

Gingival Crevicular Blood as a Screening Tool for Diabetic Patient A Randomized Clinical Trial

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Abstract

Objective: To assess and evaluate the authenticity of Gingival Crevicular Blood for screening of diabetes mellitus.

Material & Methods: 53 patients; 27 known diabetic and 26 systemically healthy were enrolled in the present study design. Blood oozing from the gingival crevices of anterior teeth following periodontal probing and finger-prick blood was taken and was analyzed by glucometer.

Results: GCB reading ranged from 78-209 mg/dl with mean \pm s.d (89.2 ± 25.10); while F.P.B value was in the range of 58-190 with mean (123.7 ± 28.3); there was a significant difference obtained between the two values. ($p < 0.5$.)

Conclusion: The present study failed to validate use of GCB for testing blood glucose during routine periodontal examination

Keywords: Diabetes mellitus Gingival crevicular blood, Chronic periodontitis, finger prick blood.

INTRODUCTION

Diabetes mellitus is associated with a wide range of complications, such as retinopathy, nephropathy, neuropathy, micro-vascular and macro-vascular diseases, altered wound healing and periodontitis.¹

Moreover, diabetes and periodontitis seem to interact in a bidirectional manner.² At present, there is strong evidence to suggest that the incidence and severity of periodontitis is influenced in part by diabetes mellitus and the level of blood glucose

control.³ Moreover, periodontal therapy might exert beneficial effects on diabetes control.⁴

Diabetes mellitus is one of the most frequent metabolic disorders with an estimated prevalence of 7% in industrialized countries, of which nearly half the cases are undiagnosed.⁵ Patients with undiagnosed diabetes mellitus are at significantly increased risk for coronary heart disease, stroke and peripheral vascular disease.¹ In addition, recent data indicates that the incidence of the most common type of diabetes mellitus i.e. Type II, maybe increasing by up to 6% per year.⁶

Screening of diabetes at time of periodontal examination provides an additional venue to diagnose and reduce the diabetic burden of the society. Glucometer is routinely used by diabetics for accessing blood sugar levels, recently they have been employed to access the same from gingival crevicular blood.

Periodontal examination as a rule comprises of careful probing of periodontal pockets which result in some amount of bleeding from the gingival sulcus. Instead of swabbing and disposing the gingival crevicular blood this can be employed to assess blood glucose by glucometer.

Number of clinical trials has supported this view while others have refuted the same. Thus the aim of present trial was to evaluate the authenticity of using gingival crevicular blood as a potential site for blood glucose estimation in screening of diabetic individuals.

MATERIALS AND METHOD

53 patients; 27 known diabetic and 26 systemically healthy were enrolled in the present study. Subjects were recruited from outpatient department of Periodontics & Implantology, NIMS Dental College and Hospital, Jaipur after obtaining the clearance from ethical committee.

Inclusion Criteria

1. Diabetic patients with generalized chronic periodontitis diagnosed clinically with presence of periodontal pockets and radiographically with bone loss.
2. Non-diabetic patients with generalized chronic periodontitis diagnosed clinically with presence of periodontal pockets and radiographically with bone loss.

Exclusion Criteria

1. Patients with requirement for antibiotic premedication.
2. Patients with disorder that was accompanied by an abnormally low or high hematocrit. For example, Polycythemia Vera, Anemia, and Dialysis.
3. Patients with intake of substances that interfere with the coagulation system for example, Coumarin derivatives, Non-steroidal anti-inflammatory drugs or Heparin.
4. Patients with severe cardio-vascular, hepatic, immunologic, renal, hematological, or other organ disorders.

Present study was a double blinded randomized controlled trial. First examiner did the periodontal examination and assessed the diabetic history. Second examiner collected gingival crevicular blood glucose readings by collecting blood oozing from the gingival crevices of anterior teeth following periodontal probing with the stick of glucose self monitoring device. Third examiner performed finger prick to access blood glucose level. Glucometer was standardized by known sugar solution after every 10th reading. Patient were informed about the study and written consent was taken from them.

STATISTICAL ANALYSIS

Descriptive data are presented as Mean \pm S.D and range values. The difference between the measurements (Gingival Crevicular blood and finger-prick blood) in the same individual was tested by paired t test. Pearson's product moment correlation coefficient was found to assess the relationship between measurements. Simple linear regression analysis was performed to predict finger prick blood glucose level for any given gingival crevicular blood glucose level. A P-value of 0.05 or less was considered for statistical significance.

RESULTS

54 subjects were divided in two groups, Group 1 (diabetic group) and Group 2, (non- diabetic group). Mean difference between G.C.B and F.P.B reading of diabetic group was 31.8 and for non-diabetic group it was found to be 26.4. Range of 106-212 mg/dl for GCB and 68-190 mg/dl for FPB in diabetic group and a range of 132-78 mg/dl and 58-97 mg/dl respectively for GBB and FPB was found in non-diabetic group.

Mean \pm S.D was 141.5 ± 27.19 and 99.78 ± 29.95 for GCB and FPB respectively in diabetic group. For non-diabetic group Mean \pm S.D was 103.84 ± 12.56 and 77.44 ± 10.36 respectively for GCB and FPB.

A highly significant difference was found between the two groups of diabetic and non- diabetic. $P < 0.001$.

DISCUSSION

Diabetes has emerged as a major health problem in India. According to International Diabetes Federation every fifth diabetic in world would be an Indian by year 2025.⁷ Further the Asian Indian phenotype commonly known as thrifty genotype predisposes Indian population to risk of developing diabetes. It is important to appreciate that these disorders periodontitis do not initiate periodontitis but they may predispose accelerate or otherwise fasten its progression. It has been estimated that about one third of type 2 cases are undiagnosed and screening for undiagnosed type 2 DM is highly recommended.¹⁰

In addition, recent data indicates that the incidence of type 2 DM may be increasing by upto 6% per year.⁶ By this and the close interrelationship between diabetes and periodontitis, it can be assumed that the dental practitioner and especially the periodontists are extremely likely to encounter an increasing number of undiagnosed diabetes patients with periodontitis. The early diagnosis of diabetes however might help to prevent its long-term complications that are responsible for the high morbidity and mortality of diabetic patients.⁸

With regard to the development of painless and noninvasive methods to measure blood glucose, considerable effort has been made in past few years.⁶ However, until now, none are in routine clinical practice.⁸ Since periodontal inflammation with and without complication factor of diabetes is known to produce ample extravasate of blood during diagnostic periodontal examination, no extra procedure, e.g, finger puncture with a sharp lancet is necessary to obtain blood for glucometric analysis.⁹

Even in the case of very low gingival crevicular bleeding, a glucose measurement is possible with the use of self-monitoring device, due to the low amount of blood (μ l) necessary to perform the analysis.¹²

In present study difficulty was reported in collection of blood from gingival crevices, multiple probing was required to collect sufficient amount of blood, also most of the subject preferred finger prick and were comfortable with the same as compared to less gingival crevice blood collection.

In present study there was a significant difference between GCB and F.P.C values indicating both cannot be considered as same. Similar finding was reported in study by Muller 2004 who concluded that there is no usefulness of gingival crevicular blood as bleeding on probing was not sufficient in every third case.

On the contrary 10 examined diabetic patients with unknown periodontal status. and wherein a very strong correlation was observed between gingival crevicular, finger prick capillary and the corrected intravenous blood glucose measurements.¹¹ In another study a strong correlation was observed between GCB and finger stick capillary measured blood glucose when diabetic and non-diabetic patients with moderate to advanced periodontitis were examined.⁵

In the present study, the F.P.B showed consistently lower measurements compared to G.C.B blood glucose. Recently it has been shown that higher glucose level may be detected in gingival crevicular fluid of periodontally diseased site as compared to healthy which could explain the aforementioned difference obtained.

CONCLUSION

Present study failed to prove the authenticity of gingival crevicular blood as a screening tool in diabetes mellitus. The two values had significant difference implying that both cannot be considered as equivalent. Further study on a larger population is desirable to establish the much hyped relation.

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