

# The Impact of Tonsillectomy on Intraoral pH and Caries Incidence in Pediatric Patients

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## Introduction

Mouth breathing is one of the most common adverse oral habits in the pediatric population. In addition to nasal obstruction due to upper respiratory illnesses, hypertrophy of tonsils and/or adenoids can contribute to mouth breathing in children. Recent studies show that sleep-related breathing disorders (SRBD) have associations with anatomical features, such as an enlarged tongue, tonsils, or uvula, and can lead to dental problems such as narrow dental arches and crowding of teeth. Patients with SRBD exhibit a higher frequency of mouth breathing which can contribute to caries formation.

Salivary flow allows for regulation of bacteria in the oral cavity as well as the mechanical washing away of food and other debris, thus preventing caries formation. In patients with tonsillar hypertrophy, salivary flow can be reduced due to mouth breathing, resulting in pH imbalance and consequently an increase in caries incidence and periodontal problems.

## Study Objectives

This study aims to investigate intraoral pH levels of pediatric patients before and after tonsillectomy and the incidence of caries formation. The long-term objective is to directly improve sleep and breathing quality in pediatric patients who suffer from adenoid enlargement and to reduce caries and periodontal issues. Additionally, other goals are to educate parents on enlarged tonsils and adenoids as they relate to mouth breathing, obstructive sleep disorders, and oral hygiene, as well as increase collaboration between the ENT department and the Dental department.

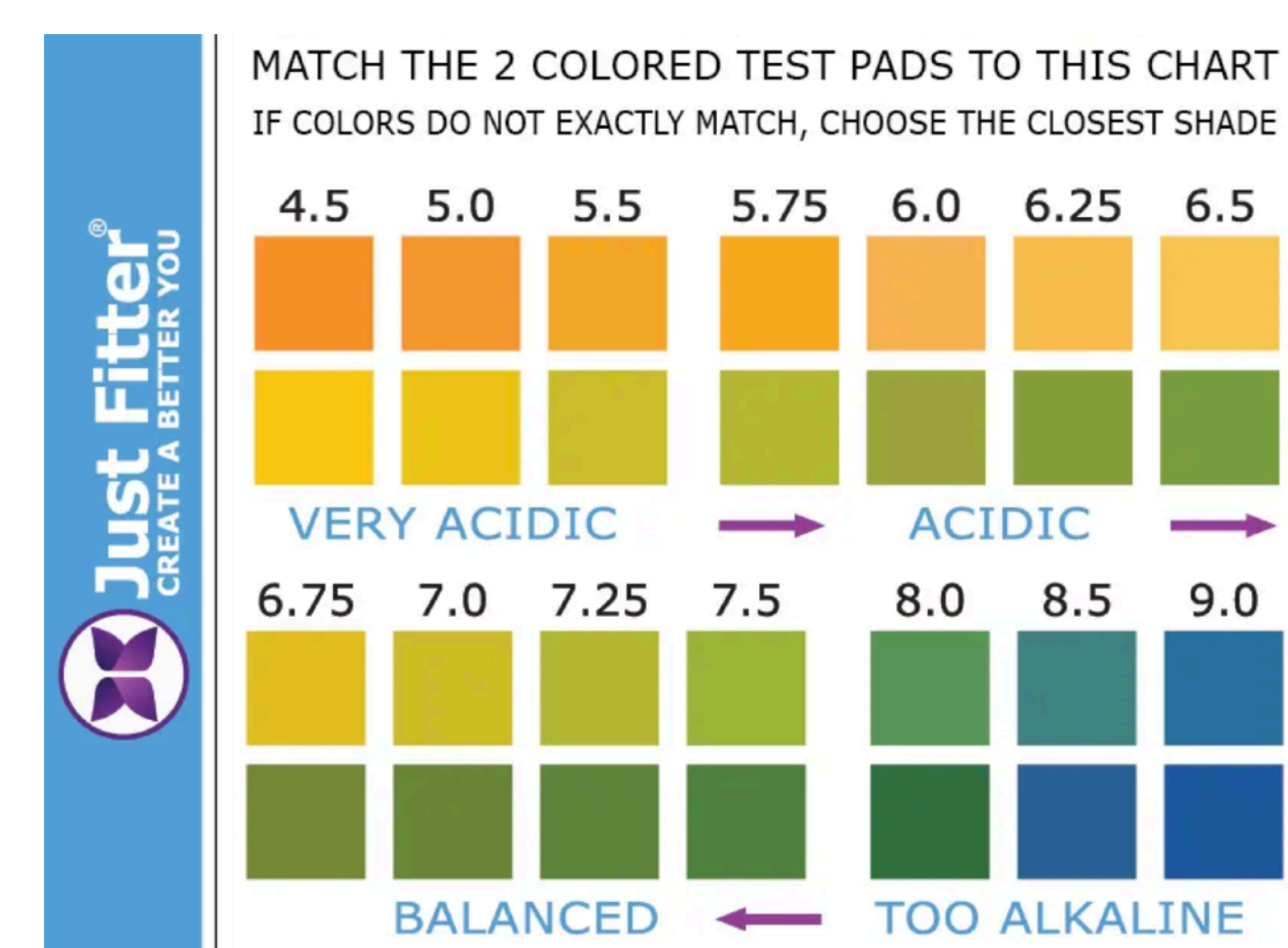
## Methods

### Subjects

Patients aged 5-15 were included in this study regardless of ethnic background, health status, and socioeconomic status at St. Barnabas Hospital/SBH Health System. Patients were recruited in both the dental clinic and the outpatient clinic settings from the ENT department where patients were to undergo tonsillectomies.

### Data Collection

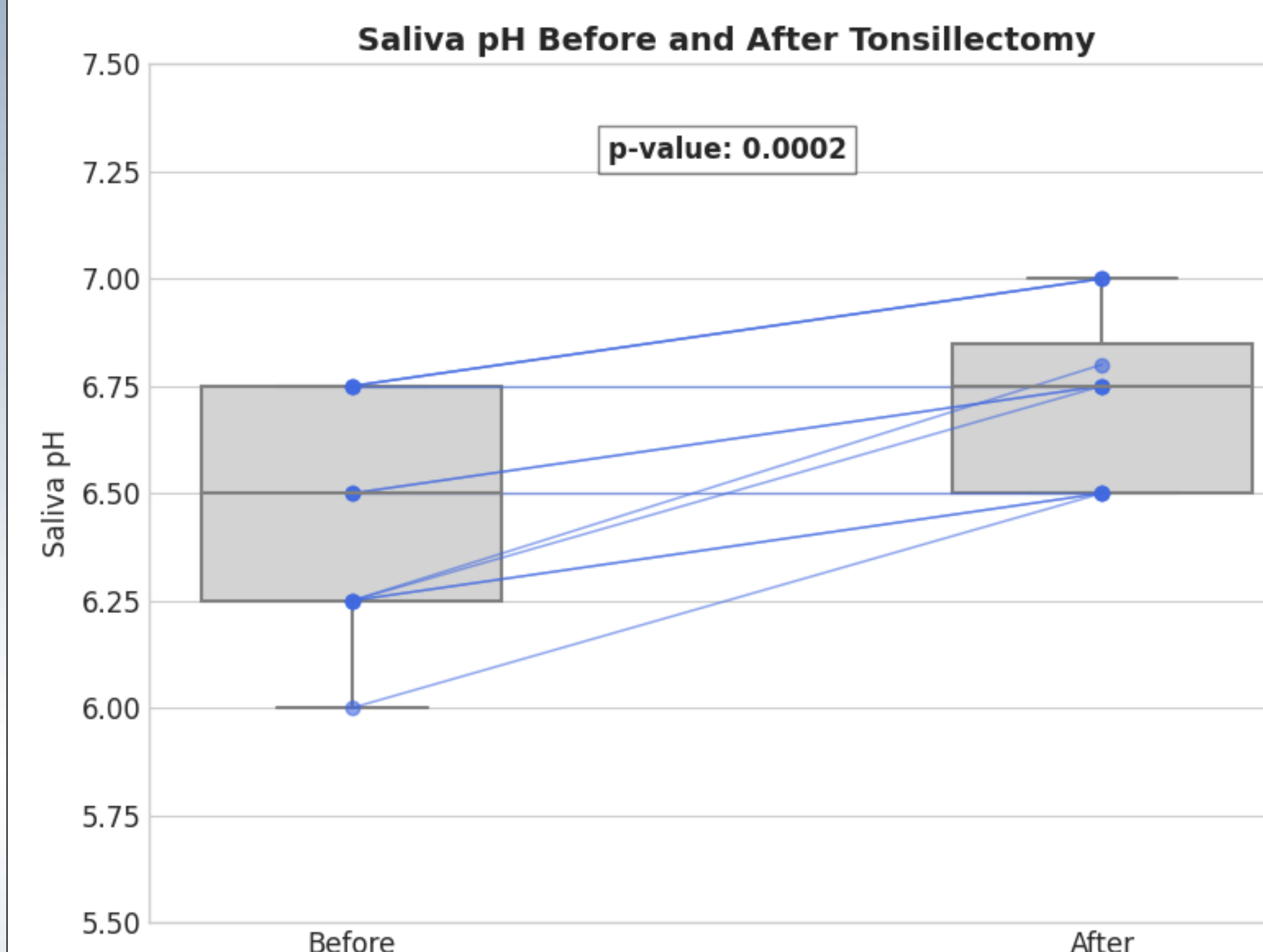
Data was collected during the subject's new patient/periodic dental exam or in the SBH Ambulatory Surgery Center Pre-Operatory area prior to his/her scheduled tonsillectomy. Patients seen in the dental clinic were instructed to not eat, drink, or rinse their mouths at least two hours prior to their exam. Patients in the Ambulatory Surgery Center were instructed to be NPO for at least 6 hours. Salivary pH was measured using pH indicator strips (range 4.5-9.0). A sterile cotton tipped applicator was used to swab the patient's cheek for 10-15 seconds. The sample was applied directly to the test strip, and pH was determined by visually matching the resulting color to the provided reference scale. Patients were seen at least 1 month after their tonsillectomy for a post-procedure cheek swab.



## Results

### Statistical Analysis

A paired t-test was used to compare mean salivary pH before and after tonsillectomy. Statistical significance was set at  $p < 0.05$ .



A statistically significant increase in salivary pH was observed following tonsillectomy. The mean preoperative salivary pH was  $6.46 \pm 0.26$ , which rose to a postoperative mean of  $6.73 \pm 0.20$ . This was an average increase of 0.27 pH units. Of the 12 subjects, 83% (n=10) demonstrated a pH increase, while 17% (n=2) remained stable. Notably, no subjects exhibited a decrease. Statistical analysis via paired t-test confirmed this trend was highly significant ( $t(11) = -5.48, p < 0.001$ ).

## Discussion

The results of this study demonstrate a significant shift toward a more alkaline oral environment following tonsillectomy, which likely results from the removal of a bacterial reservoir in the tonsils, where significant anaerobic bacteria exist. Clinically, the shift of the mean salivary pH to a more neutral pH suggests improved salivary function, likely due to enhanced nasal breathing and salivary buffering.

## Conclusion

Tonsillectomy was associated with a statistically significant increase in salivary pH in pediatric patients. These findings suggest that the palatine tonsils play a measurable role in modulating the acidity of the oral cavity. Removing hypertrophic tonsils may provide protective benefits against dental caries by moving further away from the critical threshold for enamel demineralization ( $pH < 5.5$ ).

While salivary pH was recorded for all subjects (n=12), standardized caries assessment (DMFS) was limited by the clinical setting. Pre-operative evaluations conducted in a surgical setting precluded the use of dental radiographs to evaluate for caries. Consequently, longitudinal caries incidence is not reported here to avoid diagnostic bias. Future studies may utilize standardized dental clinic environments for all time points.

## Study Limitations

- Small sample size
- Single time-point measurements
- Subjective interpretation of pH colorimetric strips
- Two visits needed; due to a high no-show rate, patients who did not show up for their follow-up appointments were not included in this study

## References

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