

Efficiency of Use of Gingival Crevicular Fluid as a Chair Side Screening Aid for Diabetes in Patients with Chronic Periodontitis. A Observational Study

Abhishek Kandwal¹, Dr Gunjan Aggarwal², Dr Nidhi Yadav³,
Dr Shailja Sharma⁴

¹MDS Periodontology Assistant Professor, Department Of Dental Surgery

²Himalayan Institute of Medical Sciences, SRHU; Dehradun

³Reader Department Of Periodontology Geetanjali Dental & Research Institute, Udaipur

⁴Reader Department of Oral Medicine & Radiology Jodhpur Dental College General Hospital
Jodhpur

⁵Post Graduate Student Department Of Oral Pathology Seema Dental Collage & Hospital Rishikesh

Abstract

Background : Diabetes is one of the most prevalent disease in Indian subcontinent . periodontitis is a know as the sixth complication of diabetes mellitus . Periodontist thus are at a crucial position to examine gingival crevicular blood to screening for diabetes during there routine clinical procedures. Present study focuses on relevance of using gingival crevicular blood as a screening tool to access blood glucose level of patients.

Method: 150patients with established diagnosis of chronic Periodontitis and type 2 diabetes mellitus were enrolled in the study. Blood oozing from the gingival crevices of anterior teeth following periodontal probing was collected. Similarly finger-prick blood was taken and both were analyzed by a standard glucometer.

Results: Mean \pm S.D was 216.34 ± 32.18 and 198.83 ± 18.24 for GCB and FPB respectively was observed in patients of chronic periodontitis and type 2 diabetes mellitus. Unpaired t- test between the two values was statistically significant ($p < 0.05$). A Pearson correlation coefficient value of $r = + 0.063$ was seen comparing GCB and FPB.

Conclusion: Present study supports that the gingival crevicular blood and figure prick blood do not show consistency in measuring similar blood glucose level and hence gingival crevicular blood show not be used as a tool to screening diabetes mellitus.

Keywords: Diabetes mellitus, Gingival crevicular blood, Chronic periodontitis, Finger prick blood

I. Introduction

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 the year 2025. ¹Diabetes is associated with various systemic complications. Periodontitis is the sixth complication of diabetes, which puts Indian population at a higher risk of developing it secondary to diabetic status. The two way relation of periodontal destruction and diabetes mellitus make diabetic screening essential in periodontitis. Majority of diabetes patients remain undiagnosed due to lack of medical infrastructure and silent nature of this disease.⁴⁻⁶ Screening for type 2 DM would alone lead to earlier recognition of cases, with the potential to intervene earlier in the disease course. Early diagnosis may prevent long term complications of diabetes. Identification of screening platform is essential to face the epidemic of diabetes in indian subcontinent as community screening would be expensive strategy.⁷⁻⁹

Dental clinic provide an excellent opportunity and platform to screening of diabetes. As diabetes and periodontitis have a bidirectional relationship , dentist especially periodontist stand in a good position to cater all walk in patients by doing a simple blood glucose estimation. Hence providing additional hands in diagnosing the diabetes in undiagnosed cases.¹⁰ Glucose estimation by use of gingival crevicular blood is been talked about and there is lot of scientific data regarding the same. The purpose of present study is the analyze the efficiency of use of gingival curricular fluid as a chair side screening aid for diabetes in patients with chronic periodontitis.

II. Materials and method:

150 Consecutive patients with chronic Periodontitis and type 2 diabetes mellitus were enrolled in the current observational study. All patients were scheduled for either one of the following dental intervention such as supragingival scaling ,subgingival scaling, root planning , periodontal flap surgery. After obtaining informed consent from the patients a through dental screening including periodontal pocket examination was

done and at same visit a gingival crevicular blood and finger prick blood was taken and recorded with a standard glucometer. Glucometer was standardized by known sugar solution after every 10th reading. Prior to probing, all the subjects were subjected to rinsing the oral cavity with 0.2% chlorhexidine in order to minimize microbial load.

Sample collection method for GCB : After detailed periodontal examination patients with > 5mm periodontal pockets in maxillary anterior teeth were selected for procurement of GCB sample with a 2mm micropipette. Sites with exudate and pus discharge or thick band of calculus were excluded. Care was taken not to get the blood contaminated with saliva. blood was transferred from micropipette into glucometer strip for estimation of blood glucose level. Glucometer was standardized by known sugar solution after every 10th reading.

Sample collection method for FPB: Samples for finger-capillary blood were drawn from preferably the index finger of the subject. The pad of the finger was wiped with alcohol, allowed to dry, and then punctured with sterile lancet. Sample was drawn onto the test strip preloaded in the glucometer and was held until the instrument gave a beep displaying the blood glucose measurements on the screen in mg/dl.

Inclusion criteria

1. Patient aged 25-65 years
2. Periodontal pocket depth > 5mm.
3. No purulent discharge from periodontal pocket .
4. Diabetic patients with generalized chronic periodontitis diagnosed clinically with presence of periodontal pockets and radiographically with bone loss.
5. Patients giving informed consent for the study

Exclusion criteria

1. Antibiotic therapy.
2. Patients with any blood disorders.
3. Pregnancy
4. Patients on any kind of anticoagulants .
5. Patients with severe cardio-vascular, hepatic, immunologic, renal, hematological, or other organ disorders.

Statistical analysis: The data obtained were analyzed using Statistical Package for Social Sciences, version 19.0 (SPSS). Descriptive data are presented as Mean \pm S.D and range values. The difference between the two site i.e gingival crevicular blood site and finger prick blood site for same patients was assessed by using unpaired t test. Pearson's product moment correlation coefficient was found to assess the relationship between difference of these two measurements(GCB and FPB). A P-value of 0.05 or less was considered for statistical significance. All Patients were informed about the study and a written consent was also taken. Ethical clearance was taken from the ethical committee, according to the the Helsinki Declaration of the 1975, as revised in 1983

III. Results

150 subjects were analyzed and the finding were as follow. Range of 184 - 248 mg/dl for Gingival crevicular blood and 180- 216 mg/dl for Finger prick blood was observed with Mean \pm S.D of 216. 34 \pm 32.18 and 198. 83 \pm 18.24 for Gingival crevicular blood and Finger prick blood respectively.

(Table 1) On applying unpaired t test, the difference between the two site of blood collection was found to be statistically significant. A Pearson correlation coefficient value of $r = + 0.063$ for Gingival crevicular blood and Finger prick blood was seen. ($P < 0.05$.) (Table 2)

IV. Discussion

Diabetes is considered as one of the most prevalent metabolic disorder which effect individual of any socioeconomic strata. Diabetes has emerged as major health problem in India. Rees et al reported a increase of upto 6% per year in incidence of type2 DM. According to International Diabetes Federation every fifth diabetic in world would be an Indian by year 2025. Further the Asian Indian phenotype commonly known as thrifty genotype predisposes Indian population to risk of developing diabetes. Periodontitis is a known complication of diabetes mellitus and is known as sixth complication. ¹⁰ periodontitis is a inflammatory disease which leads to bleeding from gingival sulcus this could be used to access blood glucose levels. ¹¹ Diabetes and periodontitis have a bidirectional relationship, many time patients with severe periodontal disease is diagnosed with Diabetes mellitus on suspicion of periodontist.

Dental clinic provide an excellent platform to screen patients with diabetes mellitus . As the patient comes to a dental clinic for regular checkup, there is a periodontal probing that leads to oozing of blood that can be used for testing diabetes. Considering the increasing lode of diabetes in indian subcontinent and close interrelationship between diabetes and periodontitis, it can be considered that the dentist and especially the periodontist 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.⁵⁻⁶

In present study due to inclusion of periodontal pockets > 5mm collection of GCB was easy, painless and efficient. We did not faced any difficulty in collecting the sample and amount of sample was adequate to place on glucometer strip for blood glucose estimation. On the contrary Muller et al concluded that there is no usefulness of gingival crevicular blood as bleeding on probing was not sufficient in every third case.¹²

In present study there was a statistically significant difference between GCB and FPB values indicating both cannot be considered as same. The value of GCB was consistently higher for every reading compared to FPB values. It is difficult to rule out contamination of GCB from Gingival crevicular fluid (GCF). GCF is known to have glucose as its constituent, hence the blood sugar content cannot be accessed correctly and this might be the reason we got higher reading for every individual as compared to FPB readings. Parker et al reported a strong correlation between gingival crevicular, finger prick capillary and the corrected intravenous blood glucose measurements.¹³ Bieker et al also reported the similar finding suggesting GCB can be used as screening tool for diabetes in patients with moderate to severe periodontitis.¹ In the study by Gaikwad similar findings were reported.¹⁴ There was also a similar profile between GCB and FPB studied by Kaur et al. Similar to our findings debnath et al and kandwal et al reported no relevance of GCB in screening of diabetes.¹⁶⁻¹⁷ A very weak positive correlation was seen between the gingival crevicular blood reading and finger prick blood for both groups indicating that the two screening tools do not correlate. In the present study, the FPB showed consistently lower measurements compared to G.C.B blood glucose. This can be attributed to the presence of higher quantity of glucose in inflammatory conditions such as periodontitis as compared to healthy sites.¹⁸

V. Conclusion

Present study summarized that there is no consistency in the GCB and FPB readings of same individual and hence this cannot be used to be a tool for screening diabetes mellitus. The Pearson correlation coefficient is very weak further supporting the notion that though the two values are related but not similar. Hence interpretation of GCB as screening tool for diabetes is not justifiable, it might reflect association with FPB but it can not substitute the same. Further long term studies with larger population based data would shed more light on this novel screening tool.

References

- [1]. Beikler T., Kuczek A., Petersilka G., Flemming T.F. In-dental-office screening for diabetes mellitus using gingival crevicular blood. *J Clin Periodontol.* 2002;29:216–218.
- [2]. Report of the expert committee on the diagnosis and classification of diabetes mellitus. *Diabetes Care.* 1997;20:1183–1197.
- [3]. Rees T.D. Periodontal management of the patient with diabetes mellitus. *Periodontol* 2000. 2000;23:63–72.
- [4]. Harris M.I., Klein R., Welborn T.A., Knudman M.W. Onset of NIDDM occurs at least 4–7 years before clinical diagnosis. *Diabetes Care.* 1992;15:815–819.
- [5]. Stein G.M., Nebbia A.A. A chair side method of diabetic screening with gingival blood. *Oral Surg Oral Med Oral Pathol.* 1969;27:607–612.
- [6]. Ainamo J., Lahtinen A., Vitto V.J. Rapid periodontal destruction in adult humans with poorly-controlled diabetes. A report of 2 cases. *J Periodontol.* 1990;17:22–28.
- [7]. U. K. Prospective Diabetes Study Group U.K. Prospective Diabetes Study 16; overview of 6 years' therapy of type II diabetes: a progressive disease. *Diabetes.* 1995;44:1249–1258.
- [8]. Grossi S.G., Genco R.J. Periodontal disease and diabetes mellitus: a two-way relationship. *Ann Periodontol.* 1998;3:51–61.
- [9]. Nishimura F., Takahashi K., Kurihara M., Takashiba S., Mura-yam Y. Periodontal disease as a complication of diabetes mellitus. *Ann Periodontol.* 1998;3:20–29.
- [10]. Sicree R., Shaw J., Zimmet P. Diabetes and impaired glucose tolerance. In: Gan D., editor. *Diabetes Atlas.* International Diabetes Federation; Belgium: 2006. pp. 15–103.
- [11]. Tsutsui P., Rich S.K., Schonfeld S.E. Reliability of intraoral blood for diabetes screening. *J Oral Med.* 1985;40:62–66.
- [12]. Muller H.P., Behbehani E. Screening of elevated glucose levels in gingival crevice blood using a novel, sensitive self-monitoring device. *Med Princ Pract.* 2004;13:361–365.
- [13]. Parker R.C., Rapley J.W., Isley W., Spencer P., Killoy W.J. Gingival crevicular blood for assessment of blood glucose in diabetic patients. *J Periodontol.* 1993;64:666–672.
- [14]. Gaikwad S., Jadhav V., Gaurav A., Shete A.R., Dearda H.M. Screening for diabetes mellitus using gingival crevicular blood with the help of a self monitoring device. *J Periodontal Implant Sci.* 2013;43:37–40.
- [15]. Kaur H., Jain S., Bansal S. Minimal invasive chair side procedure for the estimation of glucose level using gingival crevicular blood. *Indian J Dent Sci.* 2012;1:43–46.
- [16]. Crevicular blood in diabetic and non-diabetic patients: A randomized clinical trial. *J Oral Biol Craniofac Res.* 2015; 5: 2–6.
- [17]. Kandwal A., Batra M. Gingival crevicular blood as a screening tool for diabetic patient: a randomized clinical trial. *Ann Dent Speciality.* 2014;2:6–8.
- [18]. Position Paper Diabetes and periodontal diseases. *J Periodontol.* 1999;70:935–949.

Groups	No. of patients	Particulars	GCB (mg/dl)	FPB (mg/dl)	P value
Observation cohort	150	Mean	216.34	198.83	< 0.05
		SD	32.18	18.24	
		Range	184 - 248	180-216	

Table 1: Mean, Standard deviation and Range values of Glucose levels measured at different sites .

GCB vs FPB	Pearson correlation coefficient (r)	P VALUE
Observation cohort	+ 0.063	<0.05

Table 2: Karl Pearson correlation coefficient for GCB vs FPB