Primary Children's Hospital

Salivary pH Testing and Dental Caries in Pediatric Patients

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BACKGROUND

Dental caries remains a prevalent oral health concern among pediatric populations worldwide. Saliva plays a crucial role in maintaining oral health by buffering acids, remineralizing enamel, and washing away food particles. However, alterations in salivary pH can disrupt this equilibrium, causing dysbiosis and predisposing individuals to dental caries.

The Stephan curve demonstrates the pH of plaque prior to, during, and after the consumption of carbohydrates. The frequency of carbohydrate consumption has a direct effect on the pH of the oral cavity. The "critical pH", as defined by Stephan, is when the pH drops below a threshold and causes demineralization.[1] Other factors can cause the critical pH threshold to vary in each individual.

Additional studies have demonstrated that the pH of plaque is lower for children with dental decay compared to children without dental decay.[2] Bacteria metabolize fermentable carbohydrates and produce acid as a byproduct which contributes to the formation of cavities. This results in a lower pH in the oral cavity. In the case of a child with a g-tube who is not consuming fermentable carbohydrates, the resting pH should remain static.

Does a lower resting salivary pH increase a child's risk of dental caries?

PURPOSE

The purpose of this research was to assess the correlation between resting salivary pH levels in three groups of pediatric dental patients and the number of surfaces with active decay. By investigating this relationship, the study seeks to potentially establish the viability of resting salivary pH measurements as a predictive tool for determining the risk of dental caries in children.

DATA AND CHARTS

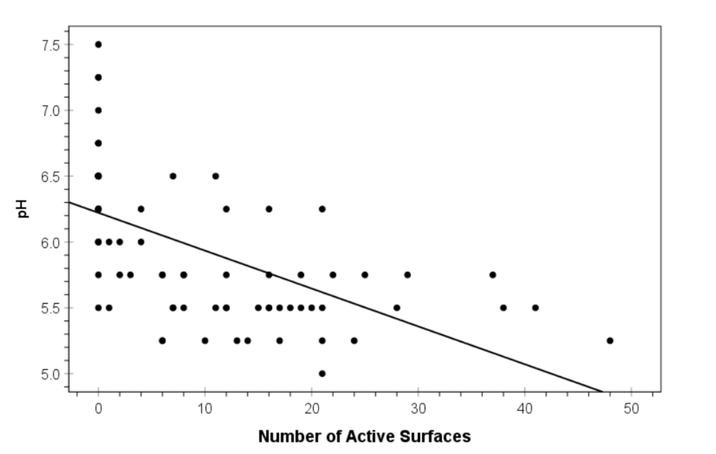

Figure 1. Scatter plot regression analysis between pH and surfaces with active decay.

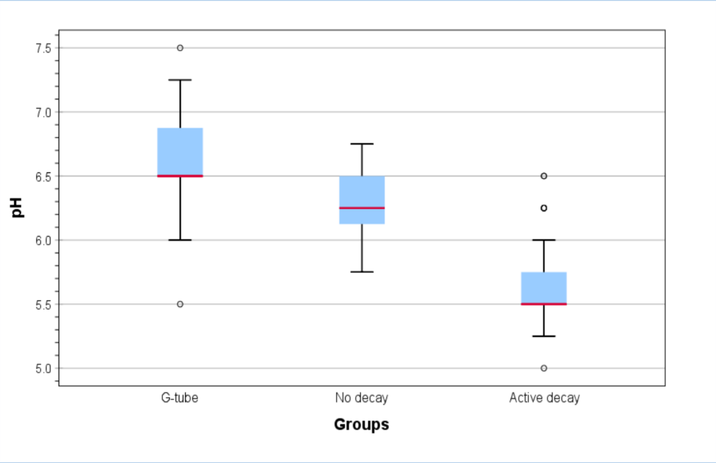

Figure 2. Box plot for Test Groups

METHODS

Salivary pH assessments were conducted using pH strips on 78 pediatric patients ages 1-12 undergoing dental examinations after a minimum 2-hour period of nothing by mouth (NPO). The pH strip was swabbed in the mouth until coated lightly with saliva, and two trained individuals determined the pH score. Simultaneously, dental examinations were performed to correlate resting pH levels with dental status, including the DMFS and number of surfaces with active decay.

RESULTS

- There was a strong negative correlation between resting pH and number surfaces of with active decay (Spearman rho = -0.71, $p<0.001$).
- Patients in the three groups of g-tube, no decay, and active decay had a mean pH of 6.63, 6.29, and 5.64 respectively (Kruskal-Wallis Test $p<0.001$).
- Differences in pH levels between g-tube, no decay, and active decay groups were statistically significant for all Mann-Whitney U post hoc comparisons ($p<0.02$).

CONCLUSIONS

A negative correlation is present between resting salivary pH levels and dental caries in pediatric patients, with lower resting salivary pH being associated with higher caries incidence. Understanding this relationship in the absence of fermentable carbohydrates and resulting acidity is important. Further research is necessary to validate salivary pH testing as a predictive tool for assessing dental caries risk in clinical practice. This tool could potentially aid health care providers to encourage modifications such as frequency of carbohydrate intake and oral hygiene to improve resting salivary pH.

1. Bowen WH. The Stephan Curve revisited. Odontology. 2013 Jan;101(1):2-8. doi: 10.1007/s10266-012-0092-z. Epub 2012 Dec 6. PMID: 23224410.
2. Dong YM, Pearce EI, Yue L, Larsen MJ, Gao XJ, Wang JD. Plaque pH and associated parameters in relation to caries. Caries Res. 1999 Nov-Dec;33(6):428-36. doi: 10.1159/000016547. PMID: 10529527.