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Gingival Crevicular Blood as a Diagnostic aid for the Detection of Diabetes Mellitus: an in-Office Chairside Test in Dental Practice

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Abstract

Background: Diabetes is a chronic metabolic disease because of the elevated levels ofglucose in the blood. And usually most of the diabetic patients are left undiagnosed in their early stages of the disease because of the unnoticeable symptoms by the patients
which could lead to the severe damage to the body system, hence an early diagnosis isvery important and life saving in diabetic patients.

Aim: aim of the present study is to evaluate the accuracy of gingival crevicular blood as adiagnostic tool in diabetic patients.

Methods: This study involves total 50 patients 25 diabetic and 25 non diabetic patients, with moderate to severe periodontitis. Regular dental check-up is done including periodontal pocket depth probing. Blood oozing from the gingival crevice wascollected with the strips of glucose self monitoring devise. To the same patient finger stick Blood glucose level and venous blood[VB] glucose level with standardized laboratory method was taken.

Results: The results showed significant strong correlation between all three groups.With p value ($P < 0.001$).

Conclusion: Blood oozing during the pocket detection can be used for diagnosing aidin diabetes.

Keywords: gingival crevicular blood, Finger stick blood, venous blood, diabetes mellitus,Glucometer, chronic periodontitis.

Introduction

The term diabetes mellitus describes a metabolic disorder of multiple aetiology characterized by chronic hyperglycaemia with disturbances of carbohydrate, fat and protein metabolism resulting from defects in insulin secretion, insulin action, or both.[1] the chronic hyperglycaemia of diabetes is associated with long-term damage, dysfunction, and failure of different organs, especially the eyes, kidneys, nerves, heart, and blood vessels. Symptoms of marked hyperglycaemia include polyuria, polydipsia, weight loss, sometimes with polyphagia, and blurred vision.[2]

Chronic Periodontitis. An infectious disease resulting in inflammation within the supporting tissues of the teeth, progressive attachment, and bone loss. It is characterized by pocket formation and/or gingival recession. It is recognized as the most frequently occurring form of periodontitis. [7]Diabetes mellitus and periodontitis are both common, chronic diseases. It is generally accepted that the inter-relationship between diabetes mellitus and periodontitis is a two-way relationship, i.e. the presence of one condition tends to increases the risk and severity of the other, and vice versa.[3] It is widely accepted that diabetes mellitus is a risk factor for increased prevalence and severity of periodontitis. Conversely, periodontitis is an important factor for increased risk of diabetic complications in patients with diabetes.[4]

Periodontal disease is more prevalent and more severe in persons with diabetes than in non-diabetic persons. Indeed, the periodontal signs and symptoms are now recognized as the "sixth complication" of diabetes.[5]usually dentist come across the chronic periodontitis patients with diabetes and may or may not be knowing it. Hence early diagnosis of diabetes with a chair side non- invasive , rapid test of gingival crevicular blood with glucometer could be most helpful and widely acceptable by the patients.

Materials and Methods:

A total number of 50 patients are selected , and subjected to routine clinical periodontal examinations, Patients with moderate [periodontal pocket depth 3-5 mm] to severe periodontitis [>6] are included in the study. After taking the personal and medical history the patients are divided into 2 groups.

Group – 25 known diabetic patients

Group- 25 Non diabetic patients

Including Criteria: Patient aged 30-65 years, periodontitis, Diabetic patients with generalized moderate to severe chronic periodontitis and co-operative patients.

Excluding criteria: Patients under Antibiotic therapy, Patients on any kind of anticoagulants, Pregnancy, Patients having any blood disorders and patients with severe cardiovascular, hepatic, immunologic, renal, haematological, or other organ disorders.

Institutional ethical committee clearance was taken , and a written and informed consent was obtained from all the patients of the study. all the participants were asked to rinse oral cavity with 0.2% chlorhexidine to reduce the microbial load. Maxillary anterior teeth are taken as test site. The area is air dried and isolated to minimize the contamination. Periodontal pocket was probed with unc-15 probe, and the profuse bleeding site was noticed. The self-monitoring glucometer[Accu-check Roche Diagnostic, Germany] was used according to manufacturer's recommendations to detect the glucose levels in gingival crevicular blood, and the reading was noted down. After that the readings were also noted from the finger stick blood [FSB], and reading was taken. After the two tests the estimation of glucose level using venous blood from the venepuncture of the anterior cubital vein. Using a sterile syringe and needle 2 ml of blood was collected and glucose level is

estimated with the help of automated chemistry analyser.

Data obtained was tabulated and statistically analysed Mean and standard deviations were calculated for both the groups using Karl Pearson correlation coefficient, unpaired 't' test and associated 'p' value.

A.Glucose estimation using GCB	B. Glucose estimation using GCB
C.Glucose estimation by FSB	D.Venous blood collection for glucose estimation

Results

A total number of 50 chronic generalised gingivitis patients are participated in the study. Among them 25 are known diabetic and 25 patients are non-diabetics.

The comparison of blood glucose levels of GCB with FSB and VB showed that for diabetic group, the mean GCB, FSB and VB glucose level were 146.07±39.23 mg/dl, 156.61±42.18 mg/dl and 146.12±39.89mg/dl respectively. Similarly, for the non-diabetic group, the mean GCB, FSB and VB glucose level were 88.70±11.07mg/dl, 97.35±13.05 mg/dl and 91.41±9.30 mg/dl respectively. Theresults were statistically highly significant ($p < 0.005$) in both the groups for GCB with FSB while non- significant ($p > 0.005$) for GCB with VB in both the groups (Table 1).

The correlation coefficient (r) in both the groups showed a strong positive correlation between glucose levels of GCB with FSB and VB with the values of 0.786 and 0.672 in diabetic group and 0.867 and 0.648 in non-diabetic group respectively (Table 1}.

The correlation between the glucose levels of FSB and VB showed a coefficient (r) value of 0.943and 0.748 in both diabetic and non-diabetic groups and represents a strong positive relationship (Table 2).

TABLE 1: CORRELATION COFFECIENT BETWEEN GCB, FB AND VB

Groups	Parameters	Mean	R value	P value	Significance
Diabetic	GCB	146.07±39.23	R=0.786	0.001	Significant
	FB	156.61±42.18			
	GCB	146.07±39.23	R=0.672	P=0,459	Non-Significant
	VB	146.12±39.89			
Non-Diabetic	GCB	88.70±11.07	R=0.867	P=0.001	Significant
	FB	97.35±13.05			
	GCB	88.70±11.07	R=0.648	P=0,652	Non-Significant
	VB	91.41±9.30			

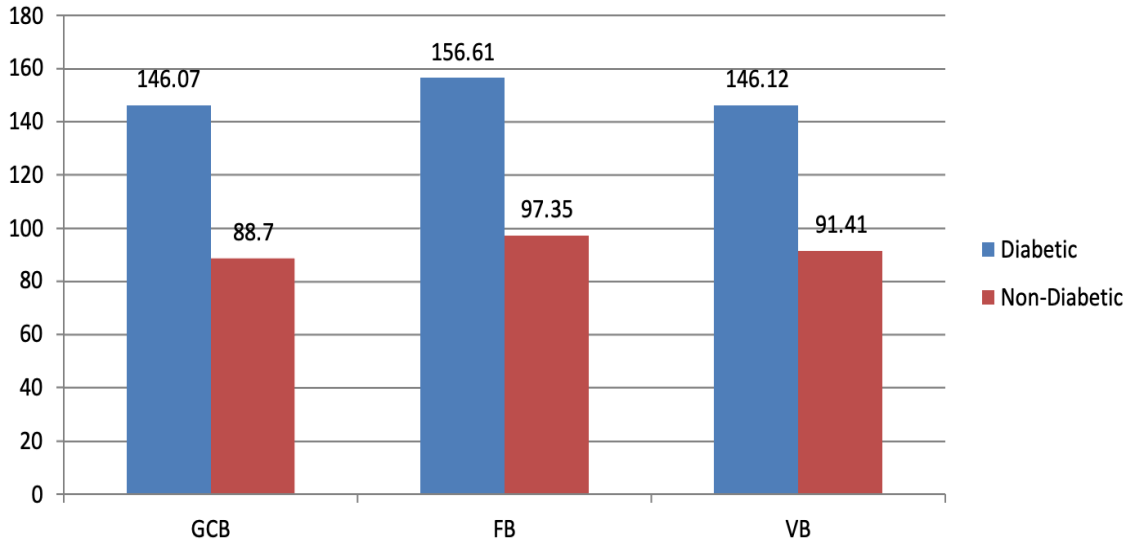
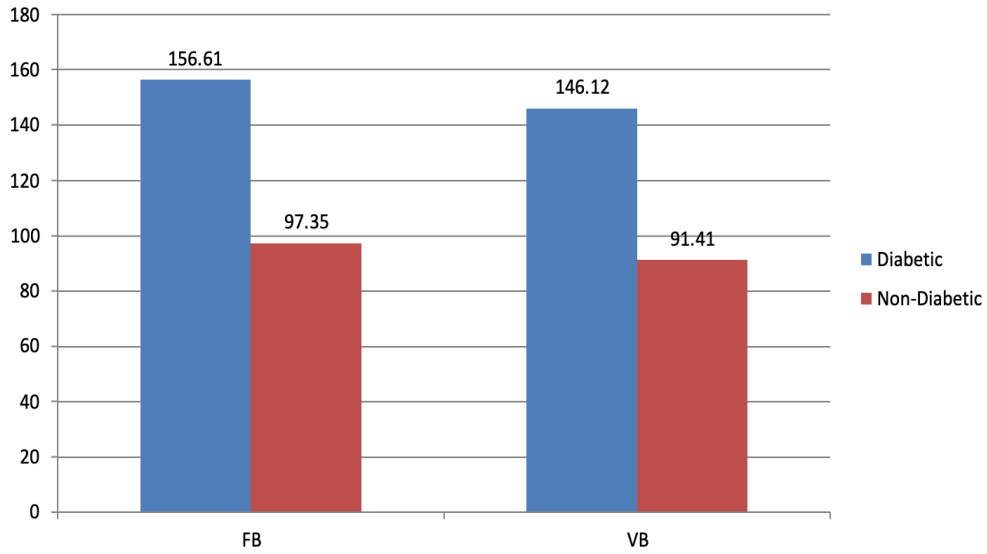


TABLE 2: CORRELATION OF FB WITH VB

Groups	Parameters	Mean	R value	P value	Significance
Diabetic	FB	156.61±42.18	R=0.943	P=0,001	Significant
	VB	146.12±39.89			
Non-Diabetic	FB	97.35±13.05	R=0.748	P=0,001	Significant
	VB	91.41±9.30			



Discussion

Diabetes is a group of metabolic diseases characterized by hyperglycaemia resulting from defects in insulin secretion, insulin action, or both. The chronic hyperglycaemia of diabetes is associated with long-term damage, dysfunction, and failure of different organs, especially the eyes, kidneys, nerves, heart, and blood vessels. Symptoms of marked hyperglycaemia include polyuria, polydipsia, weight loss, sometimes with polyphagia, and blurred vision. Impairment of growth and susceptibility to certain infections may also accompany chronic hyperglycaemia. Acute, life-threatening consequences of uncontrolled diabetes are hyperglycaemia with ketoacidosis or the nonketotic hyperosmolar syndrome. Long-term complications of diabetes include retinopathy with potential loss of vision; nephropathy leading to renal failure; peripheral neuropathy with risk of foot ulcers, amputations, and Charcot joints; and autonomic neuropathy causing gastrointestinal, genitourinary, and cardiovascular symptoms and sexual dysfunction. Patients with diabetes have an increased incidence of atherosclerotic cardiovascular, peripheral arterial, and cerebrovascular disease. Hypertension and abnormalities of lipoprotein metabolism are often found in people with diabetes.[2] There is a two-way relationship between DM and periodontitis. On one hand, poorly controlled DM increases the risk for developing destructive periodontitis and impairs treatment outcome. On the other hand, chronic inflammatory periodontal disease considerably complicates diabetic control.[6] Periodontitis is added as the 6th complication of thediabetes [5]

The degree of hyperglycaemia (if any) may change over time, depending on the extent of the underlying disease process , hence early is very important in these patients. And periodontitis is one of the early finding in diabetics that we as a dentist will come across in our regular practice. Blood glucose testing with the self-monitoring devices is sensitive method, since it can give results with small amount of blood and is very less time consuming. GCB collected during periodontal examination is an excellent source of blood, safe, easy to perform and comfortable to the patient. Moreover, the technique described is more familiar and less traumatic to the patient than a finger-puncture.[7]

The use of gingival crevicular blood to measure blood glucose is likely to be more acceptable to the dental professional and the patient because provider and patients anticipate oral intervention in the dental office. Persons can reliably be screened for diabetes by measuring glucose in gingival crevicular blood sample, since probing and gingival crevicular blood collection is less time consuming and did not increase the patient's discomfort.[8]

The comparison of blood glucose levels of GCB with FSB and VB in our study showed that for diabetic group, the mean GCB, FSB and VB glucose level were 146.07±39.23 mg/dl, 156.61±42.18 mg/dl and 146.12±39.89mg/dl respectively, and for the non-diabetic group, the mean GCB, FSB and VB glucose level were 88.70±11.07mg/dl, 97.35±13.05 mg/dl and 91.41±9.30 mg/dl respectively.

The results were highly significant ($p < 0.005$) in both the groups for GCB with FSB but non-significant ($p > 0.005$) for GCB with VB . The correlation coefficient (r) showed a strong positive correlation between glucose levels of GCB with FSB in both the groups and VB (Table 2). Similarcorrelation was observed by Parker et al.[8],and Beikler et al.[9] and Sarita Parihar et al [10] in their studies.

But study by Tsutsui et al.[11] found a slightly lower correlation between the glucose values of GCB and FSB ($r = 0.782$). It may be due to the difference in the methodology used.

Conclusion

From the values of the above study we can conclude that GCB collected during the routine clinical examinations can be used as a diagnostic method for screening the diabetic patients in regular dental setup. Which could be a safe non invasive and less painful and highly compatible to both the patient and doctor as well.

References

1. K.G.M.M. Alberti , P.Z. Zimmet. Definition, Diagnosis and Classification of Diabetes Mellitus and its Complications Part 1: Diagnosis and Classification of Diabetes Mellitus Provisional Report of a WHO Consultation. DIABETIC MEDICINE, 1998; 15: 539–553
2. American Diabetes Association: Diagnosis and Classification of Diabetes Mellitus.
3. Diabetes Care. 2014;Volume 37, Supplement 1,
4. Xiaodong Zhou a, Wenyi Zhang. Interrelationship between diabetes and periodontitis: Role of hyperlipidemia. Archives of Oral Biology 2014; AOB-3289
5. Robert G. Nelson, Marc Shlossman . Periodontal Disease and NIDDM in Pima Indians. Diabetes CARE, 1990; 13: 8,
6. Harald Loe. Periodontal Disease The sixth complication of diabetes mellitus. Diabetes CARE.1993;16:1.
7. Grossi SG, Genco RJ. Periodontal disease and diabetes mellitus: a two way relationship. Ann Periodontol. 1998;3:51–61.
8. Pramod Kumar, Bhrugesh J. Panseriya . Gingival Crevicular Blood: A Fast, Safe, Noninvasive and Chairside Method of Diabetic Screening. International Journal of Scientific Study.2013;1:2
9. PARKER, RAPLEY, ISLEY. Gingival Crevicular Blood for Assessment of Blood Glucose in Diabetic Patients. / Periodontol 1993;64:666-672.
10. T. Beikler, A. Kuczek, In-dental-office screening fordiabetes mellitus using gingival crevicular blood. J Clin Periodontol 2002; 29: 216–218.
11. Parihar et al. Estimation of gingival crevicular blood glucose level for the screening of diabetes mellitus: A simple yet reliable method . Journal of Oral Biology and Craniofacial Research .2016; 198–203.
12. Tsutsui P, Rich SK, Schonfeld SE. Reliability of intraoral blood for diabetes screen-ing. J Oral Med. 1985;40:62–66.