



Failure to Thrive, Vitamin D Deficiency, and Early Childhood Caries

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Introduction

ECC is one of the most prevalent chronic childhood diseases, with consequences beyond oral health including impaired growth and development.^{2,3,4}

Growth Faltering (FTT), which is defined as growth below the 5th percentile, stems from poor nutrition, chronic illness, and socioeconomic disadvantage. Growth faltering is the updated term for what has traditionally been referred to as failure to thrive (FTT).⁵

Vitamin D deficiency may modify both conditions through its role in enamel mineralization and immune function; behavioral diagnoses in children with feeding difficulties may further complicate this relationship.⁷

The purpose of this study is to examine the relationship between FTT and ECC and evaluate whether Vitamin D deficiency and behavioral diagnoses modify this risk in a pediatric safety-net hospital population.⁶

Methods

Study Population:

A retrospective chart review was conducted of patients ≤5 years old seen at both the Boston Medical Center Grow Clinic and Pediatric Dental Clinic, January 2018 – December 2022.

Data Collection:

- Data manually extracted from BMC electronic health records and de-identified prior to analysis.
- Variables: ECC and S-ECC status, Vitamin D deficiency, behavioral diagnoses, demographics (age, sex, language, insurance).
- 217 qualifying subjects were included

Statistical Analysis:

- All data de-identified and stored securely on BU OneDrive in compliance with HIPAA.
- Descriptive statistics were calculated for all variables; Pearson chi-square or Fisher's exact test for binary associations.
- Logistic regression to identify independent predictors of ECC. Significance level: $p < 0.05$.

Results

Table 1. Bivariate Analysis of Sample Characteristics (N=217) †

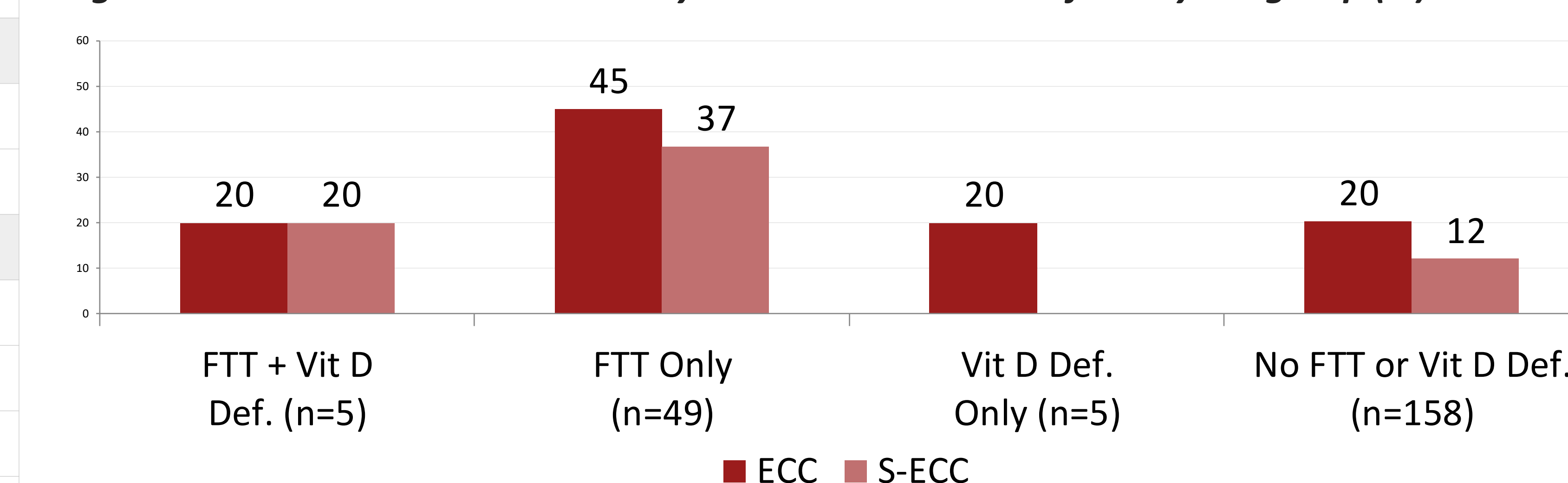
† P-values calculated via chi-square test

	FTT (n=54)	No FTT (n=163)	P-value
Sex, n (%)			0.815
Female	26 (48.1%)	72 (44.2%)	
Male	28 (51.9%)	91 (55.8%)	
Insurance, n (%)			0.005
Public (Medicaid)	49 (90.7%)	123 (75.5%)	
Private/Commercial	5 (9.3%)	40 (24.5%)	
Language, n (%)			0.872
English	31 (57.4%)	90 (55.2%)	
Other	23 (42.6%)	73 (44.8%)	
Caries status, n (%)			
ECC, n (%)	23 (42.6%)	33 (20.2%)	0.002
No ECC, n (%)	31 (57.4%)	130 (79.8%)	
S-ECC, n (%)	19 (35.2%)	19 (11.7%)	<0.001
No S-ECC, n (%)	35 (64.8%)	144 (88.3%)	
Deficiencies, n (%)			0.125
Vitamin D deficiency, n (%)	5 (9.3%)	5 (3.1%)	
No Vitamin D deficiency, n (%)	49 (90.75%)	158 (96.9%)	
Behavior, n (%)			0.379
Behavioral diagnosis, n (%)	17 (31.5%)	41 (25.2%)	
No behavioral diagnosis, n (%)	37 (68.5%)	122 (74.8%)	

Table 2. Multivariable Logistic Regression

Variable	Coefficient	Standard Error	P-value	Odds Ratio	95% CI
Vitamin D deficiency	-0.705	0.836	0.399	0.494	(0.096, 2.541)
Growth Faltering (FTT)	1.132	0.344	0.001	3.101	(1.581, 6.081)
Behavioral diagnosis	-0.218	0.368	0.554	0.804	(0.391, 1.654)

Figure 1. ECC and S-ECC Prevalence by FTT and Vitamin D Deficiency Subgroup (%)



FTT Only drives higher ECC; Vit D deficiency alone shows no additive effect ($p > 0.05$)

Vitamin D deficiency was not independently associated with FTT ($p=0.125$, Fisher's exact) or ECC ($p=0.399$). No significant Vitamin D effect was found in the stratified FTT subgroup analysis (Figure 1).

In logistic regression, FTT was a significant independent predictor of ECC; Vitamin D deficiency was not.

Discussion and Conclusions

- Growth Faltering (FTT) was independently associated with significantly higher ECC prevalence (42.6% vs. 20.2%, $p=0.005$), confirming that children with growth faltering are at substantially greater risk for early childhood caries.
- Vitamin D deficiency was not independently associated with ECC risk in this cohort ($p=0.399$), suggesting that Growth Faltering (FTT) remains the primary driver of caries risk in this population. It is noted that the limited sample size for Vitamin D deficiency warrants further investigation.
- Early, coordinated medical–dental care for children with growth concerns is essential. Pediatric providers should consider dental referral as part of FTT management to reduce caries disparities.⁸

References

Please scan for references

