May 8th, 2:15 PM - 5:00 PM

The Relationship Between Salivary Statherin and Hemoglobic A1c Levels in the Dental Setting with Regards to Oral Health

Mary Quilici
University of the Pacific

Mariayam Siddiqui
University of the Pacific

OKU Sutro Excellence Day Project Cover Sheet

Project Title

The Relationship Between Salivary Statherin and Hemoglobin A1c Levels in the Dental Setting with Regards to Oral Health

Full name(s) and class year(s) of all project collaborators

Example: Jane Smith, DDS 2022; John Smith, DDS 2022

Mary Quilici DDS 2025, Mariyam Siddiqui DDS 2025

Project Category

DDS/IDS/DH - Research Awards

Enter your abstract text here (max 300 words)

General Problem: Can the correlation between salivary statherin concentration and hemoglobin A1c (HbA1c) levels provide a more comprehensive assessment of a patient's oral health status?

Methods & Process: Whole saliva samples were collected from participants. Blood glucose concentration and HbA1c were measured from a small blood sample obtained via a needle stick. Caries risk and gum health was assessed through periodontal pocketing and CariScreen Testing Meters. Salivary statherin concentrations were measured using western blot.

Results: Higher HbA1c was associated with lower salivary statherin concentrations.

Conclusion: The concentration of the statherin protein in the saliva may be a potential biomarker to assess risk for oral conditions in diabetic patients.

The Relationship Between Salivary Statherin and Hemoglobin A1c Levels in the Dental Setting with Regards to Oral Health

Mary Quilici[1], Mariyam Siddiqui[1], David Vang[2], Homer Asadi[2], Trang Nguyen[3], Der Thor[2]
Department of Preventative and Restorative Dentistry[1], Department of Clinical Oral Health Care[3], and Department of Biomedical Sciences[2], Arthur A. Dugoni School of Dentistry, University of the Pacific, San Francisco Campus

INTRODUCTION

Diabetes increases the risk for oral diseases and salivary dysfunction. Salivary proteins play an important role in ensuring oral health through processes such as neutralizing acid, enhancing remineralization, and inhibiting demineralization. Thus, decreased levels of saliva would indicate a prevalence for dental caries and periodontitis. Statherin, a salivary protein, maintains high levels of calcium and phosphate in saliva to ensure overall oral health. Additionally, statherin exhibits high affinity for hydroxyapatite and promotes remineralization of enamel. Such properties enable statherin to potentially support oral health. It remains unclear how diabetes may affect the concentrations of salivary statherin.

OBJECTIVES

- To assess whether glycemic control can alter salivary statherin concentrations.
- To determine if salivary statherin may impact caries risk and periodontal disease.

METHODS

Clinical examinations were performed on six individuals separated into the following age groups: 18-44, 55-64, and 65+.

Clinical periodontal examinations included the following assessments : periodontal probing depth, clinical attachment level, bleeding on probing, furcation involvement, calculus detection, plaque index, and mobility. Gingival health status was classified into the following categories : gingival health, gingivitis, and periodontitis. Caries risk assessment was determined through past restorations, overall oral health, and ATP testing, measuring the level and activity of cariogenic bacteria. Scores of <1500 indicated low caries risk while scores of >1500 indicated high caries risk.

A pre-exam questionnaire was filled out by participants to determine risk for developing diabetes risk.

HbA1c and random blood glucose testing were conducted evaluate glycemic control. A glucometer was used to measure random blood glucose from a droplet of blood. HbA1c values were measured from the same droplet using a mobile HbA1c analyzer.

One to five milliliters of unstimulated whole saliva was collected for statherin concentration analysis using western blots. Saliva samples were first electrophoresed on a 15% polyacrylamide gel and transferred to nitrocellulose paper. Statherin concentration was calculated based on the intensity of protein bands identified by an anti-statherin monoclonal antibody and less than 10 kilodaltons.

RESULTS

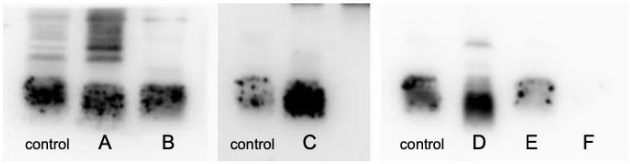

Figure 1: Detection on of salivary statherin (<10 kDa) in unstimulated whole saliva using western blot.

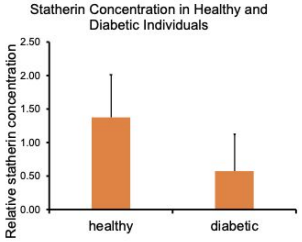

Figure 2: Western blot analysis of saliva indicates diabetic individuals had lower salivary statherin concentration than nondiabetic individuals. Classification of diabetic and nondiabetic was based on levels of HbA1c.

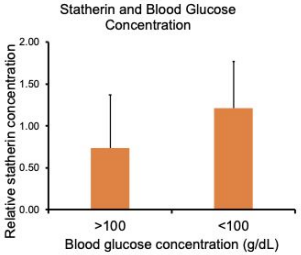

Figure 3: Comparisons of salivary statherin concentrations with random blood glucose levels showed no correlations.

Participant	Relative Statherin Concentration	A1c	Caries Risk Assessment	Age Group	Oral health
A	1.05	5.9	Low	18-44	healthy gingival
B	0.96	5.2	Low	55-64	healthy gingival
C	2.11	4.9	Low	18-44	healthy gingival
D	1.13	8.3	High	50-59	moderate
E	0.57	8.2	Low	18-44	healthy gingival
F	0.02	7.6	Moderate	>65	mild periodontitis

Table 1: Correlation between patient age, salivary statherin concentration, periodontal status, and caries risk assessment.

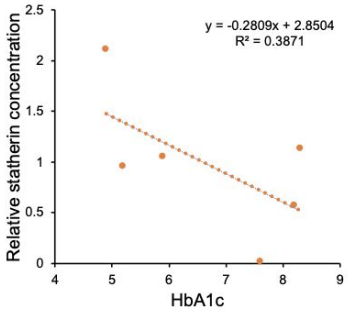

Figure 4: Correlation analysis between salivary statherin concentration and HbA1c. Current analysis suggest an inverse relationship between statherin and levels of HbA1c.

CONCLUSION

- Glycemic control was inversely related to salivary statherin levels.
- Low levels of statherin showed an age-dependent association with high caries risk and periodontitis.
- A larger sample size will provide more understanding of the correlation between a patient's age, salivary statherin concentration, and the effects on the periodontal status and caries risk assessment.

REFERENCES

1. Ahmad P, et. al. Caries Res. 2022;56(4):385-398.
2. Amerongen AV, et. al. Caries Res. 2004;38. 247-53.
3. E.M. Chavez, et. al. Oral Surg. Oral Med. Oral Pathol. Oral Radiol. 2000;89 305–311.
4. Isola M, et. al. Oral Diseases, 2011;17: 685-689.
5. Izumi M, et. al. BBA Clin. 2015;1;3:135-140.
6. Parlak HM, et.al. Arch Oral Biol. 2023;145:105574.
7. Pateel DGS, et. al. Int J Dent, *2017*, 2857629.

ACKNOWLEDGEMENT

This research was supported by intramural funding from the University of the Pacific.