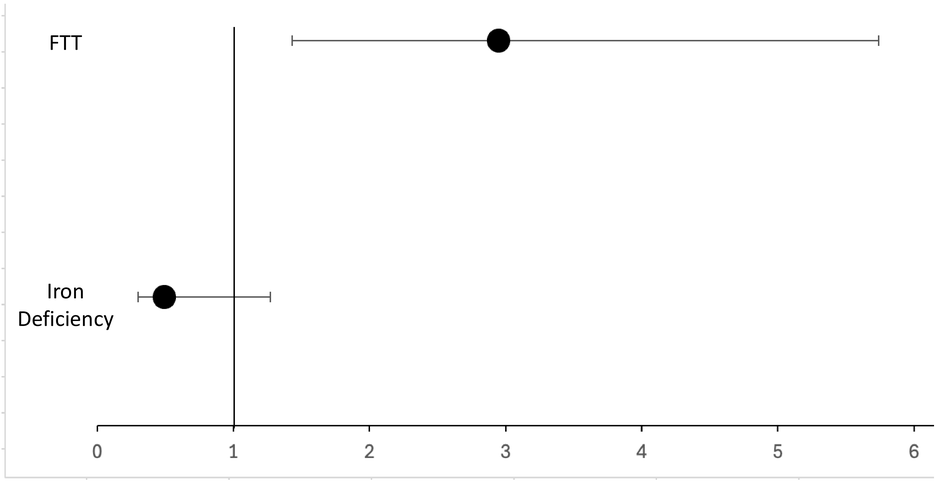
Table 1. Description of sample (n = 217)

Characteristic	FTT Group (N = 54) n(%)	Control Group (N = 163) n(%)
Gender		
Female	26 (48.1)	77 (47.2)
Male	28 (51.9)	86 (52.8)
Language		
English	35 (64.8)	103 (63.2)
Non-English Speaking	19 (35.2)	60 (36.8)
Insurance		
Public	47 (87.0)	110 (78.6)
Private	7 (13.0)	30 (21.4)
ECC Status		
ECC +	23 (42.6)	33 (20.2)
ECC -	31 (57.4)	130 (79.8)
Iron Status		
Iron Deficient	9 (16.7)	28 (17.1)
Not Iron Deficient	45 (83.3)	135 (82.8)

Table 2. Multivariate regression showing odds of ECC

Variable	Odds Ratio	95% CI	p-value
Iron Deficiency	0.4913	(0.1894,1.2741)	0.1438
FTT	2.9511	(1.5164,5.7432)	0.0014

Figure 1. Forest plot showing odds of ECC in a regression model with 95% Confidence intervals



Conclusions

Chi-square analysis demonstrated a statistically significant association between FTT and ECC ($p<0.05$), while no statistically significant association was seen between iron deficiency and ECC ($p>0.05$). Multivariable regression analysis revealed that FTT was a significant predictor for ECC, whereas iron deficiency was not. These findings suggest that broader nutritional and growth-related factors may play a more critical role in ECC risk than isolated micronutrient deficiencies. Further studies with larger sample sizes and additional nutritional and socioeconomic variables are warranted to better study the multifactorial relationship between nutritional status and ECC in the pediatric population.

Definitions and Abbreviations

- **Early Childhood Caries (ECC)**: the presence of one or more decayed, missing, or filled tooth surfaces of a primary tooth in a child under 6 years of age
- **Failure to Thrive (FTT):** diagnosed when a child falls below the 5th percentile for weight, marked by inadequate weight gain and a decrease in growth velocity, often indicated by a drop of two or more major percentiles on growth charts.
  - Terminology has recently been updated from “Failure to Thrive” to “Growth Faltering”

References