Original Article

Correlation of Salivary Glucose and Blood Glucose Level in Diabetes Patients - A Clinical Study

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ABSTRACT:
Background: The estimation of diabetes mellitus may be done with blood investigations. Saliva is only one of its kind and curiosity in it as a diagnostic media has vastly developed. The present study was conducted to correlate the salivary glucose level with blood glucose level in diabetes patients. **Materials & Methods:** Group I included controlled DM patients, group II had uncontrolled DM patients and group III had non diabetic subjects (Control). In all subjects, saliva and blood samples were collected after 8 hour of fasting, 2 hour after meal at afternoon and one more sample in the evening to estimate FBG, PPBG and RBG level. **Results:** FBG was significantly (P-0.001) higher in group II as compared to group I and group III. The PPBG level was significantly (P-0.001) higher in group II as compared to group I and group III and RBG was also higher in group II as compared to group I and group III. There was a significant correlation between FBG and FSG in all groups (P<0.05). **Conclusion:** Salivary glucose level in increased in DM patients. Saliva is a excellent diagnostic tool to detect diabetes.
Key words: Diabetes mellitus, Glucose, Saliva.

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INTRODUCTION

Diabetes mellitus (DM) is a group of common metabolic disorders that share the phenotype of hyperglycemia, which are caused by a complex interaction of genetics and environmental factors. The prevalence of diabetes is rapidly rising all over the world. It has now become the disease of morbidity and mortality affecting the youth and middle aged people. Type 2 diabetes mellitus has higher prevalence rate all over the world which accounts for more than 90 percent of all diabetes cases., but number of type I diabetes mellitus cases is increasing excessively nowadays.[1]

The number of diagnosed diabetic patients is 61.3 million so far. According to the International Diabetes Federation (IDF), at the end of 2030, the number of people with type 2 diabetes mellitus will increase to 552 million. India will contribute 21% of cases, which is very high for a single country. The most common chronic complications are erectile dysfunction, visual disturbance, and cardiovascular disorders, though hypertension alone was, neuropathy and nephropathy. The common risk factors for occurrence of complications were gender, long duration with diabetes, poor and inadequate glycemic control, negative attitude towards diabetes, poor treatment adherence, and poor knowledge about the disease and its management.[2]

The estimation of diabetes mellitus may be done with blood investigations. These are invasive procedures and offer a great deal of discomfort and anxiety, especially to pediatric and geriatric patients. Considering this, there is a critical need for the development of noninvasive procedure for diagnosing and monitoring diabetes. Saliva is only one of its kind and curiosity in it as a diagnostic media has vastly developed.[3] The present study was conducted to correlate the salivary glucose level with blood glucose level in diabetes patients.

MATERIALS & METHODS

The present study was conducted in the department of oral pathology. It included 150 subjects of both genders. All were informed regarding the study and written consent was obtained. Ethical clearance was taken from institutional ethical committee.
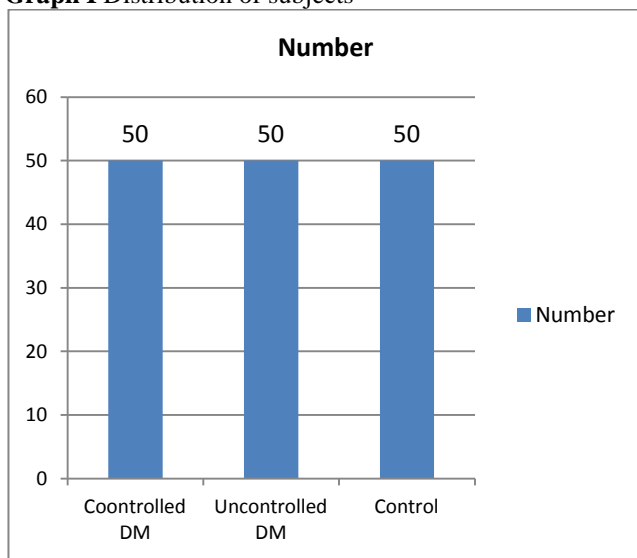
General information such as name, age, gender etc was recorded. All were divided into 3 groups of 50 each. Group I included controlled DM patients, group II had

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uncontrolled DM patients and group III had non diabetic subjects (Control).

In all subjects, saliva and blood samples were collected after 8 hour of fasting, 2 hour after meal at afternoon and one more sample in the evening. 2ml of the unstimulated whole saliva was obtained from subjects by draining method. A volume of 2 ml of peripheral venous blood was collected from the antecubital vein with syringe into a sterile test- tube. Each unstimulated saliva sample and blood sample were centrifuged at 3000 rpm for 20 min. Clear supernatants were processed immediately for estimation of glucose. Glucose was analyzed by glucose oxidase end- point assay. Automatic analyzer was used for the estimation of glucose level. Results thus obtained were subjected to statistical analysis using chi- square test. P value less than 0.05 was considered significant.

RESULTS

Graph I Distribution of subjects

Graph I shows that group I included 50 controlled DM patients, group II had 50 uncontrolled DM patients and group III had 50 non diabetic subjects (Control).

Table I Comparison of mean FBG, PPBG and RBG in all groups

	Mean	P value
FBG		
Group I	122.43±42.35	
Group II	280.13±78.27	0.001
Group III	72.30±8.22	
PPBG		
Group I	182±16.11	0.001
Group II	360±58.02	
Group III	120±10.12	
RBG		
Group I	156±15.16	0.001
Group II	340±55.19	
Group III	110±15.28	

Table I shows that FBG was significantly (P-0.001) higher in group II as compared to group I and group III. The PPBG level was significantly (P-0.001) higher in group II as compared to group I and group III and RBG was also higher in group II as compared to group I and group III.

Table II Correlation between FBG and FSG for all groups using the Pearson's Correlation test

Group	FBG	Pearson's Correlation
Group I		
FBG	0.820	0.001
Group II		
FBG	0.852	0.001
Group III		
FBG	0.912	0.001

Table II shows that there was a significant correlation between FBG and FSG in all groups (P<0.05).

DISCUSSION

Saliva has a great role in the homeostasis of the oral cavity because it stabilizes the ecosystem of the oral cavity; and hence, it serves as a brilliant marker to timely discover the disease that further leads to more successful treatment, risk estimation, estimation of glucose level and it is a simple, noninvasive alternative to blood and urine tests. Saliva is said to be the ultrafiltrate of blood. Glucose is one of the blood components that are transferable across the salivary gland epithelium in proportion to its concentration in blood. Whole saliva is the biologic fluid that is simple to collect.[4]

In this study we divided subjects into 3 groups. Group I included 50 controlled DM patients, group II had 50 uncontrolled DM patients and group III had 50 non diabetic subjects (Control). We found that FBG was significantly higher in group II as compared to group I and group III. Similarly, PPBG level and RBG level was significantly higher in group II as compared to group I and group III. This is in agreement with Agrawal et al.[5]

Diabetes mellitus is a long-term metabolic disorder that is characterized by high blood sugar, insulin resistance, and relative lack of insulin. Common symptoms include increased thirst, frequent urination, and unexplained weight loss. Symptoms may also include increased hunger, feeling tired, and sores that do not heal. Often symptoms come on slowly. Long-term complications from high blood sugar include heart disease, strokes, diabetic retinopathy which can result in blindness, kidney failure, and poor blood flow in the limbs which may lead to amputations.[6] The sudden onset of hyperosmolar hyperglycemic state may occur; however, ketoacidosis is uncommon. We found that there was a significant correlation between FBG and FSG in all groups. This is similar to Elkafri et al.[7]

There are many complications of DM such as diabetic nephropathy, diabetic neuropathy, diabetic retinopathy etc. Diabetic retinopathy is a medical condition in which damage occurs to the retina due to diabetes and is a leading