



Determination of the Expression of Resistin Adipokinin in Saliva of Type 2 Diabetes Mellitus patients

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Abstract

Type 2 diabetes mellitus (T2DM) is a relevant issue for dental professionals and patients seen in dental care settings. T2DM is an established risk factor for periodontal disease. Recent consideration has been given to resistin, a cytokine, as a potential biomarker for diabetes. Our study recruited a total of 40 patients seen in Oral Diagnosis at the SIU SDM clinic and obtained saliva samples. We then performed an ELISA bioassay to compare resistin levels between diabetic and control groups.

Hypothesis

We hypothesize that saliva from diabetic patients will express higher resistin levels than saliva from healthy individuals and these elevated resistin levels will positively correlate with higher HbA1c values. If this association is established, dentists may be able to identify at-risk patients based on elevated salivary resistin levels and refer them for further diagnosis and treatment. It is possible that general demographics may also affect our findings.

Methodology

We recruited patients seen in the Oral Diagnostics section of the SIU SDM.

Inclusion criteria:

- Individuals with HbA1c values under 5.7% (non-diabetic) and above 6.5% (diabetic)
- Patients between 18 and 80 years of age

Exclusion criteria:

- Patients under 18 and over 80 years old
- Participants with HbA1c between 5.7% and 6.4% (pre-diabetic)
- Pregnant and nursing females

Once we recruited 20 patients per group, we conducted an ELISA bioassay to evaluate resistin expression. All samples were kept in duplicates and evaluated as a 1:5 dilution series based on known resistin concentrations. Data was analyzed using student's t-test.

Introduction

Abnormal insulin signaling characteristic of diabetes mellitus can lead to chronic systemic dysfunction, delayed healing, and impaired vision. Specific to dentistry, diabetes is associated with increased risk of caries and periodontal disease. As the number of worldwide cases is expected to increase to 642 million by 2040¹, early diagnosis and intervention is necessary for improved health outcomes.

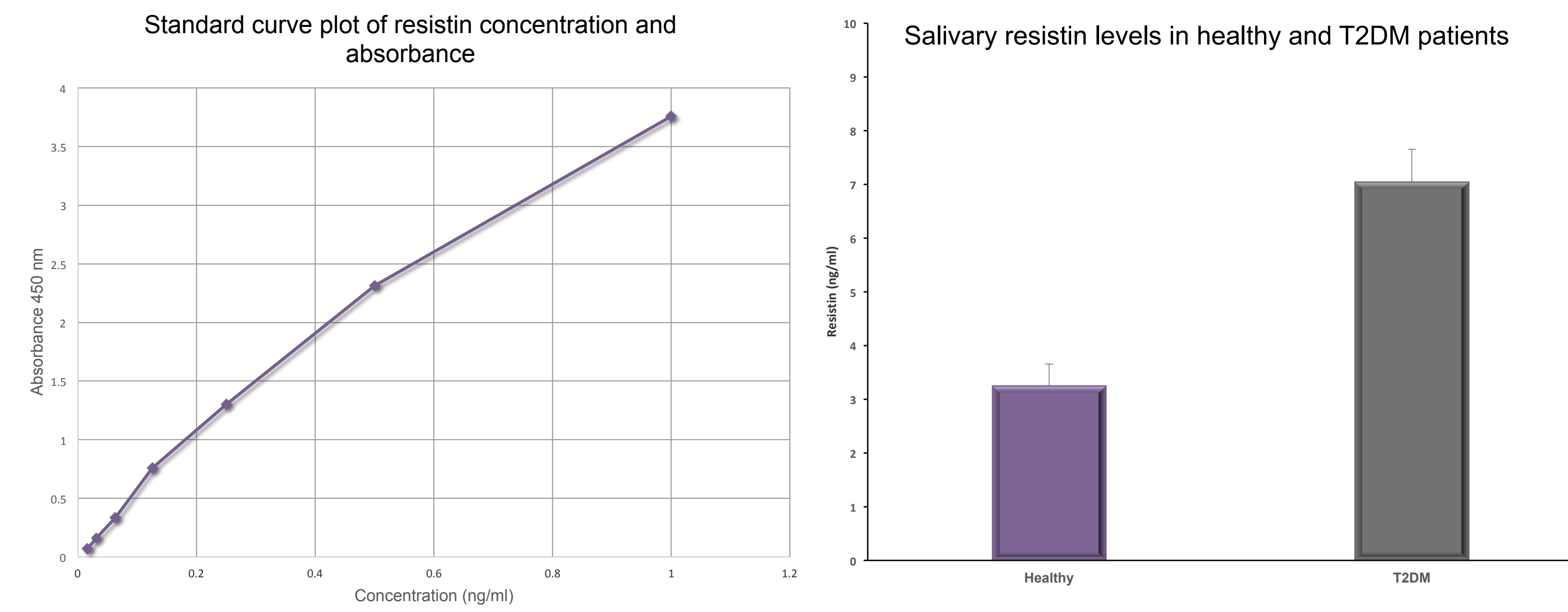
The current standard for diagnosis of diabetes is through blood testing such as HbA1c testing. Saliva, on the other hand, is obtained through non-invasive and painless collection and is easily accessible. Saliva contains roughly half of serum proteins and does not require fasting, which is an issue for diabetic patients especially.

Previous study has correlated type 2 diabetes with increased resistin levels². Resistin is a pro-inflammatory cytokine which is activated in the islet cells of pancreas and inhibits insulin signaling. The inhibition of insulin signaling can contribute to chronic inflammation, obesity, lipotoxicity, and oxidative stress³.

Dentists are in an ideal situation for assessing at-risk patients during semiannual appointments. Our knowledge of other demographics which affect glycemic levels such as heart disease and family history of cholesterol may be useful in a dentist's decision to test saliva. Thus, our study aims to demonstrate a dentist's responsibility in identifying diabetic patients for more effective diagnosis and treatment at semiannual appointments.

Results

The BMI, HbA1c, and salivary resistin levels of T2DM patients were higher than those of healthy controls. A positive correlation of salivary resistin with BMI was found in T2DM. Resistin in saliva of T2DM was more than twice the levels in healthy subjects. The difference of sex distribution, smoking status, history of hypertension or high cholesterol between healthy and T2DM group was not statistically significant.



Salivary HbA1c values were significantly different across groups, with an average of 4.8±0.4 in the healthy group and 7.8±1.7 in the diabetic group. There were significant age differences between groups, with the average age for healthy participants at 43.5±17.3 and 60.2±12.1 for diabetic participants. We assessed the presence of following risk factors for diabetes:

(1) Body mass index (BMI) was calculated from self-reported weight and height and then classified into three BMI categories according to the American Heart Association. 7 are of normal BMI, 16 were overweight, and 17 are obese.

(2) Smoking history: 19 subjects had never smoked, 11 were former smokers, and 10 were current smokers.

(3) History of hypertension: 11 patients indicated a history of HTN and 19 never had it. 6 subjects in the healthy group were hypertensive, in contrast to 15 in the T2DM cohort.

(4) High cholesterol: Of the 18 patients who indicated they were on statin meds, 15 fell into the T2DM group.

(5) History of diabetes in first-degree relatives: 21 subjects had a family history of diabetes, 11 of which were from healthy group and 10 from T2DM group.

Conclusion

This study confers the following findings:

- Salivary resistin is detectable and quantifiable
- Resistin levels are higher in saliva of T2DM patients compared to healthy peers
- Salivary resistin may be used as a marker to evaluate T2DM

Though this study is limited by small sample size, it supports ongoing evidence that resistin is a possible diagnostic tool in the evaluation of T2DM. Diabetes mellitus is a growing and global problem, so identifying early salivary biomarkers is crucial to early intervention. Thus, dentists have an unrealized capability to identify at-risk patients and direct them for appropriate care.

Acknowledgements

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References

1. Rahelic D. [7th Edition of Idf Diabetes Atlas--Call for Immediate Action]. Lijec Vjesn. 2016;138:57-8.
2. Gharibeh MY, Al Tawalbeh GM, Abboud MM, Radaideh A, Alhader AA, Khabour OF. Correlation of plasma resistin with obesity and insulin resistance in type 2 diabetic patients. Diabetes Metab. 2010;36:443-9. Rabe K, Lehrke M, Parhofer KG, Broedl UC. Adipokines and insulin resistance. Mol Med. 2008;14:741-51. Sheng CH, Di J, Jin Y, Zhang YC, Wu M, Sun Y, et al. Resistin is expressed in human hepatocytes and induces insulin resistance. Endocrine. 2008;33:135-43.
3. Srinivasan M, Meadows ML, Maxwell L. Assessment of Salivary Adipokines Resistin, Visfatin, and Ghrelin as Type 2 Diabetes Mellitus Biomarkers. Biochem Res Int. 2018;2018:7463796. Yin J, Gao H, Yang J, Xu L, Li M. Measurement of salivary resistin level in patients with type 2 diabetes. Int J Endocrinol. 2012;2012:359724.