Influence of Maternal Activity on Child Oral Health and Tooth Development

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Abstract

Purpose: The purpose of this study was to evaluate the influence of physical activity during pregnancy on child oral health and development. We hypothesized that women who exercised while pregnant would have children with lower dental disease progression, decreased caries risk, and increased tooth maturation.

Methods: Women with children 6 years old or younger seen as patients at the Pediatric Dental Clinic were asked to participate in the study. Based on responses to a pregnancy physical activity questionnaire, women were classified as exercisers, active, or control, while pregnant with their child. We looked for differences in child oral health and tooth development between the 3 groups using multiple ANOVAs.

Results: Data from 59 mother-child pairs was analyzed. No significant differences were found between groups for change in children's dental disease progression or dental caries risk. No statistical difference was found between groups for change in children's dental disease progression or dental caries risk. However, a physiological link may exist between child dental maturity and maternal activity during pregnancy. Pediatric dentists should focus on the postpartum behaviors to improve childhood oral health.

Conclusions: The data suggests that variation in behaviors postpartum limit any association between prenatal exercise and decreased dental disease progression and caries risk of offspring. However, a physiological link may exist between child dental maturity and maternal activity during pregnancy. Pediatric dentists should focus on the postpartum behaviors to improve childhood oral health.

Introduction

- The connection between activity during pregnancy and child's oral health and development has not been studied.
- Oral diseases, such as dental caries, in children are common but preventable. Caries, risk of caries, and disease progression are diagnosed by dental providers.
- During pregnancy, tooth development is regulated by neurotrophins, which also regulate nervous system development.
- Previous research has shown women who are active during pregnancy have children with more mature nervous system development.

- Purpose – To determine the influence of maternal physical activity on disease progression, caries risk and tooth development of offspring.
- We hypothesized that women who physically active during pregnancy would have children with less disease progression, caries risk, and improved tooth maturation.

Methods

Inclusion Criteria
- Child ≤ 6 years at consent
- Child is a patient at ECU School of Dental Medicine Pediatric Clinic
- Mother completed physical activity questionnaire

Questionnaire
- Physical activity during pregnancy
  - Frequency, Intensity, Time, and Type of exercise
  - Exercise: Moderate-High Intensity, ≥30 min, 3X per week
  - Active Control: Low-moderate intensity, <30 min, 3X per week
  - Controls: No physical activity

Discussion/Conclusion

- Prenatal exercise should be an important part of overall mother and child health.
  - No association found between physical activity in pregnancy and lowered dental disease progression and caries risk in children.
  - Most likely, postpartum behavior and environment variation limit associations.
- Maternal exercise is associated with increased dental maturity with child’s age, advanced nervous system development, via neurotrophins, may be the reason for advanced tooth development in children.
- Within study population, early dental development may have contributed to higher than expected dental disease progression and caries risk.
- Pediatric dentists should be aware of physiological changes, but emphasize healthy activities and choices postpartum in order to help improve childhood oral health.
- Limitations of the study include a small sample size, different stages of dental treatment for child, as well as population of cross-sectional sample.

Acknowledgements/References

We would like to extend our gratitude to Gerard Camargo, Elisabeth Boykin, and Tania Alvarez for their support with the project. We would also like to thank the participants for their time.


Table 1. Maternal Participant Demographics:

<table>
<thead>
<tr>
<th>Maternal Participants (n)</th>
<th>Control</th>
<th>Active Control</th>
<th>Exercise</th>
</tr>
</thead>
<tbody>
<tr>
<td>Age</td>
<td>24.01 ± 6.06 (28)</td>
<td>26.13 ± 6.88</td>
<td>23.83 ± 6.78</td>
</tr>
<tr>
<td>BMI</td>
<td>28.68 ± 8.18 (24)</td>
<td>27.74 ± 7.26</td>
<td>26.73 ± 7.43 (13)</td>
</tr>
</tbody>
</table>

Table 2. Child Participant Demographics:

<table>
<thead>
<tr>
<th>Child Participants (n)</th>
<th>Control</th>
<th>Active Control</th>
<th>Exercise</th>
</tr>
</thead>
<tbody>
<tr>
<td>Age</td>
<td>5.01 ± 1.30</td>
<td>4.37 ± 1.66</td>
<td>5.17 ± 2.25</td>
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<tr>
<td>BMI</td>
<td>16.47 ± 1.10 (15)</td>
<td>16.89 ± 3.40 (8)</td>
<td>15.79 ± 1.62 (8)</td>
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</tbody>
</table>

Figure 1: DMFS : DMFT Ratio. No statistical difference between groups for DMFS/DMFT. The ratio shows trends (p<0.18) of less disease progression in Active Control relative to Exercise. There is also a trend (p<0.12) of less disease progression in Active Control compared to Control group.

Figure 2: Child Caries Risk. No statistical difference between groups in Child Caries Risk. Low=1, Moderate=2, High=3.

Figure 3: Mixed Dentition Count as a function of Age. A difference (p<0.03) of advanced dentition with age was found for the exercise group compared to control groups.

Figure 4: Age vs Mixed Dentition Count

Table 3. Mixed Dentition Count:

<table>
<thead>
<tr>
<th>Dentition Count</th>
<th>Control</th>
<th>Active Control</th>
<th>Exercise</th>
</tr>
</thead>
<tbody>
<tr>
<td>n</td>
<td>20</td>
<td>7</td>
<td>10</td>
</tr>
<tr>
<td>20.74 ± 1.16</td>
<td>20.33 ± 1.44</td>
<td>21.56 ± 3.68</td>
<td></td>
</tr>
</tbody>
</table>

Table 4. Mixed Dentition Count:

- 0 Risk.
- 1 Risk.