Evaluation of the Efficacy of Gingival Crevicular Blood in Predicting the Glycemic Control

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Abstract

Background and Aim: Diabetes has emerged as a major healthcare problem in India. Diabetes and periodontitis interact in a bidirectional manner; therefore, there is a need to screen patients for diabetes in dental clinics. Development of an intraoral blood sampling technique would make screening easier for dental practitioners. Routine oral examination of patients with periodontal inflammation with or without diabetes produce ample bleeding which can be used in glucometers for screening diabetes mellitus. Therefore, the aim is to assess if gingival crevicular blood (GCB) is as efficient as capillary finger prick technique in estimating the glycemic status. Settings and Design: This was a cross-sectional study. Materials and Methods: Fifty-eight participants with gingivitis or periodontitis with bleeding on probing from at least one site were chosen. Periodontal parameters such as Probing pocket depth and gingival index were measured using William’s graduated periodontal probe. GCB and capillary finger prick blood (CFB) were collected for the estimation of blood glucose with the help of glucometer. Statistical Analysis: Performed using Pearson’s correlation coefficient. Results: The Pearson correlation coefficient of GCB and CFB was 0.982 with a \( P < 0.001 \). Conclusion: It can be concluded that GCB can be used for the estimation of glycemic status.

Keywords: Capillary finger prick blood, diabetes, gingival crevicular blood

INTRODUCTION

Diabetes has emerged as a major healthcare problem in India. About half of the diabetic patients are undiagnosed, as diabetes mellitus (DM) is asymptomatic in its early stages.\(^1\)\(^,\)\(^2\) It is a complex metabolic disorder.\(^2\) DM significantly impacts the periodontium producing a number of effects including change in subgingival microbiota, gingival crevicular fluid glucose levels, periodontal vasculature, host response (neutrophil chemotaxis defects), and collagen metabolism.\(^2\) In fact, periodontitis is considered as the sixth complication of DM.\(^3\) Diabetes and periodontitis interact in a bidirectional manner.\(^4\) Therefore, there is a need to screen patients for diabetes in dental clinics. Glucometers are reliable, rapid, and commonly used for blood glucose determination in diabetes screening. Development of an intraoral blood sampling technique could make such tests even more suitable for use by dental practitioners. Routine oral examination of patients with periodontal inflammation with or without diabetes produce ample bleeding,\(^5\) which can be used in glucometers for screening DM. Therefore, the main aim of this study is to assess if gingival crevicular blood (GCB) is as efficient as capillary finger prick technique in estimating the glycemic status.

MATERIALS AND METHODS

Fifty-eight participants with gingivitis or periodontitis with bleeding on probing from at least one site were chosen. Periodontal parameters such as Probing pocket depth and gingival index were measured using William’s graduated periodontal probe.

Inclusion criteria
1. Participants aged between 30 and 70 years
2. Gingival index scores \( \geq 2.1 \).

Exclusion criteria
1. Participants requiring antibiotic prophylaxis
2. Participants with any bleeding disorders

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3. Participants with cardiovascular, renal, and hepatic disorder.

GCB was estimated using a glucometer, after isolating the area with cotton roll to reduce the contamination of the sample with saliva, the site with maximum bleeding on probing was selected, and sample was collected by directly placing the glucometer with the detection strip in the bleeding site. Capillary finger prick blood (CFB) was tested with glucometer by pricking the finger with a lancet [Figures 1, 2a, b, 3, and 4a, b shows the steps in checking GCB and CFB].

**Statistical analysis**
Both the samples of 58 patients were analyzed using a glucometer, and the values were tabulated. Statistical analysis was performed using Pearson’s correlation coefficient, and the correlation was statistically significant at a \( P < 0.001 \).

**RESULTS**
A total of 58 participants were included in the study in the age group 30–70 years with a mean age being 44.29 ± 8.8, and the mean probing pocket depth was 6.47 ± 0.7 [Table 1].

The GCB glucose value ranged between 84 and 289 mg/dl with mean value being 143.47 ± 49.192 and the CFB glucose value ranged between 86 and 282 with a mean value of 135.97 ± 49.362 [Table 2].

The Pearson correlation coefficient of GCB and CFB was 0.92 with a \( P < 0.001 \). Scattered graph shows a linear correlation between GCB glucose value and CFB glucose value and it gives a strong correlation [Table 3 and Graph 1].

**DISCUSSION**
Diabetes being a complex metabolic disorder[3] and most of the patients coming to the dental clinics are unaware about their diabetic status. In case of periodontal inflammation, routine oral examination can produce ample bleeding (GCB) which can be used for the estimation of blood glucose using a glucometer.

The present study shows high correlation between GCB glucose and CFB glucose and is found that GCB can be used

### Table 1: Mean age and probing pocket depth

| Variable                  | \( n \) | Maximum | Minimum | Mean±SD  |
|---------------------------|---------|---------|---------|---------|
| Age                       | 58      | 67      | 30      | 44.29±8.8 |
| Probing pocket depth      | 58      | 8       | 5       | 6.47±0.7  |

SD: Standard deviation

### Table 2: Mean gingival crevicular blood and capillary finger prick blood

| Variable                  | \( n \) | Range     | Mean±SD |
|---------------------------|---------|-----------|---------|
| GCB glucose (mg/dl)       | 58      | 84-289    | 143.47±49.192 |
| CFB glucose (mg/dl)       | 58      | 86-282    | 135.97±49.362 |

GCB: Gingival crevicular blood, CFB: Capillary finger prick blood, SD: Standard deviation

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**Figure 1:** Isolation with cotton rolls

**Figure 2:** (a and b) Bleeding on probing

**Figure 3:** Estimation of blood glucose – using glucometer

**Figure 4:** (a and b) Finger pricking using lancet
Shereef, et al.: The efficacy of gingival crevicular blood examination in participants with diabetes and periodontitis, but not in those without diabetes. However, Müller and Behbehani[10] failed to obtain any correlation between GCB and CFB.

**Conclusion**

From the above discussion, it can be concluded that GCB can be a potential source for screening diabetes during routine periodontal examination in dental clinics in patients with unknown history of diabetes and moderate bleeding on probing.

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**Conflicts of interest**

There are no conflicts of interest.

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