Adverse Childhood Experiences and Microbiome: A Pilot Study

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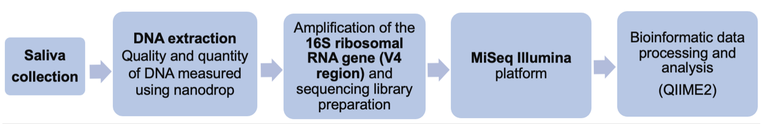
Introduction

Adverse Childhood Experiences (ACEs) are defined as potentially traumatic experiences that occur in children under 18 years of age. These early life events can have a persistent impact on an individual's systemic and mental health well-being into adulthood. The chronic toxic stress triggers a physiological response that includes the fight-or-flight hormones like cortisol, as well as neuroendocrine and immune mediators. In recent years, the effect of ACEs on health has been advanced by discovering brain-gut communication and the impact of central nervous system (CNS) neurotransmitters that can alter gut microbiota composition. While there is an epidemiological association between ACEs and dental caries, there remains a gap in the scientific research focusing on the physiological mechanisms associated with ACE-induced caries disease. Given the fact that several stress-response hormones and immune mediators are also secreted in saliva that harbors oral bacteria, the possible effect of ACEs on the oral microbiome is unexplored.

Purpose: To explore the association between adverse childhood experiences (ACEs) and oral microbiome composition and diversity.

Materials & Methods

- Preliminary cohort of caries-active children aged 7-10 years old
  - UCLA Pediatric Dentistry Clinic
  - 10 participants enrolled (5 control and 5 ACEs)
  - Inclusion criteria: Good general health, having at least one caries experience dmft/DMFT>0, and informed consent obtained from parent/legal guardian.
  - Exclusion criteria: presence of chronic systemic diseases or other medical conditions or use of antibiotics within 30 days.
- Parent/legal guardian completed demographic, oral hygiene habits, dietary intake and ACEs questionnaires
- Unstimulated saliva collected from child participants



Results

Table 1. Demographic and oral hygiene information from the preliminary clinical study questionnaire

Characteristic	Control (n=5)	ACEs (n=5)
Gender		
Female	2	2
Male	3	3
Ethnicity		
Hispanic	4	2
Non-Hispanic	1	3
Age		
	8.2 ± 1.6	8.0 ± 1.2
dmft/ DMFT index		
	9.2 ± 3.3	8.2 ± 4.6
ACEs score		
	0.0 ± 0.0	4.2 ± 3.3
Professional dental cleaning frequency		
None	0	0
Once a year	3	3
More than once a year	2	2
Tooth brushing frequency		
Not brushing	0	0
Once a day	1	2
More than once per day	4	3
Tooth Flossing frequency		
No flossing	0	0
Less than once a day	0	0
Once a day	5	2
More than once per day	0	3

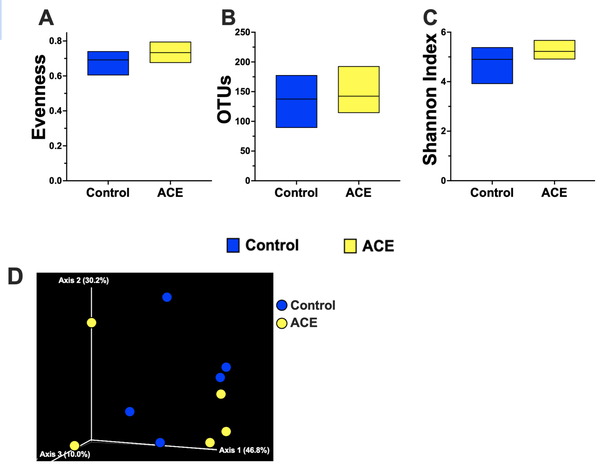


Figure 1. Diversity analyses of salivary microbial community. Alpha diversity was analyzed using **Evenness (A), OTUs (B), Shannon index (C)**; and the **beta diversity** was by principal coordinates analysis (**PCoA**) of **weighted Unifrac distances (D)** between **Control** and **ACE** groups

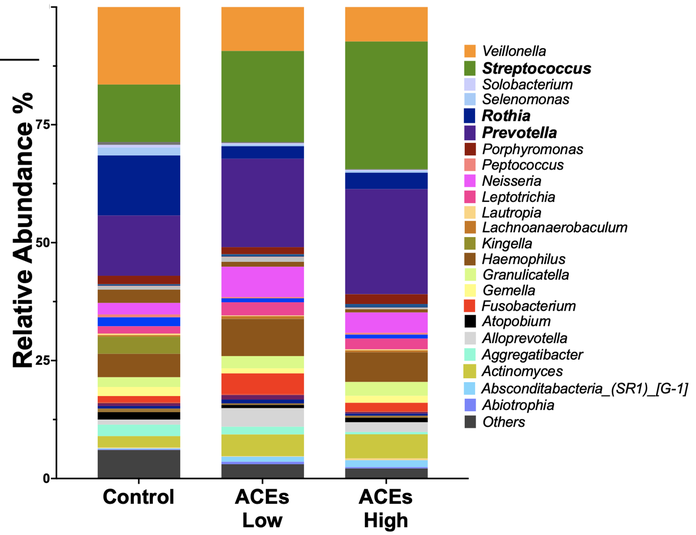


Figure 2. Salivary microbiome community taxonomic analysis. Relative abundance (percentage) of taxonomic results at the genus level are shown in stacked bar graphs. **Control** (ACE score =0), **ACEs low** (ACE score=1), and **ACEs high** (ACE score> 4)

Discussion

Overall, the salivary microbiome alpha-diversity of children with and without ACEs did not significantly differ for the studied metrics (Evenness, OTUs and Shannon index). However, no clear clustering pattern was observed in salivary microbial communities of children with and without ACEs.

The taxonomic analysis at the genus level of the salivary microbiome composition of children without ACE (ACE=0), low ACE (ACE>0), and high ACEs (ACE>4) at the genus level revealed that while the relative abundance of *Streptococcus* and *Prevotella* appeared to be more abundant in the high ACE group, *Rothia* seemed to be more abundant in the control group

The genera *Streptococcus* and *Prevotella* have been associated with dental caries, while the genus *Rothia* was linked to dental health. However, these differences may be observed at the species level.

Conclusion

→ In this pilot study, it was observed that the salivary microbiome of children with ACEs seemed to differ in composition compared to those without ACEs, regardless of caries experience.

→ Differences in bacterial composition may contribute to differences in caries susceptibility of these children.

→ An increase in the sample size of children with different childhood adversity and caries experiences is needed to generate enough statistical power for conclusive results.

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