

CHILDHOOD OBESITY AND ORAL HEALTH: INFLAMMATION AND DENTAL MATURATION

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Background

Children with obesity have more oral inflammation, linked to increased levels of pro- and decreased levels of anti-inflammatory cytokines¹²⁻¹⁴

Children with obesity experience advanced dental maturation of up to 1.5 years, especially during late mixed dentition (ages 10-12 years old)^{10-11, 15-17, 23}

Children with systemic inflammatory disease (diabetes & arthritis) experience advanced dental maturation in this age range²⁴⁻²⁵

This study explores the potential hypothesis that inflammation may contribute to early dental maturation in children with obesity.

Theorized mechanism:



Objectives

- Evaluate GCF levels of inflammatory biomarkers in children with obesity
- Evaluate whether children with obesity have advanced dental development in this sample
- Evaluate whether children with advanced dental maturation (regardless of obesity) have increased oral inflammatory markers

Methods

53 subjects recruited from PG Pediatric Dentistry

- Subjects with normal BMI (n=22)
- Subjects with obese BMI (n=31)

Patients who met inclusion criteria and were due for periodic oral examinations and prophylaxis were approached for participation, consent and assent obtained prior to data collection.

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Fig. 1 Flow Chart of Data Collection and Analysis

Inclusion Criteria	Exclusion Criteria
<ul style="list-style-type: none"> Medically healthy (exception: caries / obesity) Ages 10-12.99 years old BMI = "normal" or "obese" 	<ul style="list-style-type: none"> Systemic conditions, Rx meds Craniofacial anomalies, active ortho < 10 years, 13 years + BMI = "underweight" or "normal"



Data Collection Appointment
<ul style="list-style-type: none"> Height & Weight to calculate weight status (BMI) Panoramic Radiograph to determine dental age PerioPaper strips to collect gingival crevicular fluid (Biomarkers)



Sample Analysis
<ul style="list-style-type: none"> Cytokine analysis assays were run to detect levels of: Pro inflammatory markers: CCL2, MMP8, IL-1B, CCL3, MPO, RANK-L Anti inflammatory markers: IL-10 Adipokines: Adiponectin (anti-inflammatory), Leptin (pro-inflammatory)



Statistical Analysis
<ul style="list-style-type: none"> Significance p = 0.05 , power = 0.08 Power achieved for all measures except adiponectin, IL-1B, leptin, dental age Wilcoxon Rank Sum tests to examine level of each cytokine per BMI group Spearman Correlation Analysis to compare BMI percentile to delta age Spearman Correlation Analysis to compare each cytokine to delta age

Results

Inflammation & Obesity

- Children with obesity had higher levels of MMP8 (p=0.012)
Prior literature shows consistent results in serum & GCF levels of MMP8⁴⁸⁻⁵⁰
- Children with obesity experience more bleeding (p=0.03)
Prior literature shows individuals with obesity have heightened levels of oral inflammation¹²⁻¹⁴
- No other association between other biomarkers and children with obesity (p>0.05)
Contrary to findings of prior literature^{12-14, 39, 40-42, 44}

Obesity & Delta Age

- Accelerated dental development not correlated with obesity in this sample (p=0.47)
Prior studies have larger sample sizes (100+ subjects)^{15, 19, 23}

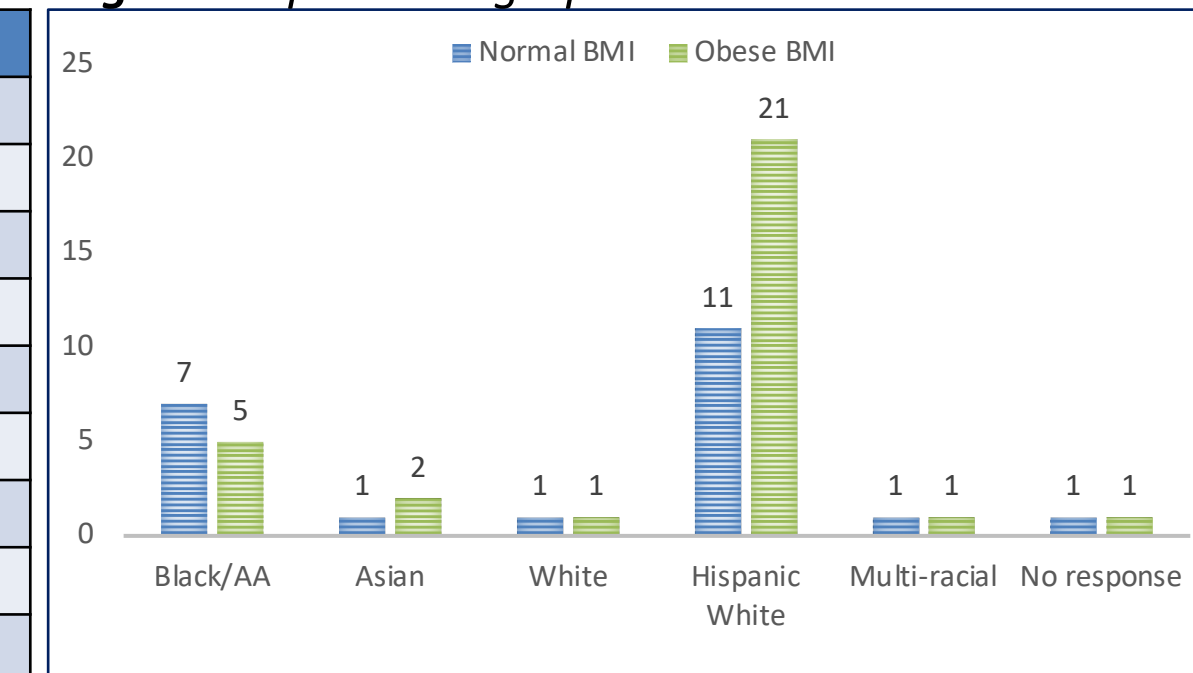
Delta Age & Oral Inflammation

- Children with accelerated dental development did not demonstrate higher levels of inflammatory markers in GCF (p>0.05)
- Non-significant trend that children with accelerated dental development experience more bleeding (p=0.17)

Fig. 2 Biomarker levels per BMI group

	Normal BMI: Mean	Obese BMI: Mean	p-value
IL-10	3.03	3.43	0.095
CCL2	42.83	46.42	0.173
MMP8	36,979.68	53,061.17	0.012
IL-1B	316.914	433.54	0.111
CCL3	180.39	184.41	0.551
Adiponectin	35,164.95	58,447.87	0.187
RANK-L	249.12	284.72	0.999
Leptin	434.79	461.93	0.401
MPO	90,200.53	76,143.96	0.312

Fig. 3 Sample Demographics



Conclusions

Children with obesity have higher MMP8 and bleeding levels compared to children with normal BMI

No biomarkers were found to correlate with timing of dental development in this sample

Children with obesity may require additional understanding and clinical judgement by dental providers

References

Use the following QR code to access the full list of references:

